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Frequency in COPD and CAD Emergency Department Visits in South Carolina: Medicare Versus Self-pay

Alexandria Brown
Walden University

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Walden University

College of Management and Human Potential

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Alexandria Brown

has been found to be complete and satisfactory in all respects,
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Walden University
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Abstract

Frequency in COPD and CAD Emergency Department Visits in South Carolina:

Medicare Versus Self-pay

By

Alexandria T. Brown

BS, Francis Marion University, 2010

MBA, Kaplan University, 2015

Doctoral Study Submitted in Partial Fulfillment

Of the Requirements for the Degree of

Doctor of Healthcare Administration

Walden University

August 2022

Abstract

Coronary artery diseases (CAD) and chronic obstructive pulmonary diseases (COPD) represent the most common cause of emergency department (ED) visits and hospitalization for both Medicare and self-pay patients, which amount to nearly 2 to 4 million spent annually. The purpose of this quantitative study was to identify the relationship between ED frequency among CAD and COPD Medicare and self-pay recipients 18 to 65 years within South Carolina between 2016 to 2018. The variables for this study were age and payer (independent) and ED frequency (dependent). Using a sample size of 7,689 an ANOVA Regression and t-test analyses were used to analyze data in conjunction on the Andersen model of health behavior. Results revealed a significant association between ED frequencies among COPD patients, while the ED frequency among CAD self-pay patients was nonsignificant in South Carolina. In both cases, the age and payer confounding variables had little to no effect on the relationship. The payment method used affected the ED visits for CAD patients compared in the years 2016 and 2017 versus the year 2018. Analyses revealed that payer type was significant in all years from 2016 to 2018, but payment type was not significant in 2018. The prevalence of Medicare and self-pay that patient's align with the use of EDs services directly with payer and payment type. The study contributes to positive social change by enabling health professionals and policymakers to develop strategies to increase alternatives to ED usages, adapt patient-centered interventions, and modify existing chronic disease care strategies to minimize or prevent outcomes. Such improvements could eliminate or reduce the overcrowding in EDs in South Carolina.

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Dedication

This dissertation is dedicated first and foremost to me for remaining solid and faithful throughout the process. The journey was not a swift one but well worth the time and energy to bring about a dream that was once so far away. This is dedicated to my children for always remaining by my side throughout the process and encouraging me when I felt like giving up.

Acknowledgments

I am most grateful to my children for dealing with me throughout the process. To my family for just being always there for me. Special thanks to Kaylin Haynes and Haydin Brown. Thanks for loving me and being there today and permanently.

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Section 1: Foundation of the Study and Literature Review

Chronic obstructive pulmonary disease (COPD) and coronary artery disease (CAD) are associated with a significant economic burden, including frequent emergency department (ED) visits (Centers for Disease Control and Prevention [CDC], 2019). COPD and CAD affect millions of adults in the United States, surpassing other diseases as the leading and second leading cause of death (CDC, 2019). COPD makes breathing difficult for the 16 million Americans who have the disease, especially men (CDC, 2019). COPD affects 20% of elderly Medicare patients and patients who pay out of pocket for their care. It is frequently associated with comorbid conditions and increased disease severity (Collins & Schuchat, 2017). COPD imposes an enormous burden on the health care system, with more than 3.2 billion spent on care, with an expected increase to 4.9 billion by 2021 (Collins & Schuchat, 2017). Similarly, CAD is the most common type of heart disease and is first detected by a heart attack (CDC, 2019). CAD also represents the most common cause of ED visits and hospitalization for both Medicare and self-pay patients, and nearly 2 to 4 million is spent annually on ED care.

In this study, I examined the association between COPD/CAD patients and the frequent ED impact among South Carolina (SC) Medicare and self-pay patients. The research drives COPD/CAD patients to frequent the ED despite the rising cost of care that self-pay patients face (Overman et al., 2018). I also accessed how often Medicare and self-pay patients use the ED for services. The financial burden of these conditions, especially among persons 18 to 65 years, has led to significant interest in decreasing ED frequency.

Problem Statement

The 1986 Emergency Medical Treatment and Active Labor Act (EMTALA) requires hospitals to perform examinations and provide stabilization treatment before transferring a person to another provider (Centers for Medicare & Medicaid Services [CMS], 2019). EMTALA offers hospitals no option other than treating anyone who comes through the ED. People using ED services and increasing congestion in EDs in SC hospitals has developed into a significant burden and represents a concern to SC hospitals (SCRFA, 2019). SCRFA (2019) found that from 2014 to 2019, ED visits rose from 18.3% to 19.7%. As a result, ED use has increased between 2014 to 2019, and these findings in utilization are consistent with a trend in SC (SCRFA, 2019).

According to Tsai et al. (2018), the Society for Academic Emergency Medicine's ED Crowding Task Force noted that frequent ED use and overcrowding had had several adverse impacts on patient outcomes. Several authors, including Kim et al. (2019), found that regular ED users are also a resource-intensive population that relies mainly on hospital care (Jacobs et al., 2016). Medicare recipients are nearly twice as likely compared to self-pay insured individuals to identify as frequent ED users, and ED use involves unhealthy events for older adults, who represent most of the Medicare population, as they may start a series of adverse events such as frequent ED use (CMS, 2019). Identifying COPD and CAD individuals, health insurance, and the health system factors associated with regular ED use remains policy-relevant and would fill the knowledge gap. It would also inform and assist South Carolina in allocating additional resources to bring about positive social change, such as supporting COPD and CAD

resources to help healthcare providers in focusing more on preventive measures in reducing COPD and CAD.

I examined how frequent ED use among COPD and CAD Medicare and self-pay patients differ in South Carolina between 2016 and 2018. Differences in payer type in the ED can determine the kind of care a patient can receive based on their ability to fund the services needed. The research highlighted how Medicare and self-pay patients vary in ED use.

Purpose of the Study

In this quantitative study, I explored whether frequent ED use by Medicare and self-pay patients in SC with COPD and CAD differ between 2016 and 2018. The independent variable is the payer (Medicare and self-pay) and two covariates: age and years. A quantitative statistical analysis was used to assess ED use of patients with COPD/CAD while controlling for 2016 to 2018. The results may expand the knowledge of COPD and CAD and the economic burden ED use has on SC.

This study was unique in addressing the frequency of ED visits and how Medicare and self-pay patients with COPD and CAD influence the use of the ED. The focus was on patients 18 to 65 years with COPD and CAD that need ED attention in the state of SC via the ED. The quantitative (retrospective) design evaluated the impact of ED use by patients with COPD and CAD. The epidemiological design study assessed SC hospitals' ED concerns related to the increased visits of patients who seek services frequently and how payment type can affect the available services throughout the disease process.

Nature of the Study

This study consisted of retrospective analyses of self-pay and Medicare claims for the calendar year of 2015-2018 and corresponding ER data for the same years under consideration. COPD and CAD patients, which includes approximately 50,000 Medicare and self-pay recipients in any given calendar year between 2015-2018, were analyzed for the study with specific emphasis on the state of South Carolina (SCRFA, 2019). Patient identification numbers, unique diagnosis codes, and information regarding inpatient and outpatient use may be linked to the demographic and assessment data of the given recipient. The SCRFA (2019) administrates data for recipients of Medicare and self-pay that have a diagnosis of COPD and CAD.

Theoretical Framework

The model of health behavior states that the use of health services is determined by a chain of predisposing characteristics, enabling resources, and needs (Andersen, S. L. et al., 2008). They noted that perceived and evaluated health behavior represents the determinant of health services use. Predisposing factors such as sociodemographic characteristics and health beliefs place certain people at greater risk of developing illnesses or conditions (Andersen, 2008). Limited resources such as access to primary care providers influence medical services to address health needs (Andersen et al., 2008). Andersen updated this model in 2008 to reflect the importance of contextual characteristics and individual determinants of health services use. The main contextual variables of interest were measures of frequency of ED visit and payer coverage, at two levels: (a) the number of recipients with Medicare coverage who frequent the ED with

COPD and CAD and (b) the number of COPD and CAD recipients that self-pay who frequent the ED. Secondary variables of interest were age and years amongst COPD and CAD patients and ED frequency. The socio-cultural characteristics of COPD and CAD individuals that existed before their illness and the logistical aspects of obtaining care can impede ED services.

Research Questions and Hypotheses

The primary research objective was to determine ED frequency amongst COPD and CAD recipients with Medicare and self-pay. I examined the difference in Medicare or self-pay for COPD and CAD recipients in SC regarding ED usage in 2016 to 2018 using Medicare or self-pay. COPD and CAD were chosen as the diagnoses for this analysis because they are costly to the medical system and include frequent trips to the ED (SCRFA, 2019).

RQ1: What is the relationship between ED frequency among COPD Medicare and self-pay recipients 18 to 65 years within SC between 2016 to 2018?

H₀1: There is no significant relationship between ED frequency among COPD Medicare and self-pay recipients 18 to 65 years within SC between 2016 to 2018.

H_a1: There is a significant relationship between ED frequency among COPD

Medicare and self-pay recipients 18 to 65 years within SC between 2016 to 2018.

RQ2: What is the relationship between ED frequency among CAD Medicare and self-pay recipients 18 to 65 years within SC between 2016 to 2018?

H₀2: There is no significant relationship between ED frequency among CAD

Medicare and self-pay recipients 18 to 65 years within SC between 2016 to 2018.

H_{a2}: There is a significant relationship between ED frequency among CAD Medicare and self-pay recipients 18 to 65 years within SC between 2016 to 2018.

Literature Review

Search Strategy

The search strategy used for this literature review involved electronic research databases such as MEDLINE, CINAHL, ScienceDirect, and PubMed. The main keywords for this study related to the topic and Boolean operators to find relevant literature. The keywords in the search included chronic obstructive pulmonary disease, coronary artery disease, emergency department utilization, Medicare, South Carolina, commercial/HMO insurance, SC four regions, and preventive programs. Scholarly peer-reviewed journals were used from the last 6 years by limiting the search to publications from 2015 to 2020. The reference list of articles was scanned in the literature search to identify additional studies within the publication date range.

