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# Impact of Palliative Care on Patients with Severe Chronic Obstructive Pulmonary Disease

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# Walden University

College of Health Sciences

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Celena Therese Romero

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

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Walden University
2018

Abstract

# Impact of Palliative Care on Patients with Severe Chronic Obstructive Pulmonary Disease

by

Celena Therese Romero

MBA, DeSales University, 2010

BS, Pennsylvania State University, 1998

Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy
College of Health Sciences

Walden University
August 2018

# Abstract

Chronic obstructive pulmonary disease (COPD) requiring long-term oxygen therapy (LTOT) is an incurable lung disease often complicated by other comorbidities. Research is limited for hospitalized COPD exacerbations with LTOT and palliative care services. The purpose of this quantitative research study was to determine the correlation between palliative care interventions and COPD patient outcomes specific to an intensive care unit (ICU) stay, invasive mechanical ventilator support, physician orders for cardiopulmonary resuscitation (CPR) code status, and hospital discharge to hospice care. The theoretical base for this study was Donabedian's quality improvement theory. The quasi-experimental, nonequivalent groups design divided COPD hospitalized patient sample into 2 groups, those with and those without palliative care, for comparison. An independent-samples *t* test, one-way MANOVA, and follow-up univariate ANOVAS was done to compare the means of ICU days and ventilator days; a cross tabulation, chi-square test of independence, and Fisher exact test was done to compare code status and place of hospital discharge. The mean number of the ICU days and ventilator days for palliative care patients was significantly higher than patients who did not receive palliative care. A significant interaction was found for palliative care and code status change from CPR to no CPR; however, data relating to palliative care and hospital discharge to hospice was insignificant. In conclusion, palliative care does not reduce costs by limiting the number of days spent in an ICU or the number of days on invasive mechanical ventilation; although, it may have an important role in the code status order change from CPR to no CPR to align with the patient's end of life care preference.

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# Dedication

I dedicate this to my husband, Dennis, for his compassion, support, and encouragement throughout the doctoral program and the dissertation journey and to patients who suffer everyday due to health problems.

# Acknowledgments

Thank you to Dr. Raymond W. Thron, my chairperson; Dr. Ronald Hudak, my second committee member; Dr. LaToya Johnson and Dr. James Rohrer, university research reviewers; and Daniel Fleischhacker, editor for their guidance, patience, and advice that made this research possible.

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# Chapter 1: Introduction to the Study

## Introduction

Chronic obstructive pulmonary disease (COPD) is an incurable, progressive lung disease often complicated by other comorbidities causing airway limitation characterized by dyspnea, increased sputum production, generalized weakness, and fatigue (Lilly & Senderovich, 2016). According to the Global Initiative for Chronic Obstructive Lung Disease (GOLD; 2017) a diagnosis of COPD is confirmed when a patient exhibits airflow disruption, or alveolar abnormalities, and emphysema typically caused by extensive exposure to noxious particles or gases, such as tobacco smoke or air pollution (p. 3). The airflow limitation, or lung function, is measured with a pulmonary function test called spirometry (GOLD, 2017). A post bronchodilator spirometry of forced expiratory volume in one second (FEV1)/forced expiratory vital capacity (FVC) of $< 0.70$ is indicative of persistent airflow limitation (Qaseem et al., 2011). A post bronchodilator FEV1 of $< 0.50$ may be an indicator of severe COPD (GOLD, 2017).

There are no globally recognized standard criteria that define the severity of COPD (Duenk et al., 2017; Strang, Ekberg-Jansson, Strang, & Larsson, 2013). However, there are symptoms a healthcare clinician should consider in assessing COPD severity in conjunction with the spirometry test results, including shortness of breath, mucus in chest, chest tightness, and cough (GOLD, 2017). A history of acute exacerbations and other comorbidities such as weight loss, skeletal muscle wasting, or cardiovascular disease should also be considered (GOLD, 2017). Patients with comorbidities of respiratory failure or right heart failure may be further evaluated with pulse oximetry (GOLD, 2017).

Pulse oximetry measures the arterial blood saturation of oxygen (SAO2). Arterial oxygen saturation is the percent of hemoglobin binding sites that carry oxygen in the blood (Jindal & Agarwal, 2012). Arterial partial pressure of oxygen (PAO2) is the measurement of the oxygen content in the arterial blood (Jindal & Agarwal, 2012). A PAO2 $\leq 55$ mmHg or SAO2 $\leq 88\%$ at rest or PAO2 56–59 mmHg plus, either pulmonary hypertension or hematocrit $\geq 55\%$, is an indication for long term oxygen therapy (LTOT) in patients with COPD (GOLD, 2017; Jindal & Agarwal, 2012; Mehta et al., 2016).

The consequences of COPD requiring LTOT are increased risk of mortality, decreased functional status, frequent hospitalizations and emergency room visits, assisted ventilation, severe dyspnea, increased dependence on others, pain, anxiety, and depression (Diaz-Lobato, Smyth, & Curtis, 2015; Hajizadeh, Goldfeld, & Crothers, 2015; Jindal & Agarwal, 2012). Due to the burden, complexity, and life-limiting illness of severe COPD, these patients are suitable for palliative care services (Diaz-Lobato et al., 2015). Despite the significant disease burden, complexity, prognosis, and healthcare expense of severe COPD, these patients are often overlooked to receive palliative care treatments (Diaz-Lobato et al., 2015; Duenk et al., 2017; Strang et al., 2013). Existing research regarding palliative care intervention is mainly focused on cancer patients. There is scarce research on how palliative care may alleviate the burden of severe COPD (Riffin et al., 2015). Further research is needed to improve the outcomes affiliated with COPD to reduce healthcare cost burden and better serve patients and their families, care givers, personal relationships, and society at large.

In this chapter, I will explore the background of palliative care and COPD, the research problem, the purpose of the research, and the research questions. I will then explain the theoretical base for this study. This will be followed by a discussion of the definitions and the significance of the research.

## Background

The number of hospital palliative care programs is growing in the United States (Dumanovsky et al., 2016). There were 25% of U.S. hospitals with a palliative care program in 2003. This has expanded to 66.5% of U.S. hospitals with a palliative care program in 2014 (Dumanovsky et al., 2016, p.10). According to the National Palliative Care Registry, an average of 4.8% of all hospital admissions received palliative care in 2015 (Rogers & Dumanovsky, 2017, p. 2). In 2015, out of the top four referring physician specialties, hospitalists referred the most patients to palliative care (Rogers & Dumanovsky, 2017). In 2015, 41% of the palliative care referrals are patients in hospital medical/surgical units and the top four primary diagnosis groups being referred to palliative care are cancer (26%), cardiac (13%), pulmonary (12%), and neurological (8%; Rogers & Dumanovsky, 2017, p. 13).

Palliative care is frequently affiliated with end-of-life care or comfort measures; however, palliative care may be provided in conjunction with other medical therapy to assist with chronic disease management (Lilly & Senderovich, 2016). Palliative care adds an additional layer of medical, emotional, spiritual, and social support that may be used to improve disease circumstance, quality of life preservation, prognostication, and patient engagement and shared medical decision making (Lilly & Senderovich, 2016). Palliative care has been scientifically proven to decrease patients' symptom burden, improve quality of life, and increase patient satisfaction (Vermylen, Szmuilowicz, & Kalhan, 2015).

Rush, Hertz, Bond, McDermid, and Celi (2017) investigated the use of palliative care in hospitalized COPD patients receiving home oxygen in the years of 2006 to 2012 (p. 41). Out of the 181,689 hospitalized COPD patient populations receiving home oxygen, they found that 1.7% received a palliative care consultation. Rush et al. noted an increase in the volume of palliative care referrals from 0.45% in 2006 to 2.56% in 2012 (p. 44). The differential in palliative care consult rates for hospitalized COPD patients receiving home oxygen aligns with the overall growth rate of palliative care services throughout the United States (Rogers & Dumanovsky, 2017; Rush et al., 2017).

No universal identification criteria exist to refer COPD patients to palliative care service (Duenk et al., 2017; Strang et al., 2013). Duenk et al. (2017) surveyed 256 pulmonologists about palliative care intervention for patients with COPD (p. 301). Their findings indicated that the majority of pulmonologists recognize the importance of palliative care for COPD patients but do not know when to involve palliative care in the COPD disease trajectory (Duenk et al., 2017; p. 303). Duenk et al. concluded that further research is needed to determine specific identification criteria for timely palliative care intervention (p. 306). Focusing the research population to hospitalized patients admitted with a COPD exacerbation and the use of LTOT present on hospital admission may serve as readily recognizable criteria to trigger a palliative care consult regardless of disease complexity or prognosis.

Riffin et al. (2015) conducted an extensive literature review of 191 articles to identify what remains unknown in palliative care research (p. 4). From their review of the literature, two future study topics were identified: (a) the potential economic benefit of palliative care and (b) the need for research focusing on complex illness other than cancers (Riffin et al., 2015). COPD is an ideal complex illness to research because of the affiliated comorbidities, high costs associated with frequent hospitalizations, and the opportunity to explore complementary interventions (Ford et al., 2015).

In the United States, costs related to COPD are projected to increase by 53%, from $32.1 billion in 2010 to $49.0 billion in 2020 (Ford et al., 2015, p. 35). Existing research correlates the use of hospital resources, such as hospital admissions, length of hospital stays, intensive care unit (ICU) stays, medications, ventilation, and resuscitation, with high health care costs (Faes, De Frène, Cohen, & Annemans, 2016). Medical expenses increase as the disease course of COPD progresses because people with severe COPD may be frequently hospitalized, admitted to ICUs, supported by mechanical ventilation, or have increased dependence on supplemental oxygen contributing to overall direct medical expenditures (Faes et al., 2016; GOLD, 2017; Vitacca, Biachi, Bazza, & Clini, 2011).