Introduction

This literature review includes studies about health insurance and primary care programs and their impact on ED use among COPD and CAD patients. To reduce ED visits and prevent avoidable hospitalization and readmissions, as well as a means for cost savings, the Affordable Care Act (ACA) incorporated an initiative that commercial/HMO insurance does not offer its insurers (Frank, R. et al., 2014). The initiative ties Medicare reimbursement to hospitals with patient outcomes (Horwitz, L. I. et al., 2019). The CMS (2019) reduced payments by 1%, which eventually increased to a complete 3% to hospitals with high admissions of chronic diseases, including COPD and CAD. This

literature review highlight scholarly literature pertinent to ED use amongst COPD and CAD patients in four SC regions (PeeDee, Midlands, Upstate, and Lowcountry) ED use within the COPD and CAD population, health insurance impact on ED use, and the overall impact of COPD and CAD on ED use in SC. In SC, COPD and CAD are responsible for more than one million emergency room visits and 200,000 hospital admissions annually, resulting in healthcare costs approaching an alarming rate (SCRFA, 2019). Among the patients hospitalized, 50% do not receive recommended therapies needed to lead a successful life (CMS, 2019).

Coronary Artery Disease (CAD) in South Carolina

Numerous studies dealing with the implications of CAD describe the condition as a critical public health problem in SC (South Carolina Department of Health and Environmental Control (SCDHEC), 2019). Consequently, heart disease is SC's second leading cause of death. Over 10,000 people have died from heart disease in SC since 2015 (SCDHEC, 2019). The burden of CAD increases due to higher mortality, especially in the four regions of SC. Hollander et al. (2016) also supported this fact, stating that clinicians' judgment alone cannot determine whether a patient who presents to the ED has CAD; the history and examinations do not distinguish sufficiently between the many conditions that cause CAD. With the improvement in cardiac assays, especially well-developed algorithms, CAD can be determined. It remains the fact that the global disease burden of CAD is primarily due to poor diabetes management, smoking, maintaining a healthy weight, lack of exercise, and periodic health checks (SCDHEC, 2019). Current studies support other contributing factors such as limited access to health care,

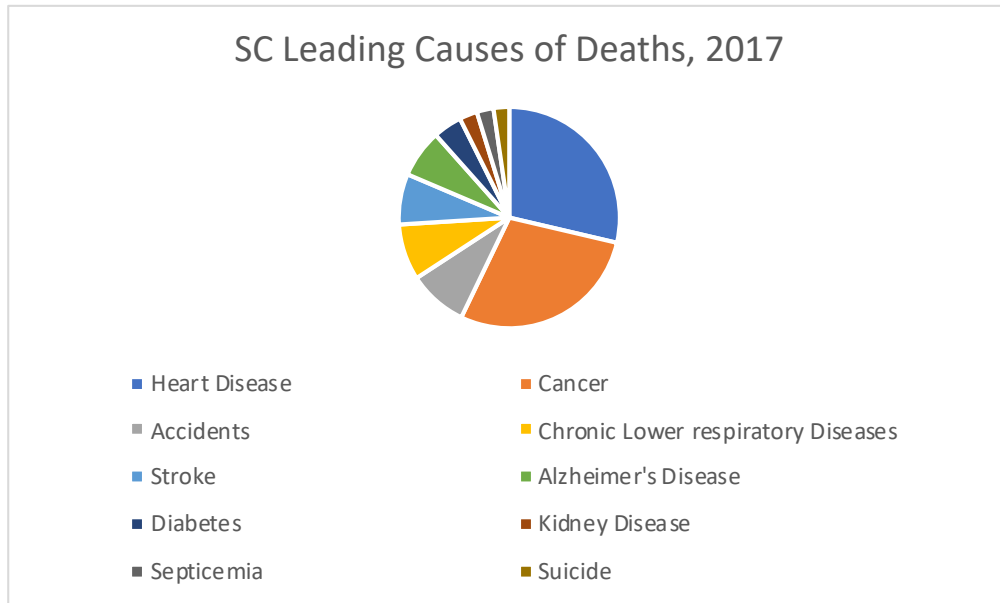
insufficient availability of primary care facilities, and the financial burden (Hollander et al., 2016). According to (Hollander et al., 2016), current studies have found that patients with CAD present with a wide variety of symptoms such as chest pain, shortness of breath, weakness, nausea, and making the diagnosis difficult. SC has the fastest growth of CAD due to costly medical services, such as treatment-related to specialist care, including procedures, diagnostic tests, and medication (Luepker, R. V. et al., 2008).

The burden of CAD was assessed in SC, where experts used the latest tests to diagnose CAD, including electrocardiogram, stress test, coronary arteriogram, and nuclear scanning (Beaufort Memorial Hospital, Beaufort, South Carolina (BMHSC), 2019). The History EKG Age Risk factors Troponin (HEART) pathway is an accelerated diagnostic protocol (ADP) used to determine whether a patient is a low-risk CAD patient with just chest pain leading to early discharge with additional testing and treatment (Mahler, 2018). While this protocol is designed to improve the quality and value of chest pain risk, there is a lack of safety and effectiveness data. Guidelines continue to insist that comprehensive cardiac evaluations continue for low-risk patients (Mahler, 2018).

SC has progressed toward adopting the HEART pathway that incorporates the chronic care model framework. The framework includes decision support and clinical systems by providing decision support to ED physicians and personalized care plans for patients with CAD (Brixner et al., 2016). The HEART pathway will increase ED visits with acute CAD. It would also identify patients' care needs early, decreasing ED visits and costs (Hood, M. et al., 2018).

Figure 1

Leading Causes of Death in South Carolina in 2017



Note. National Center for Health Statistics, Stats of the State of South Carolina, 2017.

The figure below demonstrates deaths in South Carolina from heart disease in the year 2017. Reprinted from the CDC: National Vital Statistics Reports, Vol. 67, No. 8.

Management of CAD in South Carolina

A significant number of patients have CAD in SC. CAD patients access treatment from either the ED or a private sector in SC. According to the American college of emergency physicians (ACEP) (2019), treatment is costly, particularly for patients seen in the ED. CAD patients can obtain an unofficial diagnosis from SC's ED in the four regions (PeeDee, Midlands, Upstate, and Lowcountry; ACEP, 2019). However, the official diagnosis of patients with CAD leads to coordinated treatment plans and ED design. If additional treatment is required, patients receive much of their care from the

ED (SCRFA, 2019). Upon official diagnosis and treatment, patients' data is entered into the ED database that the SCRFA monitors.

The CAD numbers are rising each year in SC. In 2015, 47,000 patients were seen in four SC regions (SCRFA, 2019). Data further indicated about 20,000 more patients among those documented visits requiring hospital admission (SCRFA, 2019). CAD treatment is obtained through the ED for the average patient, and funding for this care is provided by Medicare or self-pay. Medicare paid for 43% of ED expenses due to CAD, including admissions due to heart disease and stroke that led to surgical procedures. Self-pay paid for 20% of ED expenses, including admissions due to heart disease and stroke that led to surgical procedures. CAD subsidization does not delay, including medication costs, which may remain the patient's sole responsibility (Batista, C. et al., 2018). As the prevalence and incidence of CAD continue to rise, the state of SC turns contributed to covering treatment for patients through providing ED services.

Emergency Department Utilization

Survival for individuals living with CAD depends on life-changing behavior modifications like smoking cessation, improved diet, exercise, and psychological wellbeing (Kilgour, E. et al., 2019). In the diagnosis of CAD, diagnostic tests need to confirm coronary artery disease or effectively known as coronary heart disease (CHD). Diagnostic tests to confirm coronary artery disease are 12-lead electrocardiogram (ECG), perfusion imaging, single-photon-emission computed tomography scan (SPECT), magnetic resonance imaging (MRI), and angiography (Barrett & Davenport, 2015). Medical management of CAD should prevent further deterioration and effectively

manage the resulting symptoms. If surgical intervention is required, cardiac surgery will be performed, whether it is coronary artery bypass graft (CABG) or percutaneous coronary intervention (PCI) as determined by symptoms and prognosis (Barrett & Davenport, 2015). Provisions after surgery will include medication that reduces heart rate and improves cardiac blood flow, thins the blood, reduces the risks of clots, relieves angina, reduces blood pressure, and protects the heart. An estimated 700,000 thousand outpatient surgical procedures were performed, over 1 million cardiac catheterizations and over 500,00 thousand coronary artery bypass, 400,000 coronary angioplasty procedures, and 2,000 thousand heart transplants (Orau, 2016). The rate of patients receiving CAD care has increased to over 60 percent, partly due to the changing behaviors of patients.

All financial responsibility for services rendered to nearly 1 million Americans with CAD is that of the patient. The latest data from the South Carolina state library [SCSL] (2016) reported an estimated 49,000 thousand American adults with CAD. SCSL (2016) assessed the quality of CAD care and found that over 600,000 Americans die each year from CAD, a leading cause of death and disability in the US. Consequently, CAD has been the leading cause of death in SC since 2014. Despite the quality care provided by the ED, SCRFA (2019) purported that CAD patients had higher rates of healthcare utilization, morbidity, and mortality in SC.

Costs of CAD Treatment

According to CDC (2019), CAD and treatment are a medical problem and economical. CAD requires many resources as equipment and materials are expensive

(SCSL, 2016). According to (Espinoza Nava L. ,2017). CAD requires qualified personnel skilled in the treatment and management of the disease. Cost is defined as “the monetary value of the resource consumption for producing a commodity or service, frequently expressed as a composite sum of quantities of some activity multiplied by their respective prices” (p.160). These costs are described in four categories: “direct medical costs, direct non-medical costs, indirect costs, and intangible costs.” Direct medical costs of CAD include “staffing costs, physician fees or salary, cost of medical supplies and surgeries, the cost associated with therapy, laboratory, and medications, costs of hospitalizations and costs of out-patient consultations from other specialists. Direct non-medical costs include building, facility utilities, and other overhead costs. Intangible costs are costs associated with pain, suffering, and impairment in quality of life” (Mushi, Marschall, & Fleba, 2015, p.162). According to SCSL (2016), the total hospitalization has cost the state nearly 3 billion a year.

The increasing number of CAD patients seen in the ED has doubled between 2016 and 2018, increasing the financial strain on SC health systems. However, issues such as limited primary care providers, disease education, prevention programs, and lack of financial resources continue to affect the availability of these treatments in the SC. SC continues to battle the increasing numbers of CAD patients needing care provisions from the ED (SCRFA, 2015). According to SCRFA (2019), the primary barrier to improvement efforts in the management of CAD is the financial resources and availability of care (SCRFA, 2019). SC EDs have adopted models to assist in caring for patients with CAD through chest pain units and heart pathway programs.

In SC, healthcare has become one of the most significant financial burdens resting on the shoulders of the state (SCRFA, 2019). Various models of care, improvement initiatives, and subsidization programs have been adopted to address this burden. For example, the HEART Pathway tool prompts physicians to answer a series of questions to prospectively identify patients in real-time that need care provisions immediately (Mahler, 2019). The HEART pathway program allowed providers to assess the problem for severity. CAD costs in SC were approximately \$6 thousand primary care at the ED and over \$10 thousand per treatment depending on the treatment, not including follow-up care (Orau, 2017). A total cost of \$300 thousand for CAD treatment if heart transplant or coronary artery bypass procedure are required, and \$20 thousand for subsequent years of follow-up treatment (Orau, 2016).

Health Insurance, Subsidization, and ED Utilization

According to Hollander, Than, and Mueller (2016), access to CAD care remains highly necessary despite technological advances that can aid in detecting CAD. To address the growing prevalence of CAD, which includes over 20 million people presenting to the ED with symptoms, clinical features alone or in combination can poorly predict whether a patient has CAD or not (Hollander, Than, & Mueller, 2016). Consequently, patients present with various symptoms such as chest pain, shortness of breath, weakness, and so forth. Like many states, SC does not have a subsidization program that helps cover some of the cost of care for patients who have no medical insurance coverage, are unemployed, or disabled due to CAD (Hollander et al., 2016; & SCRFA, 2019). Some individuals purchase private health insurance that covers some, if

not all, of their CAD treatments, labs, and medications. However, this is not the norm, as most CAD patients obtain health insurance coverage through the Medicare program (Center for medicare and medicaid services (CMS), 2019). The United States Congress's establishment of Medicare coverage for patients like those with CAD, despite age or the high cost of treatment, allows for care advancements. Medicare and its initiatives have contributed significantly to improving the management of CAD. According to (Andersen et al.,2018), the expansion of Medicare among individuals with CAD has increased coverage by 40% and increased doctor visits by 50%.

Additionally, the patient protection and affordable care act (ACA) led to the most significant expansion of Medicare coverage. The development led to improved health outcomes that met lower mortality rates. According to Khatana, Bhatla, & Nathan (2019), Medicare expansion has been associated with fewer CAD hospitalizations visits and admissions without insurance. SCRFA (2016) examined the effect of health insurance on ED utilization. It was found that patients with limited insurance had an absolute lower probability of ED use. These findings were also corroborated by SCRFA (2019), who found that improvement initiatives by CMS revealed improved outcomes for CAD patients and less utilization of the ED. Despite patient outcomes and quality of care, patients with complete heart failure and myocardial infarction did not significantly affect the expansion.

According to (Khatana et al.,2019), Medicare does not cover all the costs associated with health expenses for CAD patients. The CDC corroborates that Medicare covers over half of the cost related to CAD care, commercial/HMO covers a little over

20%, with the remainder being the patient's responsibility. Patients assume responsibility for out-of-pocket expenses, including extended hospital stays, medication, laboratory testing, and specialized treatment. Additionally, for patients who have no health insurance coverage or are not recipients of Medicare, CAD treatment can become tremendously inaccessible and financially unattainable. ACEP (2019) argues that CAD patients that do not have the financial capabilities to pay for treatment secure health insurance and seek a primary care provider to manage their CAD, thus reducing costly occurrences. There are significant differences in how and if various healthcare systems throughout states and countries provide care for those unable to access it. As the world's population increases, the balancing ED use and insurance coverage for CAD will be a continuous learning curve for policymakers, health leaders, communities, families, and patients. In this literature review, first, global trends in CAD were presented. Second, the management of CAD was examined. Third, ED utilization amongst CAD patients was demonstrated. Fourth, studies examining costs, insurance, and ED utilization were discussed and presented.

COPD in South Carolina

Chronic obstructive pulmonary disease (COPD) is the third leading cause of death in SC, affecting approximately 15% of the population (SCSL, 2016). While it remains the fact that COPD affects SC disproportionately, data suggest that almost half of those involved with COPD remain undiagnosed (SCSL, 2016). According to SCRFA (2019), despite the optimal care of COPD, the diagnosis, management, and outcomes for the disease are suboptimal and fragmented. Likewise, the CDC (2019) states that 20% of

COPD cases occur in non-smokers, likely increasing in the coming years. SCSL (2016) says that COPD reflects notable disparities in SC, and individuals with COPD need various services to optimize their care. To optimize care access to medications, medical equipment, pulmonary rehabilitation services, and knowledgeable health care providers. COPD is common, and the rates in SC are significantly higher than national averages. Consequently, COPD is costly, resulting in 1.9 billion spent annually in direct health care costs (SCSL, 2016). In fact, from 2015 to 2018, there were over 10,000 COPD-related ED visits, admissions, and related hospitalization, and the cost of COPD impacts hospitals, insurance premiums, medical insurance, and the individual (SCSL, 2016).

Nih, et al.(2016), states that reducing COPD ED visits and overall COPD exceeds current resources. Likewise, SCSL (2016) states that multidisciplinary care is required due to the increased difficulty of the disease and the costs of the medications that further contribute to noncompliance. The prevention of COPD is the most effective solution. Thus, SC has proposed objectives to lessen the devastation of COPD. (Nih L. R et al.,2016) assert that adequate care can add to cost, time, and an ineffective outcome once a COPD diagnosis is established. The CDC (2018) reports that cost delays effective care of COPD individuals and that Medicare covers over 51% of the prices with 18% of private insurance. That is nearly 3.9 billion paid out by insurance, with the state contributing over 43 million as reported by the (CDC 2018). The approach taken by the state of SC to reduce COPD ED occurrence starts with practical strategies to manage the disease.

Additionally, the statewide burden of COPD was assessed in a recent report, and the results revealed that some areas of SC experienced higher than normal ED visits of COPD (SCRFA, 2019). The SCSL (2016) argues that adopting a strategic plan improves COPD management. As stated by SCSL, the strategic plan will spark a movement among all EDs, policymakers, service providers, and professional disciplines to strive toward providing COPD care effectively and promptly (SCSL, 2016). The ED system is fragmented nationwide, but there is some hope for the healthcare system in SC as it starts to expand ED services throughout the state. Additionally, as chronic conditions like COPD continue to rise, there is a chance the severity will worsen the system (SCRFA, 2019).

Management of COPD in South Carolina

Many patients suffer from COPD in SC and access treatment from the hospital ED. The behavioral risk factor surveillance system (BRFSS) is an annual, state-based telephone health survey that collects data on the demographics and behaviors that place individuals at risk for chronic disease (Strange et al., 2015). In 2012, the COPD module was added to the SC BRFSS and included respiratory symptoms and duration (Pleasants et al., 2015). The SC department of health and environmental control and the North Carolina taskforce showed that an individual diagnosed with COPD presented to the ED with respiratory symptoms that later indicated that the individual was at risk or already diagnosed with COPD (Pleasants et al., 2015). Upon official diagnosis, patients' data is recorded that later assists healthcare providers in determining suitable treatment options.

The COPD cases are rising every day in SC EDs across all four regions. In 2018, over 77,000 patients were seen at the ED in four SC regions (SCRFA, 2019). Data further indicated that among those seen at the ED, less than 25,000 were admitted into the ED (SCRFA, 2019). For the average patient, advanced treatment for COPD is out of the reach of many individuals who have either medicare or commercial/HMO insurance. Medicines, oxygen therapy, and pulmonary rehabilitation are often used to control the disease-preventing further extensive treatment such as surgery or a lung transplant (U.S. national library of medicine (USNLM, 2017).

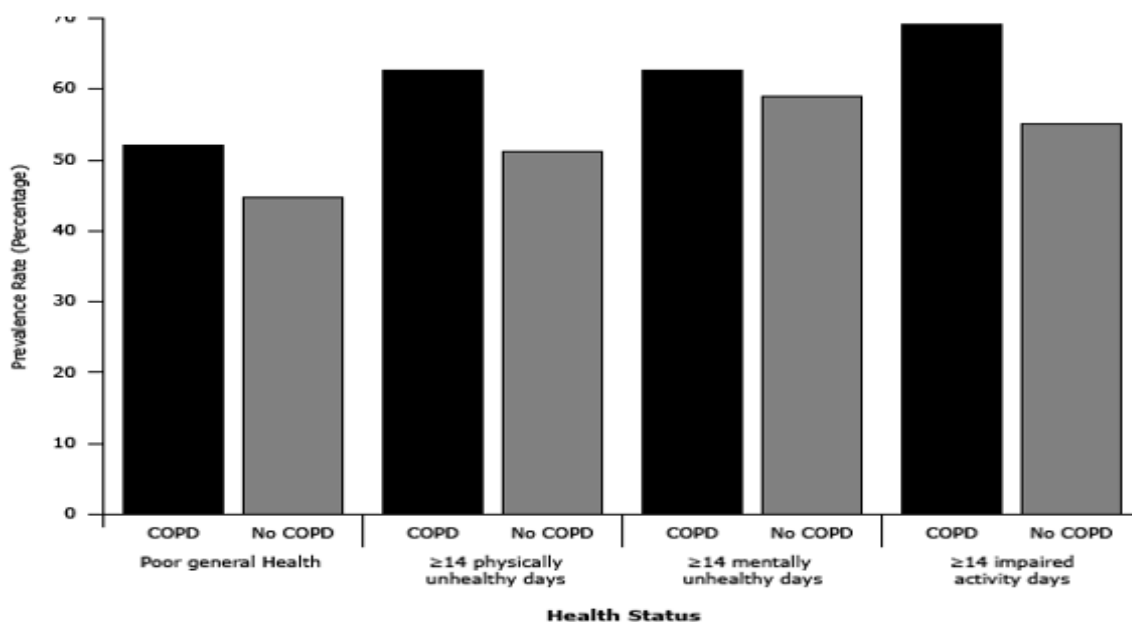
Emergency Department Utilization

Survival for individuals living with COPD depends on either clearing damaged tissue from the lungs or a lung transplant to further the advancement of the disease (USNLM, 2017). There are at least three types of lung surgery; each serves a different purpose for treating lung disease. Bullectomy removes one or more large bullae or blebs; lung volume reduction surgery (LVRS) is performed to reduce the size of the lungs by removing damaged tissue, and lung transplant surgery. The risks associated with the surgeries are high; however, the benefits are much higher. SCRFA (2019) stated that, on average, 25,000 COPD patients receive surgeries each year to prolong life with COPD after admission at the ED. SCRFA (2019) also reported that nearly 25,000 people die prematurely from COPD. Despite the statistics, COPD rates are expected to spike over the next few years with a 2% rate of growth, which is twice the past diagnosis rate (CDC, 2019).