## Problem Statement

Severe COPD is recognized as a significant cause of mortality and morbidity frequently complicated by additional chronic conditions (GOLD, 2017). Previous research has confirmed a direct and indirect cost burden of patients with severe COPD due to frequent hospitalizations, admissions to ICUs, and the need for invasive mechanical ventilation (Ford et al., 2015). Based on the literature review of Riffin et al. (2015), the potential economic benefit of palliative care is a future area of opportunity for research. Patients with COPD are recognized as being appropriate for palliative care consultation but infrequently receive routine palliative care possibly due to the physician's or patient's lack of understanding palliative care services, the unpredictable nature of the COPD disease trajectory, or lack of palliative care resources (Duenk et al. 2017; Rush et al., 2017; Strang et al., 2013). More research is needed in general to understand the complexity of the relationship between a palliative care consultation and COPD patient outcomes.

The problem is trifold: (a) Patients hospitalized with COPD with LTOT have a high mortality rate, are at risk of frequent hospitalizations, and suffer a declining quality of life as the disease progresses; (b) The disease burden is costly to society due to expensive hospital stays and treatments, loss of patient and caregiver productivity, and increasing health care expenditures; and (c) There is little research regarding the correlation between palliative care services and days spent in an ICU, days on invasive mechanical ventilation, physician orders for cardiopulmonary resuscitation (CPR) code status, and hospital discharge to hospice services for hospitalized patients with COPD and LTOT.

## Purpose of the Study

The purpose of this quantitative study was to determine if there is a correlation between palliative care services and days spent in an ICU, number of days on invasive mechanical ventilation, physician orders for CPR or code status, and hospital discharge to hospice services for hospitalized patients admitted with COPD exacerbation and receiving LTOT present on hospital admission. The palliative care consultation served as the independent variable in this study that potentially causes a change in the covariate variables identified as days spent in an ICU, number of days on invasive mechanical ventilation, physician orders for CPR code status, and hospital discharge to hospice services. The dependent variable was the hospitalized patients admitted with COPD exacerbation and receiving LTOT present on hospital admission.

## Research Questions and Hypotheses

The following research questions and hypotheses guided this study:

Research Question 1: What relationship does palliative care have on days spent in the ICU for COPD patients with LTOT admitted to a hospital?

$H_0$1: COPD patients with LTOT receiving palliative services is not associated with days in an ICU compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

$H_A$1: COPD patients with LTOT receiving palliative services is associated with a greater number of days in an ICU compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Research Question 2: What relationship does palliative care have on days receiving invasive mechanical ventilator support for COPD patients with LTOT admitted to a hospital?

$H_0$2: COPD patients with LTOT receiving palliative services is not associated with days receiving invasive mechanical ventilator support compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

$H_A$2: COPD patients with LTOT receiving palliative services is associated with a greater number of days receiving invasive mechanical ventilator support compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Research Question 3: What relationship does palliative care have on physician orders for CPR code status for COPD patients with LTOT admitted to a hospital?

$H_0$3: An inpatient palliative care consult for COPD patients with LTOT is not associated to a physician order for no CPR code status compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

$H_A$3: An inpatient palliative care consult for COPD patients with LTOT is less frequently ordered a no CPR code status compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Research Question 4: What relationship does palliative care have on hospital discharge to hospice services for COPD patients with LTOT admitted to a hospital?

$H_0$4: An inpatient palliative care consult for COPD patients with LTOT is not associated to hospital discharge to hospice services compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

$H_A$4: An inpatient palliative care consult for COPD patients with LTOT is less likely to be discharged to hospice compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

## Theoretical Foundation

The theoretical base for this study was Donabedian's (2005) quality improvement theory that focuses on three concepts: (a) structure, (b) process, and (c) outcome. This framework has been used to describe the assessment of quality of care has been applied to many health care situations. The structure is recognized as the physical and organizational constructs of care settings to include a healthcare environment or the human resources and qualifications of providers (Donabedian, 2005). The process focuses on the resources and mechanisms used in giving and receiving health care, and the outcome is the effects of the care provided such as health status or the degree of patient satisfaction outcomes (Donabedian, 2005). Donabedian's triad of structure, process, and outcome continues to be used as a foundation for healthcare quality today by linking valid measures of structure and process to outcomes without accounting for the patient, economic, or social factors outside of the healthcare system (Agency for Healthcare Research and Quality, 2007).

The structure, or setting, in this research was the acute care hospital environment with physician-driven palliative care consultants. The process, or care delivery and care coordination, was consulting palliative care for patients admitted with a COPD exacerbation with LTOT. The health outcomes were days spent in the ICU, days receiving invasive mechanical ventilator, physician orders for CPR, and likelihood of hospital discharge to hospice services (see Agency for Healthcare Research and Quality, 2007).

## Definitions

*Arterial oxygen saturation (SAO2)*: The percent of hemoglobin binding sites that carry oxygen in the blood (Jindal & Agarwal, 2012).

*Arterial partial pressure of oxygen (PAO2)*: The measurement of the oxygen content in the arterial blood (Jindal & Agarwal, 2012).

*Chronic obstructive pulmonary disease (COPD)*: An incurable, progressive lung disease often complicated by other comorbidities causing airway limitation characterized by dyspnea, increased sputum production, generalized weakness, and fatigue (Lilly & Senderovich, 2016).

*Invasive mechanical ventilation*: This procedure is often required in severe COPD patients admitted to the ICU if noninvasive ventilation cannot be used to improve respiratory acidosis. This may be initiated as a result of respiratory or cardiac arrest, hemodynamic instability, loss of consciousness, excessive secretions, or life-threatening hypoxemia (Mehta et al., 2016).

*Long-term oxygen therapy (LTOT)*: The administration of prolonged low-flow (1–3 liters per min) domiciliary oxygen for patients with chronic hypoxemia (PAO2 ≤ 55 mm Hg; Jindal & Agarwal, 2012, p. 639).

*Palliative care:* An interdisciplinary program consisting of physicians, nurses, social workers, chaplains, and other healthcare professionals that assists with managing care to relieve suffering and improve quality of life for patients with advanced or complex illness (Morrison et al., 2011).

*Pulse oximetry*: A test used to determine a patient's arterial oxygen saturation (SAO2; GOLD, 2017).

*Spirometry*: A pulmonary function test that measures the severity of airflow obstruction used as a diagnostic tool for COPD (Qaseem et al., 2011). A post bronchodilator spirometry of FEV1/FVC of < 0.70 is indicative of persistent airflow limitation (Qaseem et al., 2011). A post bronchodilator FEV1 of < 0.50 is an indicator of severe COPD (GOLD, 2017).

## Significance

The U.S. Department of Health and Human Services (2014) recognizes COPD as a significant public health burden. In the year 2013, over 15.7 million people reported a diagnosis of COPD in the United States, and in the following year 2014, an estimated 142,000 people died from COPD (U.S. Department of Health and Human Services, 2014). This was slightly less than the 155,500 people who died from lung cancer the same year (U.S. Department of Health and Human Services, 2014). COPD lends itself as the third leading cause of death in the United States (Centers for Disease Control and Prevention, 2017; U.S. Department of Health and Human Services, 2014).

In 2010, an estimated 700,000 patients were hospitalized for a primary diagnosis of COPD in the United States (Ford et al., 2015). Hospitals are fast-paced environments; palliative care services may be easily overlooked, unavailable, or not well understood by the provider managing patients' care. The prognosis for a patient with severe COPD is similar to a patient suffering from cancer; however, the COPD patient is less frequently considered to receive palliative care compared to patients with cancer and other chronic diseases (Beernaert et al., 2013; Brown, Engelberg, Nielsen, & Curtis, 2016; Hyasat & Sriram, 2016; Weingaertner et al., 2014).

There is little research investigating the role of palliative care for patients with severe COPD (Riffin et al., 2015). It is well known that severe COPD is affiliated with a high mortality, frequent hospitalizations, and expensive treatments (Batzlaff, Karpman, Afessa, & Benzo, 2014; Derosiers et al., 2014; Hajizadeh et al., 2015; Khandelwal et al, 2016; Philip et al., 2012; Piquet et al., 2013). However, there are few scientifically based recommendations for managing the health of the severe COPD patient population (Afrane, Sera, Holmes, & McPherson, 2016). I conducted this quantitative study to determine if palliative care serves an important role for patients suffering from severe COPD and LTOT specifically by analyzing days spent in an ICU, days on invasive mechanical ventilation, physician orders for CPR code status, and hospital discharge to hospice services.

## Nature of the Study

In this study, I employed a quasi-experimental, nonequivalent groups design with the use of preexisting data collected by patient medical record abstraction. This approach was most appropriate because the methods were practical, researcher bias was limited for validity and reliability of the findings, and the study posed little risk to the research participants. I divided the identified COPD hospitalized patient population into two groups: the intervention group, those with a palliative care consultation, and the dependent group, those without a palliative consultation. The covariates in the study were days spent in the ICU, days on invasive mechanical ventilator support, change in code status, and place of discharge over a 1-year period.

The sample I used in this study consisted of patient hospital admissions with a primary diagnosis of COPD and LTOT from hospital discharge dates of October 1, 2015 through October 31, 2016. The sample was identified based on corresponding admitting diagnosis codes (U.S. Centers for Medicare & Medicaid Services, n.d.). I chose the admitting diagnosis code in conjunction with a preexisting oxygen therapy code to define the scope of interest to COPD patients in advanced stages of the disease. Physician practice billing inquiries were used to identify the patients who received a palliative care consult. The time period was strategically chosen based on the implementation of International Classification of Diseases, 10th revision (ICD-10) medical billing coding system beginning October 1, 2015 (see U.S. Centers for Medicare & Medicaid Services, n.d.).

Research limitations included the use of nonequivalent comparison groups with a relatively small intervention group (less than 16%); the fact that variation in provider medical management and medication use was not considered; and the fact that the research sample was not risk stratified based on demographics, age, or other medical conditions. It is important to recognize that there are factors other than medical care that influences patient outcomes. Ideally comparative research under controlled environments strengthens outcome attribution; unfortunately, it is difficult to create a controlled environment in social science methodology (Donabedian, 2005).