The federal government does not assume financial responsibility for patients' COPD services. In SC, patients with COPD depend on Medicare and commercial/HMO to cover services related to their COPD care (SCRFA, 2019). The latest data from 2017 showed that 3,000 deaths have resulted from COPD in SC compared to the U.S., with males being the most impacted group (CDC, 2019). Despite the quality of care available at SC EDs, there is still an increased mortality rate. COPD patients will have higher healthcare utilization rates, and mortality is rising. Moreover, data revealed that the number of ED centers in SC increases as more ED is added to more urban areas (SCRFA, 2019).

Figure 2

Age- and Sex-Adjusted Prevalence of Health-Related Quality of Life by COPD Status, SC, 2011



Note. Reprinted from South Carolina Revenue and Fiscal Affairs, 2017.

Costs of COPD Treatment

According to (López-Campos et al., 2016), COPD is not only a burden on healthcare problems but an economical one. COPD consumes many resources in the ED as costs are divided into direct medical, non-direct, and indirect costs. Direct medical costs are associated with staffing, physician salary, medical equipment, laboratory, medication, hospitalization, and consultants (López-Campos et al., 2016). Non-direct costs included: building costs, facility maintenance, and overhead cost. Indirect costs are associated with pain and suffering due to COPD and the impairment in the quality of life overall. In SC, all four regions can sustain the burden of COPD, but for how long as costs

continue to rise. The increasing number of COPD cases has doubled, increasing financial strain on SC EDs and the government (SCRFA, 2019).

SC continues to battle the increased number of COPD and based on the assumption that the prevalence of COPD remains unchanged, it is estimated that COPD's total related costs would reach 49 billion in 2020 (TimH, 2015). Variations in treating COPD have contributed to the cost differences seen from region to region. According to TimH (2015), cost breakdown by payer determined that 18% of COPD costs were paid by commercial/HMO insurance, 25% other forms of payment, and 51% by Medicare. The most considerable portion of expenses paid by Medicare likely reflects that people with COPD tend to be older. To lower COPD cost, it is estimated that smoking needs to be decreased by 80% and to receive care through a regular physician as it concerns COPD (SCRFA, 2019). The reduction in cost starts with good medical management and a focus on prevention as physician care can help lower these costs.

Health Insurance, Subsidization, and ED Utilization

According to (Byng et al.,2019), access to COPD care remains highly equitable in the SC four region. It addresses the growing prevalence of COPD and its financial impact on the healthcare system. Consequently, there are not a lot of subsidization programs that assist in the cost of care of COPD patients with no medical insurance coverage. Additionally, the effect of health insurance on ED utilization was examined and determined that COPD patients with insurance, no insurance, or limited insurance still utilized the ED as their primary care point (SCRFA, 2019). It was found that patients with no or limited health insurance still have a more negligible probability of using the

ED than those fully insured. This finding was corroborated by (López-Campos et al., 2016), who found the rise of COPD cost in the ED. The SCSL (2016) further affirmed that SC took the strategic approach to control COPD's progress, care, and treatment will reveal improved outcomes throughout the states. Many of the four regions in SC have adopted programs that will improve access to care for COPD patients.

According to (CMS 2019), most of the subsidization offered by the states does not cover all the costs associated with COPD health costs. Patients' responsibilities range from treatments, medication, testing, and more. Most patients can receive some healthcare assistance programs if they qualify. Additionally, patients with no health insurance are typically recipients of these subsidized programs due to rising costs. (CMS 2019), argues that Medicare is an option that most COPD individuals qualify for to maintain their healthcare. There is a significant difference in how the four regions of SC provide subsidized programs to COPD patients (SCRFA, 2019).

Definition of Terms

Ambulatory Care Sensitive Condition (ACSC): Chronic diseases with wide hospitalization rates. There was better access to and quality of primary care to reduce unnecessary hospitalization (Sundmacher, L et al.,2015).

Chronic Obstructive Pulmonary Disease (COPD): COPD is a lung disease characterized by chronic obstruction of lung airflow that interferes with normal breathing and is not fully reversible (Gagnon et al., 2014).

Commercial/HMO: Health insurance coverage that is not provided or maintained by a government-run program (Baumrucker et al., 2014).

Coronary Artery Disease (CAD): CAD is the most common type of heart disease and happens when the arteries that supply blood to heart muscle become hardened and narrowed (Sameh et al., 2017).

Emergency Department (ED): Also known as an accident and emergency department (A&E), emergency room (ER), emergency ward (EW), or casualty department, ED is a medical treatment facility specializing in emergency medicine, the acute care of patients without appointments.

Frequent emergency department visit: Four or more ED visits in a calendar year.

Health care utilization: Health care utilization is the quantification or description of the use of services by persons to prevent and cure health problems, promote maintenance of health and well-being, or obtain information about one's health status and prognosis (Gellman, M. D. (2020)., 2020).

Health insurance: Coverage that provides payments of benefits in whole or in part for the risk of an individual incurring medical expenses (Perez et al., 2018).

Medicare: A U.S. federal government health insurance program subsidizes healthcare services (Geruso, M., & Layton, T. J., 2017).

Self-pay: A term used to describe someone who pays for their treatment directly rather than using private insurance.

Assumptions, Limitations, and Delimitations

Assumptions

For this research, I depended on SC's ED data for Medicare in analyzing the impact of use and cost on ED visits by recipients with COPD and CAD. For this study, I

assumed that all the recipients experiencing COPD/CAD accessed the ED though it is likely that some may access other means of health care, which is not captured in the data used. It was assumed that evidence of continuity of care with a primary care provider would help manage recipients' condition, thereby minimizing the frequent ED visits associated with COPD/CAD patients.

Limitations

COPD/CAD prevention may be encouraged through exercise, diet, and medication, or in some cases, surgery (Triposkiadis, 2016). Nevertheless, a combination of different approaches may be employed for maximum outcome. Attempts were made to control variables; however, not all variables related to frequent ED visits were identified. For instance, the lack of an appropriate rehabilitation environment after ED might significantly influence patients' health outcomes. Therefore, literature from previous studies was assessed to determine other relevant variables likely to affect COPD/CAD.

Delimitations

This study examined the SC Medicare recipients (age 65 and over) with COPD and CAD conditions. Recipients with these two chronic conditions were selected for this study because they are among the leading causes of death in the United States and their potential impact on ED utilization and cost (CDC, 2017). The burden of the conditions (COPD/CAD) on families and healthcare merits special attention and understanding of the characteristics that drive ED visits and cost. Knowing these will assist health professionals, and policymakers in controlling these health issues through prevention measures. While there is some previous evidence of COPD and CAD interventions to

minimize the impact of these conditions, more needs to be done concerning prevention. COPD and CAD are among the health conditions flagged by the CMS (2019) as high-risk populations and having high readmission rates (ACEP, 2019). Therefore, this study focused on recipients with these two conditions.

Other studies have focused on adults younger than 65 years of age because patients at any age may experience any of the two conditions. This study included only Medicare recipients 18 to 65 years and over who reside in the state of SC. Only recipients solely diagnosed with COPD and CAD access the ED were considered. While other subgroups suffer from these conditions in South Carolina, it was not feasible to study all groups.

The results of this study could potentially apply to other states and hospitals across the United States. that experience overcrowding in their EDs with Medicare recipients affiliated with COPD and CAD. While there may be variations between hospitals EDs, depending on the extent of the patient condition and the frequency of the patient access ED, location of recipients, and other relevant variables were included in the study.

Significance of the Study

The findings of this quantitative study lay in the possibility of examining the significant differences in ED use across different regions in the state of SC and assessing how insurance coverage, access to care, cost, and other characteristics related to frequent ED use. This research could have significant implications for public health policy. As ED users are not known in SC, this study could fill the knowledge gap. In addition, it could

inform and assist policymakers in allocating resources to bring about a positive social change. This would assist healthcare providers in focusing more on preventive measures in reducing COPD/CAD.

Knowledge from this research could potentially assist Medicare and self-pay recipients make meaningful healthier lifestyle changes such as diet, nutrition, exercise, and smoking cessation that prolongs life and minimize the burden on their families and society. Ultimately, the positive effects could alleviate the financial burden on the local, state, and federal governments. The study's findings could suggest further reforms to improve primary care and reduce ED use.

Summary

There is a problem due to frequent ED visits by SC Medicare and self-pay recipients with COPD and CAD and the economic burden experienced by SC's ED. There is a need for preventive measures and treatment of preventive strategies for Medicare and commercial/HMO recipients. Effective preventive measures of ED service use and healthcare cost among this group of people with conditions. (Venkat et al.,2017) found the need for multilayer support for COPD and CAD patients to prevent ED use. However, (Kumbhare et al., 2015) found that COPD patients need ED visits or hospital admissions because of acute exacerbations that may progress to respiratory failure. (Hollander et al.,2016) Like COPD, CAD patients present to the ED with symptoms suggestive of ACS that are not often clear. (Maeng et al., 2017) found that a primary care provider (PCP) being a general doctor, as opposed to a specialist, is a factor in the patient's availability to pay for care. ED plays a crucial role in providing needed care for

patients who lack routine access to primary care. The lack of primary care access is responsible for the wide variations in hospitalization rates (Carney et al., 2011). Better access to quality primary care reduces unnecessary hospitalization (Di Pollina et al., 2017). SCRFA (2019) reports that COPD and CAD represent the top causes of ED visits in Medicare and commercial/HMO fees for recipients. (Boyle et al., 2019) said that COPD and CAD are two conditions most strongly associated with frequent admissions to the ED.

Section 1 outlined the problem of frequent ED visits by SC Medicare and self-pay patients with COPD and CAD and the economic burden experienced by the state. SCRFA (2017) found that COPD and CAD patients who use Medicare or self-pay are the most incredible emergency department users for essential care needs. (Johnjulio et al., 2017) argued that services are needed to decrease ED care for COPD and CAD patients. The (CDC 2019) reported that COPD and CAD were two of the conditions most strongly associated with frequent ED visits. COPD and CAD patients are insured with Medicare or pay out of pocket that visit the ED. In Section 2, I explained the research design and data collection of Medicare and self-pay COPD and CAD patients and ED frequency.

Section 2: Research Design and Data Collection

The purpose of this quantitative study is to examine the relationship between Medicare and self-pay COPD and CAD patients that frequent the ED in SC four regions (Lowcountry, Upstate, Midlands, and PeeDee). Fritz and McKenzie (2015) reported that COPD and CAD are two conditions most strongly associated with frequent admissions to the ED. While there have been numerous studies on regular ED use amongst COPD and CAD patients and barriers to primary care facilities, few studies examine the efficacy of SC government subsidization for ED use amongst COPD and CAD patients (Morganti et al., 2019; SLSC, 2019). Consequently, policymakers, healthcare officials, and other stakeholders may be provided with information that can impact future initiatives for ED use amongst COPD and CAD patients regardless of health insurance options.

Quantitative research data may assist in analyzing ED frequency per region alongside the cost acquired by the ED for the care of these patients. The data outlined the visit of these patients based on several demographics, including but not limited to the region, insurance type, and cost. In this section, the research and design rationale, methodology, and threats to validity are discussed.

Research and Design Rationale

A retrospective cross-sectional study design using data from 2015 through 2018 from SCRFA and CMS was conducted to identify individuals with COPD and CAD that use the ED, the classification of the ED frequency, and calculation of the cost and usage statistics. SPSS and ANOVA programs were used to analyze the data with t-tests ANOVA applications to determine present and possible correlations between the

dependent and independent variables. The data analysis was limited to individuals identified through SCRFA, which supplies data on ED use by individuals in SC. An observational retrospective design allows for evaluating usage, the cost burden on the individual, the ED, the state, and the day-to-day operations in the ED setting. I sought to yield relevant results that could potentially be useful in treating other chronic conditions in the ED other than COPD and CAD and formulate a strategy to manage chronic conditions effectively. Furthermore, the study design advantages included predicting ED visits to prepare healthcare professionals and inform lawmakers on hospital burdens and healthcare costs.

Methodology

Population

The target population of this study comprised Medicare and self-pay beneficiaries 18 to 65 years diagnosed with COPD and CAD. The respondents are frequent ED users per the SCRFA database that tracks ED cases in SC. The study specifically focused on these patients in the state of SC. Medicare and self-pay patients who visited the ED from 2016 through 2018 were examined throughout this period. The sample of patients eligible for this study was approximately 7889 adults ages 18 to 65 with COPD and CAD who frequent the ED. The data were extracted and analyzed.

Sampling Procedures

Using the associated data for the specific conditions (COPD and CAD), related ED visits, and usage, de-identified data were extracted from the SCRFA for the required analysis. No informed consent was needed as the collected data had already been cleared.

The 100,000 plus diagnosis codes and procedure codes are aggregated into a smaller number of meaningful categories that are easier to analyze and interpret (SCRFA, 2019). In addition, an index of insurance types was created to investigate the beneficiaries with COPD and CAD. The SCRFA files included hospital types, area, insurance, and cost for service rendered, categorized by the year.

A 100% sample of the SCRFA, which includes approximately 100,000 current Medicare beneficiaries in any given calendar year, was analyzed for this study. A Chi-square statistic test was used to test relationships between the variables in the population. Unique patient identification such as identification number and inpatient and outpatient information may be linked to demographic data for a particular beneficiary (CMS, 2019). The SCRFA only included claims for recipients seen at the ED with COPD and CAD in South Carolina while accounting for their payment method. The study sample for the research questions consisted of Medicare and self-pay patients that visited the ED from 2015 to 2018. There were no exclusion criteria included in the data. Based on a preliminary sample creation exercise, the number of recipients eligible for inclusion for this study in the SCRFA files was approximately 7889. A subsample of recipients with chronic diseases indicators of interest (COPD and CAD) specific to the state of SC was constructed.

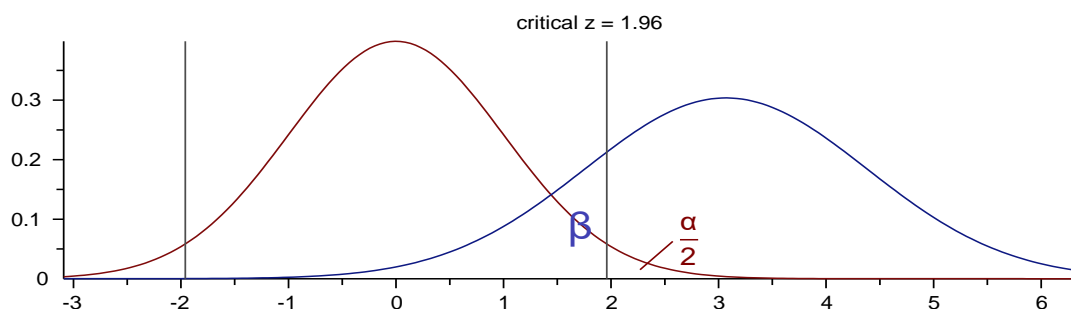
Sample Size Calculations

The sample size was extrapolated using the G*power program from the Medicare and self-pay sample from 2016 to 2018. The sample size needed was 7,689 patients. The sample sizes were calculated for SC based on the available information. The study

focuses on the state of SC, and as such, the sample size was extracted from the sample size for the Medicare and self-pay population. Sample size analysis was conducted for the dependent variable as frequent ED visits related to COPD and CAD to give a power up to 80% two-sided confidence interval. Power analysis for logistic regression was conducted in G-power to determine a sufficient sample size using an alpha of 0.05 and a small effect size of 0.02.

Figure 3

Medicare and Self-Pay Patient Analysis



Note. Medicare and self-pay patient analysis for emergency department use, South Carolina 2016-2018.

Operationalization

Measures-Independent Variables

The independent variables for this study were payer and age for the state of SC. These variables were assessed using the chi-square statistics and logistic regression. At the contextual level, those predisposing characteristics were not measured. In SC, 75 hospitals provide care to COPD and CAD patients. Oconee County is the only county not to have CAD admissions, while COPD admissions are seen in all counties with the

expectation of the southern-most county. In SC, COPD and CAD patients seek hospitalization for conditions treatable outpatient. The compromised access to care has manifested in various ways, with 26% of patients going in for preventable diseases. As part of the Rural Hospital Flexibility Grant Program, an initiative in SC, funding has been provided to strengthen rural healthcare known as critical access hospitals (CAH; Singal, R. et al., (2018)). In SC, ten rural hospitals and programs can service COPD and CAD patients and are reimbursed on a reasonable cost basis. The frequency of these visits to the ED and access to care has created an extreme burden on the healthcare system.

Payment Type

Medicare and self-pay are the primary sources of payment used by COPD and CAD patients that visit the ED for services. There has been a significant increase in total health care costs in patients that suffer from COPD and CAD. (Singal, R. et al.,2018)) stated that the median cost of care for patients was \$35,000, with costs reaching over \$40,000 in most cases. The costs are slightly lower for physician visits, specialist visits, and simple emergency department visits (Baumeister et al., 2015). Medicare takes care of the cost associated with these visits, unlike self-pay patients who are solely responsible for their care with any assistance. Cost is related to the procedure, such as surgeries and emergency procedures.

Age

COPD and CAD Medicare and self-pay patients range in age throughout SC. COPD was 13.7% prevalent in those adults 65 years and older (SC, 2016). COPD prevalence in adults 45 to 65 was 26%, with a long smoking history. Individuals aged 18

years and over accounted for 43 to 46 deaths per the 100,00 deaths in South Carolina annually. The rural areas of SC have a relatively high rate of COPD cases in adults between 18 to 65. CAD was 12 times higher in adults aged 65 years and older, while adults less than 65 years in age were 6 times higher (Benjamin et al. 2019). Those adults between 18 to 55 age had a 2.5 times likelihood of getting the disease due to living an unhealthy lifestyle in those early years. The nearly 200,000 plus deaths from heart disease annually primarily affect men between 18 to 65 age.

Measures-Dependent Variables

Emergency Department Frequency

The frequency of ED visits largely contributed to COPD and CAD patients, nearly 75% of the patients yearly (Rowe et al., 2016). COPD and CAD patients rely on the ED to deliver acute care. These complex chronic conditions are difficult to treat, require close follow-up, and require assessments or disease management clinics. The ED has focused more on acute care management and encouraging preventive interventions. The use of the ED has been compounded by poor health conditions, mental health, substance use, poverty, and social factors (Westney et al., 2017). On average, ED visits lead to 5 to 6 days of hospital stays with a cost of between 25,000 a year (Westney et al., 2017).

Data Analysis Plan

SPSS and Excel were used for the analyses. A regression analysis will be the statistical test used to examine the relationship between two or more variables of interest, thus the independent and dependent variables to determine which variables impact. In

addition, an ANOVA test was used to determine if the results were significant, and a Chi-Square test was used to compare the variables to determine if the data matched the population. The ED data used for this study had already been screened and cleared. In SC, the ED submits COPD and CAD claims to the SCRFA office, and all claims are uploaded to the SCRFA database. The SCRFA files represent the original data submitted to the database through the ED for all COPD and CAD claims, including admissions, treatment, inpatient, outpatient, and readmissions. The data specific to the state of SC recipients with either COPD or CAD who frequent the ED was tested, reviewed, and evaluated against the following research questions and hypotheses:

RQ1: What is the relationship between ED frequency among COPD Medicare and Self-pay recipients 18 to 65 years within SC between 2016 to 2018?

H₀₁: There is no significant relationship between ED frequency among COPD Medicare and Self-pay recipients 18 to 65 years within SC between 2016 to 2018.

H_{a1}: There is a significant relationship between ED frequency among COPD Medicare and Self-pay recipients 18 to 65 years within SC between 2016 to 2018.

RQ2: What is the relationship between ED frequency among CAD Medicare and Self-pay recipients 18 to 65 years within SC between 2016 to 2018?

H₀₂: There is no significant relationship between ED frequency among CAD Medicare and Self-pay recipients 18 to 65 years within SC between 2016 to 2018.

H_{a2}: There is a significant relationship between ED frequency among CAD Medicare and Self-pay recipients 18 to 65 years within SC between 2016 to 2018.