I restricted this research to a single hospital geographic location with a robust palliative care consultation service largely populated with English speaking, White men and women. This created generalizability challenges in applying the results of this study as a normative standard of care throughout the United States healthcare system; however, the focus on established diagnosis codes and the review of palliative care operations gives insight on a segment of practice that can be replicated as an empirical standard derived in actual practice (see Donabedian, 2005). I collected patient demographics including gender, age, race, language preference, and ethnicity and factored them into the analysis.

## Summary

COPD is an incurable, complex chronic disease that progressively results in an increase in exacerbations resulting in hospitalizations (GOLD, 2017). COPD patients with respiratory failure or right heart failure may be appropriate for LTOT (Hajizadeh et al., 2015; Jindal & Agarwal, 2012). These patients are typically in the late disease stage of COPD with poor prognosis (Diaz-Lobato et al., 2015; Hajizadeh et al., 2015). Palliative care is recognized as a valuable service for managing complex disease; however, there is little specifically known about palliative care and COPD patient populations (Diaz-Lobato et al., 2015; Duenk et al., 2017; Riffin et al., 2015).

In the following literature review in Chapter 2, I will detail 26 quantitative research articles discussing criteria to trigger a palliative care consult, costs affiliated with COPD, mortality risk, end-of-life decisions, hospice enrollment, and general palliative care. There is little research examining the influence of palliative care on patients with COPD. With this literature review, I will demonstrate a gap in addressing the outcomes of palliative care services for patients suffering from severe COPD and LTOT specifically by analyzing days spent in an ICU, days on invasive mechanical ventilation, physician orders for CPR code status, and hospital discharge to hospice services.

# Chapter 2: Literature Review

## Introduction

Severe COPD is recognized as a significant cause of mortality and morbidity leading to costly health care interventions such as frequent hospitalizations, admissions to ICUs, and the need for invasive mechanical ventilation (Ford et al., 2015). According to the literature, COPD patients are recognized by providers as being appropriate for palliative care consultation but infrequently receive palliative care services (Duenk et al. 2017; Rush et al., 2017; Strang et al., 2013). My aim with this study was to better understand the outcomes of a palliative care intervention for hospitalized patients with severe COPD.

With my initial literature search, I aimed to identify a gap in the literature related to palliative care for hospitalized patients with COPD. A thorough search of the literature was performed accessing the electronic library databases of CINAHL, MEDLINE, and Google Scholar within the publication years of 2011 to 2017. In the databases, I used the following keyword search terms: *palliative care and invasive mechanical ventilation, palliative care and intensive care unit, palliative care and code status, palliative care, palliative care and discharge disposition, palliative care for hospitalized patients,* and *palliative care for COPD*. I also used the Boolean operator “and” to search palliative care and COPD. A separate search was conducted regarding Donabedian’s theory and quality assurance.

## General Findings

My literature search resulted in 26 quantitative research articles relevant to palliative care and/or patients with COPD. Thirteen of the studies were based in the United States, two in Australia, two in Italy, and the other countries of origin were Canada, Sweden, Brazil, Netherlands, South Africa, France, Taiwan, Germany, and Belgian. Fifteen of the studies were hospital based. The majority were retrospective involving medical record abstraction.

Rush et al. (2017) indicated palliative care consultation for COPD patients is on the rise but continues to be infrequently utilized routinely by health care providers (p. 45). Duenk et al. (2017) and Strang et al. (2013) surveyed respiratory health care clinicians regarding palliative care perceptions for patients with COPD. They determined health care clinicians recognize the importance of palliative care but may not know when to involve palliative care in the COPD disease trajectory. Batzlaff et al. (2014) and Hajizadeh et al. (2015) focused on the mortality risk and prognosis of patients with COPD indicating a significant risk of mortality following an ICU admission. Philip et al. (2012) noted 41.6% of 20,019 COPD patients died within 4 to 6 years of hospitalization. Piquet et al. (2013) and Hajizadeh et al. (2015) identified oxygen therapy as an associated risk of mortality.

Four studies compared outcomes of patients with COPD diagnosis to other diagnosis groupings determining severe COPD is similar to a patient suffering from cancer and other chronic diseases commonly involving palliative care (Beernaert et al., 2013; Brown et al., 2016; Hyasat & Sriram, 2016; Weingaertner et al., 2014). Five different groups of researchers analyzed palliative care and healthcare costs (Desrosiers et al., 2014; Khandelwal et al, 2016; McCarthy, Robinson, Huq, Philastre, & Fine, 2015; Morrison et al., 2011; Vitacca et al., 2011). Desrosiers et al. (2014) recognized a cost savings and decrease in length of hospital stay for patients attending a palliative program. Khandelwal et al. (2016) captured an estimated cost savings of a palliative care intervention by attributing 37% fewer ICU admissions and a 26% shorter length of ICU stay. Morrison et al. (2011) indicated a cost savings with palliative intervention with the most significant cost savings in the average intensive care costs per admission. Vitacca et al. (2011) analyzed COPD patients with home LTOT and costs over a 1-year period and McCarthy et al. (2015) researched palliative care and cost savings for patients with advanced COPD. Neither study demonstrated a cost savings among hospitalizations and palliative care.

I reviewed two studies regarding COPD patients’ end-of-life decisions for no resuscitation and the preference to die at home. Both studies revealed a disassociation between patients’ end of life wishes and the end of life care provided (Carlucci et al., 2016; Horton et al., 2013). Two studies examined palliative care in an ICU (Braus et al., 2016; Ramos, Correa, Tavares de Carvalho, Jones, & Forte, 2016) revealed patients receiving palliative care before the ICU referral had shorter hospital stays and a reduction in ICU length of stay. Two studies indicated palliative care increases the likelihood of hospice enrollment (Riggs et al., 2016; Reyes-Ortiz, Williams, & Westphal, 2014). Other noteworthy studies that I reviewed included two that researched pharmacologic impact on dyspnea and maintaining comfort on hospice service (Afrane et al., 2016; Gomutbutra, O'Riordan, & Pantilat, 2013), and a study conducted in an outpatient environment that linked palliative care to better management of symptoms, advance care planning, improved physical functioning, and higher self rated health status (Schroedl, Yount, Szmuilowicz, Rosenberg, & Kalhan, 2014).

## Theoretical Foundation

Donabedian (2005) wrote a classic article titled, “Evaluating the Quality of Medical Care,” published in *The Milbank Quarterly* in 1966. To this day, most medical care processes at the provider/patient level of interaction are evaluated using Donabedian’s conceptualization for quality of care in organized health care institutions (Berwick & Fox, 2016). The article was cited over 5,500 times in the year 2015 alone (Berwick & Fox, 2016). Donabedian’s methodology factors in structure, process, and outcomes in determining effectiveness and efficiency of health care (Berwick & Fox, 2016). Donabedian indicated that the relationship between structure and process has an influence on outcomes.

Donabedian (2005) referred to medical records as common sources of information for medical care process but also cautioned that the medical record itself may be evaluated or researched as a legitimate document of information. For example, Rush et al. (2017) used the diagnostic code V667 to identify palliative care services, and this code implied that “comfort care” is documented in a patient’s medical record. It was not clear if palliative care services were provided as a result or in conjunction with the documentation of “comfort care” (Rush et al., 2017). Donabedian suggested an alternative source of information about the process of care in the event a flawed medical record, such as direct observation. The alternative source of information identifying palliative care consultation in this study was the use of billing inquiries submitted by palliative care providers to validate that a consultation had indeed occurred.

The billing inquiries served as an identifier for a palliative care consult. The details surrounding the consultation was dependent on medical chart abstraction. Manual chart abstraction was necessary to obtain outcomes data. The following sections of this literature review will contain 20 research articles where clinical records were used as methods of obtaining data focusing on hospital and physician factors in addition to a process or chain of events that ultimately influenced quality of care or research outcomes (Afrane et al., 2016; Batzlaff et al., 2014; Beernaert et al., 2013; Braus et al., 2016; Brown et al., 2016; Chou, Lai, & Hung, 2013; Desrosiers et al., 2014; Donabedian, 2005; Hajizadeh et al., 2015; Hyasat & Sriram, 2016; Khandelwal et al., 2016; McCarthy et al., 2015; Morrison et al., 2011; Philip et al., 2012; Piquet et al., 2013; Ramos et al., 2017; Reyes-Ortiz et al., 2015; Riggs et al., 2016; Rush et al., 2017; Schroedl et al., 2014; Vitacca et al., 2011).

I chose to use Donabedian’s theory as the theoretical framework for this study because the degree of assurance is supported by previous research as reliable and valid despite a lack of precision or a controlled environment (see Donabedian, 2005). Donabedian (2005) argued that a strict focus on the technical management of illness pays little attention to prevention, the coordination and continuity of care, and the physician/patient relationship. Hospital-based palliative care services strive to enhance all of the above quality of care components.

## Palliative Care Trends and Perceptions for COPD Patient Populations

The use of palliative care among COPD patient populations has increased from the year 2006 to 2012 (Rush et al., 2017). Rush et al. (2017) examined a nation-wide COPD hospitalized patient population of 181,689 patients with a primary diagnosis of COPD exacerbation on home oxygen to determine patient factors associated with palliative care consultation (p. 42). Of the 181,689 patients sampled, 1.73% ($n = 3{,}145$) received palliative care as indicated by a V667 International Classification of Diseases, 9th edition (ICD-9) diagnostic code (Rush et al., 2017). This is a relatively small intervention group; nevertheless, Rush et al. noted a 4.5-fold increase in palliative care referrals from .45% in 2006 to 2.56% in 2012 ($p < .01$; p. 44).

Rush et al. (2017) used the Nationwide Inpatient Sample from the Agency for Healthcare Research and Quality to gather the research population and all inpatient medical care. The ICD-9 codes of 490x, 491.x, 492.x, 494.x, or 496x identified patients with COPD in their study. They defined an acute COPD exacerbation as the ICD-9 codes of 48x, 49121, 4912, 4941, or 490. Home oxygen was identified with the ICD-9 code V462 (Rush et al., 2017). They completed statistical analysis using Statistical Analysis Software (SAS), examined continuous variables via independent *t* tests, and used the Pearson chi-square test for ordinal and nominal data. Data were displayed as 95% confidence intervals as appropriate and a *p*-value of < .05 was considered statically significant (Rush et al., 2017). The researchers identified palliative care trends and variable outcomes with linear analysis and a multivariate logistic regression model. Variables examined included age, gender, healthcare insurance, socioeconomic status, race, and hospital size, location and region (Rush et al., 2017). The second set of variables examined included orders for no resuscitation, invasive mechanical ventilation, noninvasive mechanical ventilation, metastatic cancer, and non-metastatic cancer (Rush et al., 2017).

COPD patients receiving palliative care in this study were older by an average of 5 years, had a longer hospitalization (4.9 days vs 3.5 days), were less likely to have medical insurance, were more likely to die in the hospital (32.1% vs 1.5%), and were more likely to have a DNR order (29.0% vs 3.4%; Rush et al., 2017). Of those participants in the study who received noninvasive mechanical ventilation, 5% received palliative care, and of those who received invasive mechanical ventilation, 8% received palliative care (Rush et al., 2017). COPD populations with a cancer diagnosis were more likely to receive palliative care than those without cancer (Rush et al., 2017). Palliative care was more common in urban hospitals and less likely in small or rural hospitals (Rush et al., 2017).

The strength of Rush et al.’s (2017) study lay in the large sample size of 181,689 COPD patients with oxygen therapy but the study was slightly flawed due to the inconsistent use of the V667 ICD-9 codes for palliative care services throughout coding practices in the United States. The results of the study did not indicate if palliative care influenced the patients’ DNR status or decision for ventilator support (Rush et al., 2017). The racial majority receiving palliative care was White; however, Rush et al. (2017) noted substantial missing race data among the nonpalliative care group.

Researchers in two different studies conducted in Sweden and Netherlands surveyed respiratory medical professionals to better understand their role in providing palliative care (Duenk et al., 2017; Strang et al., 2013). Duenk et al. (2017) conducted a mail-based survey of 256 respiratory medical professionals across Netherlands questioning general aspects of palliative care for patients with COPD (five questions), identification of COPD patients for palliative care services (one question), the content of palliative care for patients with COPD (two questions), and the organization of palliative care (five questions; p. 300). Strang et al.'s (2013) web-based Swedish survey had 93 respiratory medical professionals respond with *yes, partly, no*, or *do not know* to the following five questions: (a) Do you consider any of your COPD patients as needing palliative care? (b) When a patient is considered as such, do you usually discuss palliative care with the patient and the family members? (c) Are there any established routines at your unit for patients with COPD to receive palliative care, if needed? (d) Are there any plans at your unit to develop, or further develop, palliative care services for patients with COPD? (e) According to World Health Organization, palliative care is focused on physical, psychological, social, and existential dimensions. To what extent do you provide support in each of these dimensions? (Strang et al., 2013, p. 182). Out of the 93 respiratory health care professionals surveyed in Strang et al.'s study, 85 (93%) considered their patients to be palliative care, but only 63 (69%) said they discuss palliative care when a patient is considered to be a palliative care patient. Only 32% (*n* = 29) had established palliative care routines for their patients, and only 20% (*n* = 18) had plans to develop palliative care services (Strang et al., 2013).

The descriptive statistical analysis conducted by Duenk et al. (2017) indicated 98.8% (*n* = 253) of respiratory medical professionals agreed that palliative care is desirable for patients with COPD (p. 301). Only 7.4% (*n* = 19) found no distinguished palliative care phase in the COPD disease trajectory (Duenk et al., 2017). Resuscitation status and treatment agreements in the form of advance care planning were identified as the important aspects of palliative care (82% and 80.1% respectively; Duenk et al., 2017). Despite the recognition of palliative care for COPD patients being important, few clinicians routinely incorporate palliative care in their practice (Duenk et al., 2017; Strang et al., 2013). Neither study captured palliative care referral rates or discussed COPD patient outcomes of providing palliative care.

## Mortality Risk and Prognosis

COPD is recognized as a significant cause of mortality and morbidity (Afrane et al., 2016). COPD is commonly complicated by an individual having additional chronic conditions such as diabetes or heart disease (Hajizadeh et al., 2015). People with advanced COPD frequently die from respiratory failure or cardiovascular disease as a systemic result of the disease (Hajizadeh et al., 2015). This creates challenges in accurately capturing and affiliating a COPD diagnosis in mortality and morbidity data. Despite such challenges, COPD is acknowledged as a major cause of death in most countries and is projected to be the third leading cause of death worldwide by 2030 (Faes et al., 2016). The unpredictable course of the COPD disease process creates a challenge of providing timely palliative care. Palliative care may not be routinely considered for the treatment of individuals with COPD because of the unknown disease trajectory and prognosis (Beernaert et al., 2013).

Patients admitted to the hospital with COPD and respiratory failure have a 2-year median survival, and approximately half of those patients who survive the hospitalization are readmitted within a six-month period from discharge (Hajizadeh et al., 2015, p. 294). Patient requiring invasive ventilator support during their hospitalization have an increased risk of mortality, a decline in functional status, are likely to be discharged to a nursing home, and are at risk for recurrent hospitalizations (Hajizadeh et al., 2015). Hajizadeh et al. (2015) researched three primary outcomes among Medicare beneficiaries with COPD and LTOT after being admitted to the ICU and receiving invasive mechanical ventilation: (a) in-hospital mortality and 12-month mortality, (b) all-cause hospital readmissions over a 12-month period, and (c) discharge to skilled nursing home (p. 294).

Patient characteristics were factored into the analysis using counts and proportions. Age was reported as a mean standard deviation value. Bootstrap methods estimated 95% confidence intervals, and a simple logistic regression was used to determine patient characteristics factors on mortality and readmission. A multiple logistic regression and backwards elimination variable selection algorithm estimated fully adjusted models (Hajizadeh et al., 2015).

Of the 4,791 Medicare beneficiaries hospitalized with COPD and LTOT requiring invasive mechanical ventilation studied; 23.3% died in the hospital, and 45.2% died within the following 12 months after hospital discharge (Hajizadeh et al., 2015). This indicates that hospitalized patients with COPD and LTOT requiring ventilator support have a 30% 1-year survival rate after being discharged from the hospital. Of the 77% who survived, 67.1% were hospitalized again within a 12 month period, and 26.8% who were not a previous nursing home resident were admitted to a nursing home within 30 days after hospital discharge (Hajizadeh et al., 2015). Indicating a decline in functional status, the increasingly complexity of COPD and an increased dependency on skilled clinical care as the disease progresses. This research did not consider palliative care influencing outcomes of readmissions to hospital, survival rates, and likelihood of nursing home discharge disposition.

Batzlaff et al. (2014) assumed that predicting 1-year survival for patients with COPD after an ICU stay would serve as an important model to indicate timely palliative care intervention. The retrospective cohort study analyzed the data of 591 patients from a medical ICU of a tertiary academic medical center in the United States. Patients' demographics, ICU admission diagnosis, Sequential Organ Failure Assessment score (SOFA), Acute Physiology and Chronic Health Evaluation III (APACHE III) score, ICU and hospital length of stay, and the use of invasive or noninvasive mechanical ventilation was abstracted from an APACHE III database. ICU, hospital, and 1-year mortality data were collected by reviewing survival status and date of death in the medical record (Batzlaff et al., 2014).

A univariate analysis followed by a stepwise multivariate logistic regression analysis was done to determine the variables affiliated with 1-year risk of mortality. The variables were categorized into subgroups, a nominal logistic analysis was done, odds ratio was used to assign scores to the sub groups, and scores were summed to generate a total mortality score for each patient (Batzlaff et al., 2014). A bootstrap analysis was performed for validity, the Hosmer-Lemeshow chi-square statistic done for model calibration, a Cox proportional hazards regression model was used to determine if the year of hospital admission affected the mortality rate, and a Kaplan-Meier survival curve was completed for the 1-year period.

Approximately 50% of the 591 patients died within a 1-year time frame after an ICU admission; 7% died in the ICU, and 15% died in the hospital (Batzlaff et al., 2014). Results of this study indicated age, ICU and hospital length of stay, use of noninvasive ventilation, and SOFA and APACHE III scores on the day of admission were associated with 1-year mortality (Batzlaff et al., 2014). Race, sex, or the use of invasive mechanical ventilation was not found to be statistically significant in association with 1-year mortality (Batzlaff et al., 2014).

Batzlaff et al. (2014) acknowledged a lack of important clinical variables such as body mass index (BMI), an assessment of dyspnea, FEV1, or cardiovascular comorbidities as a study limitation (p. 6). The findings were too vague for the development of a model to predict 1-year survival in COPD post ICU stay. This study offered little evidence supporting the prediction of 1-year mortality as an appropriate trigger for palliative care intervention.

An Australian retrospective cohort study abstracted hospital data of 20,019 individual patients with diagnosis of COPD defined as having the three-digit ICD-10-AM codes of; bronchitis, not specified (J40), simple and mucopurulent chronic bronchitis

(J41), unspecified chronic bronchitis (J42), emphysema (J43), other COPD (J44), asthma (J45) and status asthmaticus (J46) to better determine factors associated with mortality 6 months after an index hospitalization (Philip et al., 2012). There were 5.4% patients who died during the index admission, 13.2% who died within 6 months of the index admission, and 41.6% who died within 4-6 years; with the majority being hospital deaths (Philip et al., 2012). The data gathered consisted of the presence of comorbidities, hospital and admission type, ICU length of stay, ventilation, and hospital length of stay. The data were analyzed using multiple logistic regression. Similar to the findings of Batzlaff et al. (2014) age and a hospital length of stay greater than 16 days were found to be indicators of mortality risk in patients with COPD (Philip et al., 2012). Emergency hospital admissions, a prior hospital admission, and multiple comorbidities were also found to be associated with an increased 6-month mortality risk (Philip et al., 2012).