Description of Data Analysis Plan

An exploratory data analysis was used to examine the distribution of ED visits as a count outcome and as a categorical outcome. Histograms displayed the frequency of ED counts from zero to the highest count, and bar graphs will display the distribution of Medicare and self-pay recipients among ED users. The statistical procedure used was F-tests. Logistic regression was used as predictive analysis to determine whether ED frequency results from Medicare or self-pay COPD and CAD patients' repetitive use. The logistic regression will evaluate the probability of increased ED frequency by patients with Medicare or self-pay diagnosed with COPD and CAD. Tables were created to display the variables' relative values and p-values to indicate statistical significance. Relevant comparisons among the ED will include:

- Adults aged 18 to 65 years and older
- Payer type and age
- Percentage of visits for (COPD and CAD) patients

Threats to Validity

Threats to External Validity

There are several advantages in using the ED data from SCRFA, including that the results from this study applied to the majority of COPD and CAD recipients that are 18 years to 65 years of age. There are some limitations to using the SCRFA. It only represented recipients from the four regions that visited the ED, not clinics or urgent care, and EDs outside of those areas. However, SCRFA can capture data from recipients that visited the main EDs in those four regions. Therefore, the conclusions drawn remained

generalizable to recipients enrolled in Medicare and self-pay, and the study still had strong external validity.

Threats to Internal Validity

One major threat to the internal validity of my approach to studying frequent ED use includes using SCRFA data precluded examination of critical aspects of access to care and quality of care. For instance, there was no gauge care coordination among medical providers, essential for managing COPD and CAD. Without self-reported information from patients and providers, there could not explore certain factors that might be relevant to predicting ED use, such as ease of getting an appointment with a primary care provider and satisfaction with primary care providers.

Threats to Construct or Statistical Conclusion Validity

Frequent ED use was studied over a more extended period to avoid threats to statistical conclusion validity, especially four years. This allowed for a more definitive and practical classification of users by the persistence of use and concentration of ED use within a given year. Due to the large sample size of the Medicare and self-pay population, there was no threat to the statistical power, resulting in a larger sample not being identified. Another threat to validity may occur if statistical analyses are performed outside the statistical test, for instance, nonlinear relational linear regression. For this study, all appropriate assumptions tied to the frequent ED use in the SCRFA data were applied to avoid invalidity of statistical conclusion. Correspondingly, using two case studies (COPD and CAD) helped reduce any threat to validity.

Ethical Procedures

Anticipating ethical issues is essential to mitigating them throughout the research process. Obtaining the necessary permission will access the de-identify secondary datasets for the quantitative study (Creswell & Creswell, 2018). The Walden Institutional Review Board will review the analysis to ensure ethical processes will be followed. All data for this study were obtained from available public datasets. There is no utilization of patient or protected health information.

The data collected by the SCRFA are protected and de-identified before releasing the data. Since the data are de-identify, there are no risks that can negatively impact an individual. Additionally, there will be no compromise on patients' private health information. After evaluating the data, the dataset will be downloaded to a personal computer and deleted. The research will not present any ethical issues for the university, Medicare, the researcher, or participants.

Summary

In summary, this study with a quantitative analysis of the relationship between Medicare and the self-pay population with COPD and CAD and frequent ED visits. In the previous sections one and two, we discussed the foundations of the study and the research design. In conjunction, the impact on ED utilization was examined to ascertain the burden on SC hospitals, families, and the state of South Carolina. It was analyzed using linear regression and two-tailed t-tests to investigate the distribution of ED visits. A correlational design was compared among the four regions of South Carolina ED using chi-squared statistics. Charts and tables were created to illustrate the relative values of the

variables in conjunction with p-values to show the statistical significance of this study. Including variables relevant to the research would render the epidemiological analyses a practical approach to the care and wellbeing of Medicare and self-pay recipients with a diagnosis of COPD and CAD. Data collection, research, and results of this study will be provided in each section. In section 3, the results of the relationship between COPD and CAD and utilization of the ED will be identified.

Section 3: Presentation of the Results and Findings

The purpose of this quantitative study was to explore whether frequent ED use by Medicare and self-pay patients in SC (South Carolina) with COPD and CAD differed between 2016 to 2018. I sought to answer either the following research questions:

RQ1: What is the relationship between ED (Emergency Department) frequency among COPD Medicare and Self-pay recipients 18 to 65 years within SC between 2016 to 2018?

H₀1: There is no significant relationship between ED frequency among COPD Medicare and Self-pay recipients 18 to 65 years within SC between 2016 to 2018.

H_a1: There is a significant relationship between ED frequency among COPD Medicare and Self-pay recipients 18 to 65 years within SC between 2016 to 2018.

RQ2: What is the relationship between ED frequency among CAD Medicare and Self-pay recipients 18 to 65 years within SC between 2016 and 2018?

H₀2: There is no significant relationship between ED frequency among CAD Medicare and Self-pay recipients 18 to 65 years within SC between 2016 to 2018.

H_a2: There is a significant relationship between ED frequency among CAD Medicare and Self-pay recipients 18 to 65 years within SC between 2016 to 2018.

The analysis was done using primary and secondary diagnostic coding. Specifically, administrative claims data for SC was used, focusing on recipients with CAD and COPD who visited the ED between the years 2016 to 2018. I examined the association between COPD/CAD patients and the frequent ED and its impact among SC Medicare and self-pay patients. The research identifies what drives COPD/CAD patients

to frequent the ED despite the rising cost of care that self-pay patients face (Andre et al., 2018). I also accessed how often Medicare and self-pay patients use the ED for services. The financial burden of these conditions, especially among persons 18 to 65 years, has led to significant interest in decreased ED frequency.

In addition, the data provided by SC was used to determine whether there was a relationship between the variables. Within this section, cleaning and preprocessing of the data were examined, then sorted and processed to provide a summary statistic. Next, data analysis was presented to answer the research questions, and the results were discussed. Finally, a summary of the data and whether the hypothesis will be accepted or rejected will conclude the section and offer insight into whether additional research on the topic could assist with social change.

Data

For the study purposes, the sample size was 7,689 patients with COPD and CAD that had Medicare insurance or self-pay for medical care in South Carolina. The subject's age and payment type accounted for within 2016-2018. Other identifiers such as gender and race were not used but provided valuable insights into the research subjects' use of the ED usage, ED location, health status, area dynamics, etc. It was assumed that the age and payment type reported each year was the correct age and payment type for data analysis purposes, and all self-identifying data was removed from the analysis. A significant amount of data was missing regarding whether a recipient received additional treatment, paid a higher amount for services, or if payment was made that year. This missing data were assumed to be zero (0) throughout the study. Finally, recipients that

did not meet the criteria were removed from the analysis. After these changes, the researcher was left with a dataset of 7,789 for research.

Table 1*Sample Size Calculation*

Item	Statistic
Equation	$Z^2 * P(1-P) / E^2 / 1 + (Z^2 * P(1-P) / E^2 N)$
Confidence level	95%
P-value	0.5
Error	0.02
Population size	97.419
Alpha divided by 2	0.025
Z-score	1.959963985
Sample size	1.03E-05
Numerator	2400.911763
Denominator	233894424
Medicare Sampling	Self-pay Sampling
2557	678
1147	1983
229	795
1437	331
41	769
5411	4556
Sample size total	7689

Note. Sample size calculation. Medicare and self-pay COPD and CAD patients per South Carolina.

Data Collection of Secondary Data Set

Secondary deidentified data were obtained from the SCRFA. SCRFA collected raw data from all South Carolina EDs. The data is updated regularly by SCRFA once it is received. Updating the data requires time, and SCRFA must code to maintain confidentiality before handing it over for processing and public availability. No additional authorization was required after obtaining official institutional review board (IRB) approval from the SCRFA and Walden University. A password-protected Microsoft Excel file containing the data set was delivered to me, including all the required variables for analysis.

The final sample size included 7,789 COPD and CAD patients that had visited an SC hospital's emergency room hospital between the years of 2016 to 2018. Patients in the sample were placed into two payer categories: self-paying and Medicare. The data was sorted by age with patients aged 18 and older. This study sought to determine whether a relationship between payer type and age increased emergency department use in SC. The sample population included in the data set was sufficient for this study.

Table 2

The Numbers of COPD in South Carolina.

Value	Item
67%	Percent of adults have been diagnosed with COPD (prevalence)
278,300	adults have been diagnosed
47.5%	Percent of people out of every 100,000 die per year with COPD (incidence)
\$509 million	Dollars spent annually on COPD

Note. By the Numbers-COPD in South Carolina. Prevalence of COPD in South Carolina per Emergency Department Admissions. Reprinted from South Carolina Revenue and Fiscal Affairs, 2017.

Data Analysis

The statistical tests were used to answer the research question included summary statistics, frequency table, the significance of variables, chi-square, and ANOVAs. The statistical tests resulted in tables and graphs that displayed age, ED visits, and payments for the patient from 2016 to 2018; highlighted ED visits for COPD and CAD patients from 2016 to 2018; and showed relationships of the variables in research questions. These statistical tests determined whether they were significant in the variables and the nature of those relationships. It will establish the relationship between the dependent and independent variables. An ANOVA test compared the ED visits with COPD and CAD patient type and payment type at the same time to determine whether a relationship

existed between them. The results or the F statistics allowed for the variability of the data and the relationship between independent and dependent variables. These selective statistical tests were selected due to the nature of the research questions and the scale of the variables' measurements. In the case of missing data that could not be interpreted, statistical tests can still yield results for the present data depicting a relationship between variables in question.

Results

Summary statistics tables for each variable were presented to summarize and provide information about sample data. It explained the values in the data set that included highlighting where the mean lied and whether the data was skewed. Summary statistics report two main things about the data: where the trend lies and how to spread out or vary your data set is. A significance of variables table determines whether a relationship between two or more variables is caused by something other than chance. An ANOVA table helps break down the components of variations in the data as to whether the null or alternate hypothesis is accepted or rejected. Finally, a frequency table for the data was presented to report on basic descriptive statistics that would help to understand each variable and data. This was important to this study because the data would provide insights into emergency department excessive emergency department use among patients diagnosed with COPD and CAD.

Table 3

Summary Statistics for the ED Visits for COPD Patients Between 2016-2018

	2016		2017		2018
Mean	1116.636364	Mean	1184.091	Mean	1096.818
Standard Error	176.9312796	Standard Error	186.3151	Standard Error	157.2542
Median	1094	Median	1132	Median	1049
Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	586.814668	Standard Deviation	617.9373	Standard Deviation	521.5532
Sample Variance	344351.4545	Sample Variance	381846.5	Sample Variance	272017.8
Kurtosis	-0.620890867	Kurtosis	-0.57118	Kurtosis	-0.55998
Skewness	0.436699105	Skewness	0.428235	Skewness	0.198942
Range	1756	Range	1883	Range	1645
Minimum	309	Minimum	342	Minimum	305
Maximum	2065	Maximum	2225	Maximum	1950
Sum	12283	Sum	13025	Sum	12065
Count	11	Count	11	Count	11

Note. Summarize ED visits for COPD patients for the years. 2016 to 2018.