Another study associated long term oxygen therapy, first admission to an ICU, ICU length of stay, in-hospital treatment with oxygen therapy, increased duration of hospital stays, and discharge treatment with oxygen therapy as several risk factors affiliated with death (Piquet et al., 2013). The study involved 1,750 patients assessed for long term mortality, risk of death, and likelihood of hospital readmissions after an acute COPD exacerbation hospital admission in 68 French hospitals. Patient anthropometric and sociodemographic data, data surrounding characteristics of COPD and the acute COPD exacerbation, and data about the hospital care was collected and analyzed with SAS (Piquet et al., 2013). A Kaplan–Meier method was used to build a survival curve from 0 to 54 months and a multivariate Cox proportional hazard model was done for survival analysis (Piquet et al., 2013). The variables determined to be significant by a $p < 0.10$ in a univariate analysis (Piquet et al., 2013). The variables significantly associated with mortality were determined by a two-tailed *p*-value of 0.05 (Piquet et al., 2013).

Unlike the research conducted by Batzlaff et al. (2014), this study included important clinical variables in identifying patients characterized as high risk for mortality (Piquet et al., 2013). The clinical variables considered were low BMI, presence of lung cancer, presence of cardiovascular disease, previous hospitalizations for COPD exacerbations, clinical signs of severity, and the need for long term oxygen therapy at hospital discharge (Piquet et al., 2013). The identified mortality risk factors for patients hospitalized with a COPD exacerbation supports the notion that hospitalized COPD patients have a significant disease burden and mortality risk. Therefore; regardless of the timeliness of death, hospitalized COPD patients may benefit from palliative care services to better understand the disease trajectory to make informed decisions about future medical interventions (Batzlaff et al., 2014; Philip et al., 2012).

There is an increased risk for mortality in advanced COPD requiring frequent hospitalizations. Both Batzlaff et al. (2014) and Hajizadeh et al. (2015) found 1-year mortality rates ranging from 50% to 68% after an ICU stay, with a 15% to 23% likelihood of mortality during the course of hospitalization. Philip et al. (2012) also noted 41.6% of 20,019 COPD patients died within 4 to 6 years of hospitalization; with the majority being hospital deaths. Piquet et al. (2013)  identified oxygen therapy as an associated risk of mortality which may be why Hajizadeh et al. (2015) found a greater mortality rate of 68% studying COPD and LTOT patients compared to Batzlaff et al.

(2014) who found a mortality rate of 50% of COPD patients admitted to ICU regardless of oxygen or invasive mechanical ventilation therapies.

Hospital 30-day mortality rates and 30-day readmissions are hospital specific outcome measures for COPD populations in The Centers for Medicare & Medicaid Services Hospital Value-Based Purchasing and Hospital Readmissions Reduction Program. Both programs impact payments to hospitals based on quality of care as indicated by specific clinical outcomes (Quality Net, 2017). Palliative care services may help identify hospice needs or assist patients in making informed decisions about invasive medical treatments that may lead to alternative therapies preventing hospital mortalities and hospital readmissions.

The majority of palliative care research centers on cancer diagnoses (Lilly & Senderovich, 2016; Riffin et al., 2015). Weingaertner et al. (2014) suggested that symptoms and disease burden of COPD are equivalent to that of lung cancer in a cohort study. The study participants were recruited from an inpatient and outpatient clinic in Oldenburg, Germany. A series of telephone interviews were conducted to gather data relating to breathless symptoms, functional status, distress, and palliative care needs overtime in lung cancer patients (*n* = 32) and COPD Stage III or IV GOLD classification patients (*n* = 50; Weingaertner et al., 2014, p. 570). Forty one percent of the study participants (26 COPD and eight lung cancer) completed the study in a 12-month period. Weingaertner et al. (2014) indicated that COPD patients reported continuous shortness of breath and limited functional status more frequently than lung cancer patients. Severity of breathlessness increased in patients with lung cancer as the disease progressed. Both groups had similar meaningful levels of distress and palliative care needs (Weingaertner et al., 2014).

This study had a high participant dropout rate of 21 COPD patients and 14 lung cancer patients who did not complete 12 months of telephone interviews. There were three COPD participant deaths and 10 lung cancer participant deaths. This was an exploratory study that did not factor in medical management and the underlying causes of disease distress (Weingaertner et al., 2014).

A Belgian population based retrospective study conducted surveys completed by general practitioners examining 1,197 patients who died from COPD, heart failure, cancer, or severe dementia to better understand palliative care referral practices among the four disease groupings (Beernaert et al., 2013). The researchers conducted Pearson chi-square tests to explore the differences in the disease groups, treatment goals of those not referred to palliative care, and demographics in each disease group. Nonparametric Kruskale-Wallis test was used to examine differences in timeliness of palliative care referrals. A multivariate binary logistic regression was done to control for effects of patient demographics and for each disease group using Statistical Package for the Social Sciences (SPSS) analysis software (Beernaert et al., 2013).

Patients with COPD (20%) were less often referred to palliative care in comparison to patients with heart failure (34%), severe dementia (37%), or cancer (60%) within the last three months of life (Beernaert et al., 2013). In regards to treatment goals, patients with COPD were more likely to receive curative or life prolonging treatment in the last 3-months of life compared to those with heart failure, dementia and cancer

(Beernaert et al., 2013). The researchers did not find an affiliation between sociodemographic characteristics and the timing of onset of palliative care services among the four disease groups (Beernaert et al., 2013). The difficulty in interpreting COPD disease trajectory and an under recognition of disease severity may explain why practitioners are more likely to pursue life prolonging treatment without considering a referral to palliative care services (Beernaert et al., 2013).

A retrospective study identified and compared patients who died in a hospital from COPD ($n = 34$) or lung cancer ($n = 55$) in The Gold Coast Health Service District in Australia to evaluate the differences in palliative care services, end-of-life care, management plans, and diagnostic tests performed on the last hospital admission (Hyasat & Sriram, 2016). Statistical analysis was done using SPPS Version 22.0. Normally distributed data comparisons between the two groups were assessed by student *t* test. Nonparametric distributed data were assessed by a Mann-Whitney *U* test. A *p*-value of $< .05$ was considered statistically significant.

The COPD population were older than the patients with lung cancer (median age 81 vs 69 years, $p < .001$). In the 12-months prior to death lung cancer patients had more frequent hospitalizations and outpatient appointments when compared to patients with COPD. Acute resuscitation on the last hospital admission prior to death occurred in 82% of patients with COPD and in 59% of patients with lung cancer. Palliative care occurred more frequently in patients with cancer than patients with COPD (50% vs 9%, $p < .001$) (Hyasat & Sriram, 2016). Similar to the findings of Beernaert et al. (2013) patients with COPD received more life prolonging treatment than patients with cancer (Hyasat &

Sriram, 2016). Providing life prolonging treatments on the last hospitalization prior to death may explain the association of higher costs for patients with COPD compared to patients with lung cancer.

Palliative care implementation for patients with COPD (*n* = 592) and/or interstitial lung disease (ILD; *n* = 79) were compared to patients with metastatic cancer (*n* = 158) who died in ICUs (Brown et al., 2016). Trained abstractors conducted retrospective medical record review to obtain data. The outcome variables were the presence or absence of CPR within an hour of death, pain assessment within 24 hours of death, a do-not-resuscitate (DNR) order at time of death, discussion of prognosis within the first 72 hours of ICU admission, consultation with palliative care experts, spiritual care involvement, withdrawal of life sustaining treatments, and presence of an advance directive (Brown et al., 2016).

The two groups were analyzed using Pearson's chi-squared test for sex, race, ethnicity, and marital status, and one way ANOVA for age, hospital length of stay, and ICU length of stay. The association of disease with all outcomes were tested with logistic regression models for the dichotomous palliative care outcome variables, and linear regression models for length of stay outcomes. Statistical significance for all tests of association between diagnosis and outcome was set at $p < 0.05$ (Brown et al., 2016). Findings suggested that patients with COPD were less likely to avoid CPR in the hour before death than patients with metastatic cancer (*OR*, 0.43; 95% CI, 0.20–0.90). Patients with ILD or COPD were less likely to have a DNR order in place at the time of death compared to metastatic cancer patients (*OR*, 0.40; 95% CI, 0.19–0.86; and *OR*, 0.49; 95%

CI, 0.27–0.86, respectively). Patients with ILD or COPD were less likely to have documentation of prognoses discussions compared to patients with metastatic cancer (*OR*, 0.36; 95% CI, 0.19–0.66; *OR*, 0.62; 95% CI, 0.43–0.90, respectively). Hospital and ICU length of stay was longer in patients with COPD than those with metastatic cancer. No significant differences were found for palliative care consultation, spiritual care involvement, life support withheld or withdrawn, and presence of advance directives (Brown et al., 2016).

This research strictly focused on palliative care elements provided after the patient was admitted to the ICU with the conclusion that patients with ILD and COPD are less likely to receive elements of palliative care than metastatic cancer patients (Brown et al., 2016). This may be due to patients with COPD being misidentified as not having palliative care needs due to the under recognition of disease burden and symptom distress (Diaz-Lobato et al., 2015; Meffert, Hatami, Xander, & Becker, 2015). Further research is needed to gain a better understanding of the benefits of palliative care in relation to patients with severe COPD.

## Palliative Care and Cost Savings

Palliative care may decrease costs of hospital inpatient stays by potentially reducing length of hospital stay, limiting time spent in the ICU, reducing hospital readmissions, and increasing hospice referrals; thereby, avoiding hospitalizations and limiting prolonging life treatments near end of life (Hughes & Smith, 2014). Desrosiers et al. (2014) conducted retrospective research based on medical record review of deceased patients with primary diagnosis of cardiovascular disease, cardiac failure, respiratory disease, renal failure, cardiac failure and respiratory disease, cardiac failure, renal failure and respiratory disease, renal failure and cardiac failure, renal failure and cardiovascular disease, cancer, and cancer and cardiovascular disease. The intervention group (*n* = 56) attended a weekly outpatient group clinic known as “Abundant Life” ran by a multidisciplinary team in a small urban South African hospital with a total of 158 beds (Desrosiers et al., 2014).

The control group (*n* = 48) met intervention criteria but died prior to the existence of “Abundant Life.” The clinic physician provided palliative care in Week 1 with other disease specific interventions (Desrosiers et al., 2014). Week 2 consisted of physiotherapy and occupational therapy, and Week 3 provided social work guidance and spiritual counseling (Desrosiers et al., 2014, p. 788). The aim of the study was to determine if the outpatient clinic impacts hospital admissions, costs, and place of death compared to similar patients who did not attend the clinic (Desrosiers et al., 2014).

The mean number of admissions and length of stay was assessed using a Mann Whitney U test (Desrosiers et al., 2014). The mean number of admissions in the control group was 1.98 compared to 1.39 for the intervention group (Desrosiers et al., 2014). The mean total number of length of days per hospital admission was 9.3 days for the control group and was lower at 4.52 days for the intervention group (Desrosiers et al., 2014). Costs for the intervention group were approximately half the costs of the control group (Desrosiers et al., 2014). There were 33 of the 56 in the intervention group who died at home compared to nine of the 48 patients who died at home in the control group (Desrosiers et al., 2014).

I identified the following several study limitations. This study had a small population sample of less than 100 deceased patients with 33% in the intervention group with a respiratory disease, 29% in the control group with a respiratory disease (see Desrosiers et al., 2014). The costs were not comprehensive to include palliative care administration costs, nursing costs, and training (Desrosiers et al., 2014). It is difficult to attribute study outcomes to palliative care services because palliative care was provided as part of a larger, unique multidisciplinary clinic oppose to a more traditional hospital consultative team model (see Desrosiers et al., 2014).

Data collected from medical inpatient record reviews and claims data at five hospitals in Dallas-Fort Worth, Texas compared direct costs incurred for palliative care patients to direct costs incurred for non-palliative care patients from January 2009 through June 2012 (McCarthy et al., 2015). McCarthy et al. (2015) analyzed cost savings results based on primary diagnosis, the timing of the palliative care consult, and patients who died in the hospital versus patients discharged alive. The discharged alive non-palliative group consisted of 35,574 patients matched to a group of 1,816 palliative care patients (McCarthy et al., 2015). There were 1,246 non-palliative care patients who died in the hospital matched to 572 palliative care patients who died in the hospital (McCarthy et al., 2015).

Palliative care patients were matched to a non-palliative care patient group based on primary diagnosis, diagnosis present on admission (POA), Charleston comorbidity index, payer type, race, gender, age, and hospital (McCarthy et al., 2015). Matching was finalized with a propensity score matching algorithm within a radius of 0.20 standard deviations of the logit of propensity score (McCarthy et al., 2015). Patients were matched discharged alive versus discharged deceased with logistic regression propensity scoring (McCarthy et al., 2015). A series of weighted generalized linear model (GLM) regressions were applied to timing of consult, diagnosis, and hospital cohorts (McCarthy et al., 2015). To determine the maximum cost savings in relation the timing of the palliative care consult the models were further examined at what day during the hospitalization course the palliative care consult occurred (McCarthy et al., 2015). Due to the nonlinear GLM regressions in relation the timing of the palliative care consult, diagnosis, and hospital cohorts, the cost savings were interpreted with the application of bootstrapping to estimate the dollar value effects in each model and the respective 95% confidence intervals (McCarthy et al., 2015, p.228).

McCarthy et al. (2015) revealed differences in palliative care cost savings across diagnoses, hospitals, and time of consult. Patients discharged alive diagnosed with cancer and cardiovascular diseases were associated with palliative care cost savings (McCarthy et al., 2015). Patients discharged alive with an infection or pulmonary disease was not associated with a palliative care cost savings (McCarthy et al., 2015). Among the patient populations who died in the hospital results indicated a palliative care cost savings for cancer diagnosis, cardiovascular disease, and infection (McCarthy et al., 2015). The results did not identify a palliative care cost savings for those who died with a pulmonary diagnosis (McCarthy et al., 2015). McCarthy et al. (2015) indicated that earlier hospital stay palliative care consults are associated with a greater cost savings but did not analyze the timing of palliative care consults within each of the diagnosis groupings. The authors did not make any generalizations regarding what attributed to the specific cost savings in the palliative care groups (see McCarthy et al., 2015).

Another study conducted in four urban New York State hospitals examined a palliative care program impact on the cost reduction for Medicaid patients by comparing hospital costs of patients receiving palliative care compared to patients receiving usual care without palliative care involvement (Morrison et al., 2011). The patients included had advanced disease in metastatic solid tumor malignancies; metastatic melanoma, local advanced head and neck cancer, locally advanced pancreatic cancer, HIV/AIDS, liver disease with cirrhosis, congestive heart failure or chronic obstructive pulmonary disease with two or more hospitalizations within a 6-month time period; and patients with a 5 day or greater ICU stay (Morrison et al., 2011). Data were not analyzed based on the individual inclusion criteria (Morrison et al., 2011). Patients were grouped by patients discharged alive and patients who died in the hospital (Morrison et al., 2011).

There were 296 patients that received palliative care and discharged alive matched to 1,427 patients who received usual care without palliative care and discharged alive (Morrison et al., 2011). Likewise, there were 185 patients that received palliative care and died in the hospital that were matched to 149 patients who received usual care without palliative care and died in the hospital (Morrison et al., 2011). The costs were divided into categories of ICU, pharmacy and intravenous therapies, laboratory work, and diagnostic imaging (Morrison et al., 2011). The researchers indicated that patients who received palliative care had lower costs per day after the consultation than those without palliative care consultation at an estimated cost savings of $666 per day for patients discharged alive and an estimated cost savings of $844 per day for patients who died in the hospital (Morrison et al., 2011, p.458). The most significant cost savings were seen in the average intensive care costs per admission (Morrison et al., 2011). The COPD population represented less than 2% of the sampled population (Morrison et al., 2011). Unlike the research conducted by McCarthy et al. (2015) this study did not determine estimated cost savings per diagnosis groupings.

Khandelwal et al. (2016) analyzed costs affiliated with patients who were admitted and died in the ICU and the role of palliative care interventions. The researchers reviewed the financial records of 572 patients who died in the ICU over a 2-year period (Khandelwal et al., 2016). Demographic and clinical data was collected to include age, gender, race, education, insurance type, diagnosis, ICU and hospital length of stay, code status, and life-sustaining treatments (Khandelwal et al., 2016). The cost data were categorized by cause of death, clinical service, ICU type, and insurance type (Khandelwal et al., 2016). Cause of death was classified further by trauma, cancer, cardiac, respiratory, neurological, and other (Khandelwal et al., 2016).

The median ICU stay was 3 days (Khandelwal et al., 2016). Costs represented overhead costs, labor costs, and supply costs on each hospital day and were categorized by direct fixed costs, direct variable costs, and indirect costs (Khandelwal et al., 2016). Generalized estimating equations and independent correlations tested day 1 and day 2 ICU costs and compared the cost differential between the 2 days (Khandelwal et al., 2016). An equivalence test of the linear trend was used to determine differentiating costs after day 2 of an ICU stay (Khandelwal et al., 2016). To capture the estimated cost savings of a palliative care intervention it was assumed advance care planning attributed to 37% fewer ICU admissions and palliative care consultation resulted in a 26% shorter length of ICU stay (Khandelwal et al., 2016).

Of the 572 patients who died in the ICU 90% were intubated on mechanically invasive ventilation within the last week of life (Khandelwal et al., 2016). The researchers indicated an average total cost per patient to be 39.3K +/- 45.1K with 45% representing direct fixed costs, 20% variable costs, and 34% indirect costs (Khandelwal et al., 2016). Khandelwal et al. (2016) used a COPD patient with the preference to die at home as an example of an assumed cost savings from advance care planning and palliative care interventions (p. 1174). The direct variable cost savings for advance care planning was estimated at $6,200, and the direct variable cost savings from palliative care was estimated at $1,300 for that particular patient. This assumes advance care planning could prevent a 6.5 day ICU stay, and palliative care could reduce length of stay by 1.7 days (see Khandelwal et al., 2016). This study effectively demonstrates the costs affiliated with an ICU stay among the 572 patients who died in an ICU; however, the cost savings affiliated with palliative care and advance care planning are assumed and questionable.

Vitacca et al. (2011) described ICU costs as 39% of the total average cost per year per patient with advanced COPD (p. 212). The researchers for this Italian based prospective research looked at 30 COPD patients with home noninvasive mechanical ventilation, 12 COPD patients with home invasive mechanical ventilation, and 41 COPD patients with home LTOT and analyzed costs over a 1-year period (Vitacca et al., 2011).

The patients included in the study were prescribed ventilation or oxygen therapy upon discharge from a respiratory department (Vitacca et al., 2011).

Clinical anthropometric, functional and a premorbidity life style score was collected at baseline (Vitacca et al., 2011). The 1-year follow up period consisted of collecting mortality data, number of exacerbations and pharmaceutical interventions, emergency room, hospital and ICU admissions, and number of urgent calls to the general practitioner. Acute costs were defined as unitary reimbursement by the national Diagnosis Related Group per single performance and calculated by multiplying the number of events (Vitacca et al., 2011, p. 208). Chronic costs were defined as unitary reimbursement for home care computed as daily cost related to LTOT, noninvasive mechanical ventilation rent, and invasive mechanical ventilation rent and calculated by multiplying the number of days in use (Vitacca et al., 2011, p. 208).