Table 4*Summary Statistics for the ED Visits for CAD Patients Between 2016-2018*

	2016		2017		2018
Mean	591.0909091	Mean	602.5455	Mean	545.2727
Standard Error	106.737695	Standard Error	108.9334	Standard Error	97.9513
Median	435	Median	444	Median	423
Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	354.0088854	Standard Deviation	361.2911	Standard Deviation	324.8677
Sample Variance	125322.2909	Sample Variance	130531.3	Sample Variance	105539
Kurtosis	-0.428258313	Kurtosis	-0.1228	Kurtosis	-0.11706
Skewness	0.898534182	Skewness	0.958621	Skewness	0.976628
Range	1045	Range	1125	Range	1006
Minimum	175	Minimum	161	Minimum	163
Maximum	1220	Maximum	1286	Maximum	1169
Sum	6502	Sum	6628	Sum	5998
Count	11	Count	11	Count	11

Note. Summarize ED visits for CAD patients for the years. 2016 to 2018.

The frequency of the ED for patients with COPD had the highest mean compared to visits made by the patients with CAD between the years 2016 to 2018. The variance between the frequency of the individual visits for both categories of the patients (COPD and CAD) was very high.

Table 5

Average Number of Visits for Patients with Different Payments

Means	Medicare	Self-Pay
COPD	1396.8667	912.2222
CAD	592.4	569

Note. From table 5 above, the average frequency of ED visits for patients whose payment was "Medicare" was higher than the patients whose payment method was "Self-Pay" from 2016 to 2018 for both COPD and CAD.

Research Question 1

What is the relationship between ED frequency among COPD Medicare and Self-pay recipients 18 to 64 years within SC between 2016 to 2018?

H₀: There is no significant relationship between ED frequency among COPD Medicare and Self-pay recipients 18 to 64 years within SC between 2016 to 2018.

H₁: There is a significant relationship between ED frequency among COPD Medicare and Self-pay recipients 18 to 64 years within SC between 2016 to 2018.

The above research question was addressed by fitting a regression model below.

Table 6*Regression Results for COPD Patients*

Regression Statistics	
Multiple R	0.4377604
R-Square	0.1916342
Adjusted R Square	0.1655579
Standard Error	511.36947
Observations	33

Table 7*ANOVA*

Statistic	<i>df</i>	SS	MS	<i>F</i>	Significance <i>F</i>
Regression	1	1921747.398	1921747.4	7.3489739	0.01084011
Residual	31	8106460.844	261498.737		
Total	32	10028208.24			
	Coefficients	Standard Error	t-stat	p-value	
Intercept	1396.8667	132.0350299	10.5795157	8.21E-12	

Note. Based on Table 7, the p-value for the payment method (0.0108) does not exceed a 95% confidence level. Thus, the null hypothesis was rejected, concluding that there is a significant effect or relationship between the frequency of ED visits for COPD patients and the payment method.

Table 8*T-test Results of ED Visits for COPD Patients*

Statistic	MEDICARE	SELF-PAY
Mean	1396.866667	912.2222222
Variance	354418.8381	184976.3007
Observations	15	18
Pooled variance	261498.7369	
Hypothesized Mean Difference	0	
Df	31	
<i>t</i> Stat	2.710899098	
$P(T \leq t)$ one-tail	0.005420055	
<i>t</i> Critical one-tail	1.695518783	
$P(T \leq t)$ two-tail	0.010840111	
<i>t</i> Critical two-tail	2.039513446	

Note. Based on Table 7, the average frequency of ED visits for COPD patients is equal for the two payment methods; and the intermediate frequency of ED visits for COPD patients is not equal for the two payment methods. The two-tail p-value for the unpaired *t* test (0.0108) does not exceed the 5% alpha level; thus, the null hypothesis was rejected, concluding that the average frequency of ED visits for COPD patients is not equal for the two payment methods.

Research Question 2.

What is the relationship between ED frequency among CAD Medicare and Self-paying patients 18 to 64 years of age within SC between 2016 to 2018?

H₀: There is a significant relationship between ED frequency among CAD Medicare and Self-pay recipients 18 to 65 years within SC between 2016 to 2018.

H₁: There is no significant relationship between ED frequency among CAD Medicare and Self-pay recipients 18 to 64 years within SC between 2016 to 2018.

The regression analysis model was fitted to address the research question above. The output of the analysis is as follows.

Table 9*Regression Analysis Results for CAD Patients*

Statistic	Value
Multiple R	0.035110777
R-square	0.001232767
Adjusted R square	-0.030985531
Standard error	342.1776373
Observations	33

Table 10*ANOVA*

Statistic	df	SS	MS	F	Significance F
Regression	1	4480.036	4480.036	0.0382629	0.84619265
Residual	31	3629652	117085.5		
Total	32	3634132			
	Coefficients	Standard Error	t-stat	p-value	
Intercept	592.4	88.34989	6.705159	1.68E-07	
Payments_coded	-23.4	119.6263	-0.19561	0.8461926	

Note. From the results in table 9 and 10, the p -value (0.8462) for the payment method

exceeded the 95% confidence level, thereby failing to reject the null hypothesis.

Therefore, the effect of the payment method was statistically insignificant in determining the frequency of ED visits for the CAD patients.

Table 11*T-Test Results for CAD Patients Between 2016-2018*

Statistic	MEDICARE	SELF-PAY
Mean	592.4	569
Variance	101365.6857	130031.2941
Observations	15	18
Pooled Variance	117085.5355	
Hypothesized Mean Difference	0	
Df	31	
<i>t</i> Stat	0.195609141	
<i>P</i> ($T \leq t$) one-tail	0.423096323	
<i>t</i> Critical one-tail	1.695518783	
<i>P</i> ($T \leq t$) two-tail	0.846192645	
<i>t</i> Critical two-tail	2.039513446	

Note. CAD patients emergency room visits between 2016-2018.

H₀: The average frequency of ED visits for COPD patients is equal for the two payment methods.

H₁: The average frequency of ED visits for COPD patients are not equal for the two payment methods.

The two-tail p-value for the unpaired t-test (0.846) does not exceed the 5% confidence level. Thus, the null hypothesis was not rejected, concluding that the average frequency of ED visits for COPD patients equals the two payment methods.

Summary

The purpose of this study was to determine whether the COPD and CAD diagnosed Medicare and self-paying patients had contributed to the increased ED visits in the state of South Carolina, using a sample from the SCRFA for the years 2016, 2017, and 2018. This was done using regression equations to determine if payer type significantly affected the ED visits for a given year. Increased ED visits were seen in one payer type. From the research findings, the payment type statistically affected the frequency of ED visits for the COPD patients while being insignificant for the CAD patients. It is also likely that the patients came to the ED with combined symptoms, which might have increased or decreased ED visits. The classifications of Medicare and self-paying could likely affect this finding. Future studies may be needed to use a broader range of data and restrict ED visits to strictly COPD and CAD with no other present symptoms. The broader implications of these recommendations will be discussed in section 4.

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

In South Carolina, ED visits were on the rise, and between the early 90s and 2000, ED visits increased from 1.5 million to nearly 2 million across the United States (Kociol et al., 2013). Because of these increases, hospital administration decided to use alternative measures to cut costs, which increased costs in other areas of the ED. According to research, most Americans were unwilling to pay the costs associated with caring for frequent ED users, who were likely to be the reason behind their decline in health (Kociol et al., 2013). Thus, it was imperative to find a way to lower costs and reduce ED usage without closing EDs; therefore, this study was relevant and necessary.

The current quantitative study was a retrospective cross-sectional study designed to explore the connection between COPD and CAD patients, either Medicare recipients or self-paying ones' frequent use of the emergency department. It was conducted to evaluate the impact of ED usage by COPD and CAD patients from a specific age group with the designated payment type known and in Section 4, I discuss and interpret the findings of the study and point to the potential implications of the study's findings on EDs across the United States. In addition, I discuss how effective management of the ED for frequent ED usage and the importance of programs that highlight preventive measures can reduce ED use across SC for COPD and CAD patients. Furthermore, this section will conclude with recommendations for future research.

Discussion

The primary research objective was to determine whether frequent ED usage in SC by Medicare and self-paying COPD and CAD patients differed between the calendar

years of 2016 to 2018. Secondly, I sought to determine if frequent visits to the ED were associated with the payment type for the same population in those same years.

Two research questions informed the research in the study:

RQ1: What is the relationship between ED frequency among COPD Medicare and self-pay recipients 18 to 65 years within SC between 2016 to 2018?

H₀1: There is no significant relationship between ED frequency among COPD Medicare and self-pay recipients 18 to 65 years within SC between 2016 to 2018.

H_a1: There is a significant relationship between ED frequency among COPD Medicare and self-pay recipients 18 to 65 years within SC between 2016 to 2018.

RQ2: What is the relationship between ED frequency among CAD Medicare and self-pay recipients 18 to 65 years within SC between 2016 to 2018?

H₀2: There is no significant relationship between ED frequency among CAD Medicare and self-pay recipients 18 to 65 years within SC between 2016 to 2018.

H_a2: There is a significant relationship between ED frequency among CAD Medicare and self-pay recipients 18 to 65 years within SC between 2016 to 2018.

I used the study to either confirm or deny the association through data analysis or, alternately, a definite connection between the two phenomena studied within each question.

Interpretations of the Findings

Medicare and self-paying recipients across the county aged 18 to 65 are a resource-intensive population for which COPD and CAD are ongoing (Dalal et al., 2011). This population is dependent upon the emergency department for all care needs. The findings were further discussed categorically based on the research questions individually.

Research Question 1

The presumption (H_0) was that either there would be no significant relationship between ED frequency among COPD Medicare and self-pay recipients 18 to 65 years within SC between 2016 to 2018, or alternately (H_a), that there would be a significant relationship. Tests of the data obtained determined that in the years from 2016 to 2018, for Medicare patients, ED frequency was significant amongst COPD patients that paid for services through Medicare. Thus, proving the first supposition to be false. The significance of the variables to the research questions is necessary if not equal to zero, which the payment type and diagnosis were not.