The descriptive data were expressed as mean, standard deviation, or standard error of mean, range, or percentages (Vitacca et al., 2011). The three groups and variables were assessed with a one way ANOVA for multiple comparisons with Bonferroni's correction (Vitacca et al., 2011). A Levene test was used for homogeneity of variances and the Welch and Brown-Forsythe statistics were used in cases of inequality of the variances (Vitacca et al., 2011). An unpaired two-tailed *t* test was used to assess differences in variables with a *p*-value <0.05 considered statistically significant (Vitacca et al., 2011).

Vitacca et al. (2011) limited the mean follow up time from 1-year to 10 +/- 3.4 months due to a 51% mortality of patients who initially met inclusion criteria and were enrolled. This coincides with other research findings of >50% mortality rates of advanced COPD patients within a 1-year post hospital discharge (Batzlaff et al., 2014; Hajizadeh et al., 2015). The overall mean health care cost per day per patient was 96±112€ (72% acute care costs and 28% chronic care costs) totaling up to 34,820€ per patient per year (Vitacca et al., 2011). No significant cost difference was found among the three groups (Vitacca et al., 2011).

Research conducted by Vitacca et al. (2011) was inconclusive regarding palliative care and cost savings for patients with advanced COPD. McCarthy et al. (2015) did not identify a palliative care cost savings among hospitalized patients who died with a pulmonary diagnosis, or among patients discharged alive with a pulmonary disease. Unlike Morrison et al. (2011) who found a palliative care cost savings of $666 per day for patients discharged alive and an estimated cost savings of $844 per day for patients who died in the hospital but had a COPD population of less than 2% in the sample (Morrison et al., 2011). COPD has a severe health care cost burden, especially the intensive care costs per hospital admission (Khandelwal et al., 2016; Morrison et al., 2011; Vitacca et al., 2011). Further research is needed to determine if palliative care corresponds to decreased ICU stays potentially reducing health care costs.

## End of Life Preferences Among Patients with Severe COPD

Several studies suggested that COPD patients' end of life decisions for no resuscitation and the preference to die at home are infrequently honored (Carlucci et al., 2016; Chou et al., 2013; Horton et al., 2013). Chou et al. (2013) reviewed the medical records of 91 hospitalized COPD patients with (*n* = 17) and without (*n* = 74) palliative care who expired in Saint Paul’s Hospital located in Taoyuan, Taiwan. The COPD patients suffered from end stage lung disease with comparable symptoms to the GOLD criteria Stage III or Stage IV (Chou et al., 2013). Patients were either referred to palliative care by their primary care physician or recruited by the palliative care team based on a signed DNR consent form. Data collection included patient demographics, pulmonary function test, medical costs, length of hospital stay, length of ICU ventilator support, procedures and treatments, medications, DNR status, and hospice care referrals. Data were analyzed using SPSS 17.0 statistical software (Chou et al., 2013).

No significant difference was found in the rate of ICU care, length of ICU stays, and ventilator support; however, the frequency of ventilation was higher in the non-palliative care group (57% vs. 29%, $p = 0.04$). Patients receiving palliative care had a higher rate of DNR consents (100%). The researchers did not indicate if the DNR consent was obtained before or after the palliative care intervention. Despite the DNR consents, 44% of patients received CPR. This may be an indication of unwanted heroic measures in an attempt to prolong life oppose to providing comfort care and symptom relief (Chou et al., 2013). Fifteen of the patients received palliative care based on a family member request and the other two patients received palliative based on personal request. None of the patients in the study were referred to palliative care by their primary care physician (Chou et al., 2013). The authors concluded that palliative care was underutilized for patients suffering end stage COPD and end of life care is not routinely considered (Chou et al., 2013).

A Canadian study conducted by Horton et al. (2013) researched 30 severe COPD patients and 18 caregivers in their homes over a 6-month period. The patients and caregivers received education about end of life issues; such as, mechanical intervention, rehabilitation information, a written COPD action plan, and other related education (Horton et al., 2013). After the education program was completed, patients were enrolled in a 4-month home health integrated palliative care program (Horton et al., 2013). Demographic data and validated quantitative questionnaires about quality of life, symptoms, and care satisfaction were collected at baseline, 2-months, and 4-months after enrollment. Hospital admissions, emergency room visits, and mortality data to include location of death, documented goals of care, and DNR orders were also collected (Horton et al., 2013). The place of death was compared to the patients' stated preference for place of death collected at baseline (Horton et al., 2013).

Twenty five patients and 14 caregivers completed the two phase intervention; four died and one dropped out of the study (Horton et al., 2013). The researchers identified challenges in study population recruitment and questionnaire completion (Horton et al., 2013). Within a 1-year period 53% of study participants died (Horton et al., 2013). Results indicated dyspnea as the most prevalent symptom (Horton et al., 2013). The most significant finding was 12 of the 17 deaths indicated a preferred preference to die at home during the baseline collection period; none of the deaths occurred at home (Horton et al., 2013).

Another prospective study conducted in Italy used a semi structured interview with a scenario based decision aid to determine 43 severe COPD patients' end of life preferences (Carlucci et al., 2016). The decision aid consisted of detailed information regarding intubation and invasive mechanical ventilation, noninvasive mechanical ventilation as ceiling treatment, and no mechanical support. Data regarding patient demographics, education level, religion, bereaved loved one within 12-months, living condition, use of ventilation or oxygen, previous intubation, pathology awareness, and confidence in physician were collected at baseline. A 20-item questionnaire was provided to determine depressive symptoms and a Maugeri Respiratory Failure questionnaire was used to determine wellbeing and health status (Carlucci et al., 2016).

The quantitative variables were distributed by median and percentiles and nonparametric tests applied (Carlucci et al., 2016). A Fisher exact test was used for association variables, a Wilcoxon Rank-Sum test or Kruskal-Wallis test was used to test differences by categorical subgroups, and an exact binomial test was used to determine the presence of statistically significant differences between observed and expected choices (Carlucci et al., 2016). A multivariate stepwise logistic regression was applied with variables showing a statistically significant *p*-value of <0.05 (Carlucci et al., 2016).

Of the 43 research participants, the majority was on LTOT, 44% used noninvasive mechanical support, and 29% had been previously intubated (Carlucci et al., 2016). The participants receiving noninvasive mechanical support mostly chose the noninvasive mechanical ventilation as a ceiling treatment (66.7%; Carlucci et al., 2016). The patients who preferred intubation were more likely to have low education levels (OR = 15.71, 95% CI = 1.65-402.41, *p*-value = 0.034), take antidepressant drugs (OR = 0.06, 95% CI = 0.01-0.53, *p*-value = 0.028), and have previous experience with intubation (OR = 46.67, 95% CI = 3.24-2680.49, *p*-value = 0.019). Higher education levels had the strongest affiliation with choosing no ventilator support (OR = 12.94, 95% CI = 1.98-259.38, *p*-value = 0.024; Carlucci et al., 2016).

Similar to the research of Chou et al. (2013) and Horton et al. (2013) about half of those who indicated end of life preference at the interview phase was honored at the time of death (Carlucci et al., 2016). Twenty two of the 43 patients died under either invasive or noninvasive mechanical support; 37% preferred comfort measures without ventilation. A caregiver interview indicated that only four changed their end of life preference prior to death (Carlucci et al., 2016). It is difficult to attribute the decision aid as an influence of end of life preference considering most of the research participants previously experienced mechanical support (Carlucci et al., 2016).

Palliative care may have an important role in clarifying a patient's goals of care but none of the studies indicate palliative care as an influence of end-of-life treatment decisions. There is a disassociation between a patients end of life wishes and the end of life care provided (Carlucci et al., 2016; Chou et al., 2013; Horton et al., 2013). Further research is needed to determine if palliative care can influence shared decision making among patients and providers.

## Palliative Care in an ICU

An estimated 20% of Americans die in an ICU or shortly thereafter (Braus et al., 2015; Ramos et al., 2017). Research indicates that palliative care may reduce time spent in an ICU (Braus et al., 2015; Ramos et al., 2017). Two studies examined palliative care in an ICU setting (Braus et al., 2015; Ramos et al., 2017). Ramos et al. (2017) researched

2,476 ICU patients; 7% (*n* = 179) with a palliative care services and urgent ICU referral in the same hospitalization over a 1-year period in Australia (p. 25). The researcher aimed to compare clinical characteristics of patients with concurrent ICU and palliative care referrals to patients with ICU referrals alone at the time of an urgent ICU referral (Ramos et al., 2017). The palliative care group was further divided into patients with a palliative care referral prior to the urgent ICU referral (*n* = 29, 16%), and patients with a palliative care referral after the urgent ICU referral (*n* = 150, 84%; Ramos et al., 2017).

Statistical analysis was completed with SPSS Version 13.0 software. Means and median differences were done with ANOVA or Mann-Whitney *U* test. A multiple logistic regression identified variables independently associated with palliative care. The variables associated with palliative care were found significant with univariate analysis. Wald statistic stepwise procedure with backward elimination, and the Hosmer and Lemeshow statistic goodness of fit was used to develop the final covariate model. A two-tailed *p*-value < .05 was considered significant (Ramos et al., 2017).

Upon ICU cohort assessment Ramos et al. (2017) found that ICU and palliative care referral patients were less likely to be admitted to the ICU (88 [49.3%] vs 1463 [64.0%]; odds ratio 0.54; 95% CI, 0.40 – 0.74; p. 26). Those referred to palliative care and ICU were older with higher severity of illness scores, had higher mortality, more likely to be transferred to other facilities, more likely to have a previous cancer diagnosis, depressed level of consciousness, and longer length of hospital stay before ICU referral compared to ICU only patients (Ramos et al., 2017). Patients receiving palliative care before the ICU referral had shorter hospital stays (median, 19.0 [IQR, 8.5 – 26.5] vs 32.0

[IQR, 15.5 – 52.0] days; *p* = .003) and had a shorter ICU stay (median, 2.0 [IQR, 1.5 – 24.0] vs 12.0 [IQR, 5.0 – 21.0] days; *p* = .065; Ramos et al., 2017). This study was not exclusive to COPD patient diagnosis.