The graphs and tables display the mean ED visits with COPD diagnosis. Payment type was also analyzed to show the mean and minimum cost associated with COPD. Using the ANOVAs by studying the F-value and F-critical and the p-value at their significance levels, I determined whether there is a difference in the values and whether one value affected the other. The probability that the assumptions are correct (its p-value) was calculated to determine the presence or absence of statistical errors in the data. A p-value calculated to be less than or equal to 0.05 would indicate that the first presumption

(H₀₂) was acceptable. Thus, the alternative assumptions must then be rejected (H_{a2}). In this case, the data indicating the frequency of ED visits per COPD, age, and payer type had a p-value of less than 0.05. The first presumption that there would be a difference in the frequency of ED usage relative to age, payer, and diagnosis type was accepted, proving that there was no relationship between these variables.

The analysis of the p-value also revealed that payer-type played a significant part, as payment used affected ED visits for COPD patients compared in the years 2016 to 2018. Additionally, patient age had no relative effect on the relationship between the two. Perhaps, being aged 18 to 65 was negatively related to ED visit frequency, with the number of visits decreasing, instead of increasing as the alternative hypothesis suggested.

Research Question 2

After research question posed in this study indicated the extent to which (H₀₂) was that either there would be no significant relationship between ED frequency among CAD Medicare and self-pay recipients 18 to 65 years within SC between 2016 to 2018, or alternately (H_{a2}), that there would be a significant relationship. Tests of the data obtained determined that 2016 and 2017 for self-pay patients showed no significant difference in ED frequency amongst CAD patients who paid for the services out of pocket. Thus, proving the first supposition to be true. The significance of the variables to the research questions is necessary if not equal to zero, which the payment type and diagnosis were not.

The graphs and tables display the mean ED visits with CAD diagnosis. Payment type was also analyzed to show the mean and minimum cost associated with CAD. Using

the ANOVAs by studying the F-value and F-critical and the p-value at their significance levels, I could determine whether there is a difference in the values and one value effect the other. The probability that the assumptions are correct (its p-value) was calculated to determine the presence or absence of statistical errors in the data. A p-value calculated to be less than or equal to 0.05 indicated that the first presumption (H_0) was not acceptable. Thus, the alternative assumptions must then be accepted (H_a). In this case, the data indicating the frequency of ED visits per CAD, age, and payer type had a p-value of less than 0.05. The first presumption that there would be no difference in the frequency of ED usage relative to age, payer, and diagnosis type was rejected, proving that there was indeed a relationship between these variables.

The analysis of the p-value also revealed that payer type played a significant part, as the payment method used affected the ED visits for CAD patients compared in the years 2016 and 2017 versus the year 2018. Additionally, patient age had no relative effect on the relationship. Perhaps, being aged 18 to 65 was negatively related to ED visit frequency, with the number of visits decreasing, instead of increasing as the alternative hypothesis suggested.

The theoretical premise I used in the study relates to Andersen's (2008) model of health behavior. I addressed this theory using demographic statistics concerning Medicare and self-paying patients with COPD and CAD on age and payer type by indirectly speaking to the context of perceived need, resource allocation, and diagnosis characteristics. The need has been proven to be the most significant determinant of health services usage (see Andersen, 2008). However, when need is surpassed by concerns

about care as related to predisposition characteristics, the amount and equality of services increase.

Variables used were age, ED frequency, and payment method to assess the use and cost of ED visits on patients identified as having CAD and COPD. The statistics demonstrate Andersen's (2008) premise that health coverage usage mainly determines the equality of services rendered. I determined that the variables that contributed to the decrease in ED visits of COPD and CAD patients (2016-2018) and the increased use of visits in those same years directly correlate to the payment type used as payment. This study's findings suggest that 2016 and 2017 did not see a significant level of ED visits for COPD and CAD patients that paid out of pocket for services, as seen in Tables 10 and 11. This slightly coincides with Andersen's premise that access to services not based on need leads to inequality of services. Thus, the overuse of the ED services and financial burden on local hospitals. The study's implications speak to COPD and CAD's impact on ED frequency and the possibility that preventative care can positively contribute to patients' overall health and decrease ED frequency related to usage for self-paying and Medicare beneficiaries. Although the focus is on ED frequency, the results differ from the more broadly scoped studies of hospitalization studies. While I did not look at hospitalization overall, I focused on ED frequency amongst self-paying and Medicare beneficiaries only, as reported by the SCRFA. The sample size included 100% of the claims data for 2016 to 2018.

Some factors not presented as part of this study include the rates of hospitalization and rehospitalization and its relation to COPD and CAD diagnosed self-paying and

Medicare beneficiaries. A recommendation for future research applies to the findings in this study that look at the relationship between primary care providers and frequency of ED usage. The inclusion of demographic data relative to primary care providers and ED frequency paired with hospitalization, rehospitalization, and death statistics could present a clear picture of the ED frequency amongst this group of beneficiaries to include race and gender as alluded to by Andersen (2008), the primary theoretical framework of this study, and could extend the current research. The present study results align with the study's research methodology as claimant information for Medicare and self-paying recipients are accessible. Other studies also observed racial disparities, chronic diseases trends, and care costs on the Medicare population and patients with no insurance coverage.

Limitations of the Study

The study's design and implementation have inherent limitations. The most prominent limitation is within the design of the study. Due to the researcher's structure and sample size, the researcher was limited to the types of data that the researcher could measure and compare due to reliance on South Carolina revenue and fiscal affairs. Although the data used in the study produced valued information about Medicare and self-paying patients in EDs practiced in SC, it did not differentiate ED usage by the hospital, by socioeconomic status, or race, thereby leaving a gap in an important research area that could have been useful to the extent the research. Thus, while helpful, the data does not necessarily provide SC hospital administrators and lawmakers with the types of

generalized information needed to understand and rectify the inequalities present in current care models.

Implications for Professional Practice and Social Change

The study's findings have the potential for real positive change; however, the study's limitations may restrict its impact. The study problem, combined with the available research, indicates that more research is needed to determine the scope of the problem related to geographical and racial disparities and what, if anything, can be done to eliminate the overcrowding of EDs in South Carolina states. The findings correlated to lowering the ED costs can positively impact hospital spending on ED services, as preventative care creates positive change in the quality of patients' lives. This may be achieved by increasing the supply of nurse practitioners, physician assistants, and family doctors. Furthermore, since ED visits are not associated with mortality, programs should divert patients to less expensive care such as after-hours clinics and telemedicine.

The study results indirectly support the epidemiologist triad's theoretical framework by systematically acknowledging the relationships between behavior, ecological and environmental factors, lifestyle and physical factors, and chronic diseases. The study's implications also positively correlate to (Andersen, 2008) Model of Health Behavior as it potentially poses the predisposing characteristics, enabling resources and need relevant to COPD and CAD patients. The statistical significance of financial impact, race, and age correlates within the study have the potential of bringing clarity to the theoretical framework and suggest that corrections to access to services could result in significant change.

The study results combined with the theoretical framework can guide further research in determining the optimal cost analysis of response to preventative medicine, which could help researchers develop a plan to even the playing field regarding equality of care. With projected growth in the percentage of Americans living with chronic illness by 2022, a vast majority of individuals will be living under the poverty line (Bodenheimer, Chen, & Bennett, 2017). Insights into racial, socioeconomic, and geographical disparities could yield research promoting positive social change. Policymakers can utilize the information obtained in this and future studies to understand the impact of age, gender, race, PCPs, Medicare, and the collective effect on hospital ED spending. Hence, this research can inform the health care delivery system and improve existing and emerging public health programs through better care, better health, and reduced healthcare costs.

Recommendations

The study's limitations revealed a possible area of potential for future researchers. To extend the scope of the research, there is a need for additional studies designed to isolate the independent variables relative to patients' income, primary care physician availability, hospital spending, disease management, socio-economic and demographic factors. Further research is needed to include alternate sources of care such as physician assistants, primary care doctors, and nurse practitioners. In the future, researchers could use a mixed research methodology for a case study rather than relying solely on data taken from SCRFA. A mixed research model could offer insights into individual patients' reasoning behind utilizing emergency room services rather than taking actions, such as

partaking in regular primary visits, that might prevent their chronic conditions from worsening. A mixed-method approach helped understand the contradictions between qualitative and quantitative findings and reflect the patient's perspective. The combination of in-depth case studies relative to SC's ED usage and quantitative data could be a more meaningful way to bridge the gap.

A study of the effects of race, gender, and cost on the consistency and quality of treatment for chronic health conditions could bring to light many of the concepts and correlational characteristics mentioned in the literature regarding the epidemiological triad model of the person, time, and place (Andersen, 2008). Future research could indicate how variables such as the financial burden on families, hospitals, and the state, influence the treatment of COPD and CAD and spur the development of preventive measures designed to curb health care costs among Medicare and self-pay patients while optimizing health.

Conclusion

Using data from SCRFA, I obtained data on SC residents with COPD and CAD and their ED use and payment type from 2016 to 2018. The data was to be used to determine a pattern in ED use among this group of patients and the impact that it was having on ED overcrowding. As a guide to deciding whether payment type or disease type impacted, the research looked to answer two questions: 1. What is the relationship between ED frequency among COPD Medicare and Self-pay recipients 18 to 65 years within SC between 2016 to 2018? What is the relationship between ED frequency among CAD Medicare and Self-paying recipients 18 to 65 years within SC between 2016 to

2018? Several factors were considered in the process, such as the age and payment type of the patients; however, this study did not look at race, gender, and socioeconomic levels when determining the increase in ED frequency. Considering the focus of the research and the questions surrounding the cause and effect of ED visit frequency, an analysis was performed. It was determined that payer type played a significant part in ED frequency related to COPD patients from 2016 to 2018. In addition, the finding was significant in COPD patients; it was also substantial in CAD patients but for the year 2018. It was determined that from 2016 to 2017, self-paying patients had no significant effect on ED frequency. The analyses revealed that payer type was significant in all years from 2016 to 2018, but payment type was not significant in 2018.

The prevalence of Medicare and self-pay patients' utilization of EDs services directly correlates with payer and payment type. Additional factors need to be accounted for to determine the overall increase. Therefore, the answers to this study could help the state of South Carolina to develop new programs and adjust current practices related to the rising cost and frequency of ED care relative to overuse, and simultaneously improve the health outcomes of patients with chronic diagnosis.

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Appendix A: CAD and COPD Codes

CAD Codes used in this study were: I25.10, I00-I99, I20-I25, 302, 303, I70.90, I77.90, I51.90, I25.2

COPD Codes used in this study were: 490, 4910, 4911, 4918, 4919, 4920, 4928, 49120, 49121, 49122, 4940, 4941, 496