Braus et al. (2016) conducted a two phase prospective study comparing 100 patients in an initial usual ICU care phase, and 103 patients in an intervention phase consisting of a palliative care nurse specialist rounding with intensivists for high risk ICU patients. The aim of the study was to determine the proportion of patients with a documented interdisciplinary family meeting while in the ICU, timing of the family meeting, ICU and hospital length of stay, mortality, family satisfaction, and family member psychological burden (Braus et al., 2016). Similar to Rush et al. (2017) the continuous variables were examined via independent *t* tests, and Pearson's chi-squared test was used for ordinal and nominal data (Braus et al., 2016). The Wilcoxon-Mann-Whitney test assessed length of stay variables, a multivariable logistic regression was used for documented family meetings, and a multivariate Poisson regression was used for time of ICU admission to documented family discussion (Braus et al., 2016).

During the usual care phase 35% out of 100 ICU patients had a documented interdisciplinary family meeting compared to 53% out of 103 ICU patients in the intervention phase (Braus et al., 2016). The median number of days between the ICU admission and family meeting was shorter in the intervention phase (3 days) compared to the usual care phase (5 days; Braus et al., 2016). The physician order for a full palliative consultation did not differ among the two groups (Braus et al., 2016).

Braus et al. (2016) found no significant difference in the ICU length of stay (*p* = 0.22) or ICU mortality (27% vs 28%), and no significant difference in discharge destination. Among the patients who died in the ICU the intervention group had a 19% reduction in ICU length of stay (95% CI 33 – 1% shorter, *p* = 0.043; Braus et al., 2016). Hospital length of stay was 26% shorter in the intervention group compared to the usual care group (95% CI 31 – 20% shorter, p < 0.001; Braus et al., 2016). There were no significant differences found in total family satisfaction and family member psychological burden (Braus et al., 2016). This study was not exclusive to COPD patients and did not analyze outcomes when a full palliative care consultation occurred.

## Palliative Care and Discharge Disposition

Patient discharge options after an acute care hospitalization include, but are not limited to, home, hospice, rehabilitation, long term acute care, skilled nursing facility, death, or home with home health or home hospice (Reyes-Ortiz et al., 2015). Continuing healthcare management of COPD is a medical necessity after an acute exacerbation requiring hospitalization. The place of discharge impacts the care continuum and varies in direct and indirect cost depending on the level of care needed. Reyes-Ortiz et al. (2015) examined early palliative care intervention for 531 frail and elderly hospitalized patients and the association with number of days from palliative care consults to hospital discharge and place of discharge. Patient demographics were considered, and with use of ICD-9 codes, patient diseases were classified by cancer, congestive heart failure, respiratory failure, infections, debility, dementia, stroke, and other diagnosis (Reyes-Ortiz et al., 2015). Palliative care consults were initiated by the attending physician and grouped as early palliative consults and late palliative care consults for comparison. Early palliative care consults were defined as 3 days or less after hospital admission, and late palliative care consults were defined as greater than 3 days after hospitalization (Reyes-Ortiz et al., 2015).

Data were analyzed with SPSS statistics software. Descriptive statistics were displayed as % or mean +/- standard deviation, a chi-square test was used for categorical variables, and a *t* test for continuous variables (Reyes-Ortiz et al., 2015). The association affiliated with early palliative care consultation was examined with a multivariate analysis, ORs was calculated with a logistic regression model, a multivariate analysis tested days to discharge, and a multivariate ANOVA was used to analyze discharge outcomes (Reyes-Ortiz et al., 2015).

Early palliative care consultation was affiliated to fewer deaths in the hospital (13.7% vs 21.2%), higher deaths in hospice after hospitalization (53% vs 45.4%), fewer hospital days from consultation to discharge (means 4.2 vs 5.4, $p = .007$), and lower length of hospital days (means 5.4 vs 16.6, $p = < .001$; Reyes-Ortiz et al., 2015). Patients with a congestive heart failure diagnosis were more likely to have an early palliative care consult, and patients with respiratory disease and infections were more likely to have a late palliative care consult (Reyes-Ortiz et al., 2015, p. 518).

Another United States based study among patients receiving palliative care examined the likelihood of hospice enrollment after referral to a palliative care community-based service, and the duration of palliative care enrollment prior to hospice (Riggs et al., 2016). This study consisted of 1,505 community based palliative care patients assessed for hospice eligibility (Riggs et al., 2016). Those deemed appropriate for hospice care required a referral from the primary care physician and further discussions ensued with the patient and family (Riggs et al., 2016). If an agreement existed for hospice services, options to choose from various hospice providers in the area were presented to the patient or the patient's care giver (Riggs et al., 2016).

Similar to Reyes-Ortiz et al. (2015) patients were grouped by ICD-9 codes for cancer, neurodegenerative disease, COPD, congestive heart failure or other cardiac disease, chronic renal failure, cirrhosis, and other (Riggs et al., 2016). Demographics were collected and an analysis was performed in SPSS and SAS statistical software programs. A univariate, bivariate, chi-square test or Fisher exact test and multivariate analysis was used to analyze data.

This study consisted of a diverse patient population ranging in ages 1 to 100 years old (Riggs et al., 2016). The average age was 70.4 years old with a total of 28 children enrolled in palliative care out of the 1,505 (Riggs et al., 2016). There were 32.9% White, 29.8% Black, 28.6% Hispanic, and 5.4% Asian enrolled in the study (Riggs et al., 2016). Approximately 31% spoke language other than English and approximately 20% lived in zip codes affiliated with poverty level or below poverty level (Riggs et al., 2016). The majority of patients had either a cancer diagnosis (*n* = 520) or cardiac diagnosis (*n* = 396; Riggs et al., 2016).

There were 200 patients who died while on palliative care service (Riggs et al., 2016). Those who enrolled in hospice had a mean length of stay of 146.4 days on palliative care; the mean length of stay on hospice service was 86 days (Riggs et al., 2016). Hospice enrollment was more likely for patients with shorter palliative care duration, cancer diagnosis, increased debilitation, and nonpoverty residency (Riggs et al., 2016). Those with a shorter palliative care enrollment included Asian or White populations, spoke languages other than English, and had a cancer or cirrhosis diagnosis (Riggs et al., 2016).

This data was inconclusive regarding the likelihood of early hospice enrollment for palliative care patients (Riggs et al., 2016). The research was confined to the New York area with palliative care patients enrolled in the same palliative care and hospice program (Riggs et al., 2016). Neither Riggs et al. (2016) nor Reyes-Ortiz et al. (2015) distinguished study results pertaining to COPD populations. Further research is needed to determine predictors and outcomes of palliative care and likelihood of hospice referral.

## Outpatient Palliative Care and COPD

Schroedl et al. (2014) reviewed the medical records of 36 patients with COPD seen in the Northwestern University Pulmonary Palliative Medicine Clinic to have a better understanding of the characterization of patients with COPD seen in an outpatient palliative care clinic. Data for this descriptive study were collected from medical records (Schroedl et al., 2014). The data included FEV1, GOLD spirometry class, BMI, airflow obstruction, dyspnea, and an exercise index, COPD assessment tool score, medical comorbidities, COPD therapies, documented advanced directives, symptom presence, new treatments, emergency room visits, hospital admissions, and deaths (Schroedl et al., 2014, p. 1257). Topics addressed by the outpatient palliative care team included the patients’ symptoms, psychological issues, social issues, spirituality, advance care planning, care coordination, and consults or referrals (Schroedl et al., 2014, p. 1258).

The majority of patients (72%) were using oxygen at home (Schroedl et al., 2014). Symptoms were addressed by palliative care providers in 100% of the patients (Schroedl et al., 2014). Symptoms that were present more than 80% of the time included breathlessness, depression, sleep disturbance, fatigue, and pain (Schroedl et al., 2014). The medical record reviews indicate new treatments often occurred at the initial palliative care appointment; however, the initiation of treatments cannot be solely attributed to the palliative care intervention (Schroedl et al., 2014). Variability was seen in the number of emergency room visits and hospitalizations but palliative care could not be directly linked to these occurrences (see Schroedl et al., 2014). Schroedl et al. (2014) found a direct link to palliative care and better management of symptoms, advance care planning, physical functioning, and higher self rated health status.

Limitations to this research included a low rate of patients with COPD and palliative care referrals (5%; Schroedl et al., 2014). The reasons for low referral rates were unknown (Schroedl et al., 2014). Low referral rates may be due to the newness of the palliative medicine clinic that was developed at the start of the study, lack of formal palliative care referral criteria, or there may have been a general unawareness that the palliative care clinic existed (Schroedl et al., 2014). There were 18 out of the 36 patients that did not have palliative care follow up visits due to appointment no show, appointment cancellation, or follow up appointment not scheduled (Schroedl et al., 2014).

## Pharmacologic Impact on Dyspnea

Due to the unpredictability of the disease trajectory and mortality risk of patients with COPD (Batzlaff et al., 2014; Philip et al., 2012; Piquet et al., 2013) individualized therapy may be appropriate near end of life to meet individual comfort goals (Afrane et al., 2016). GOLD (2017) suggests the management of severe but not life threatening exacerbations should be treated with bronchodilators, oral corticosteroids, and antibiotics if a bacterial infection is present, supplemental oxygen or noninvasive mechanical ventilation (p. 103). Palliative care providers may or may not make recommendations for the pharmacologic management of COPD (Afrane et al., 2016). Provider adherence to recommendation guidelines for patients in stable COPD should not be underestimated; however, therapeutic recommendations may be more flexible in end stage disease to maximize patients' comfort level (Afrane et al., 2016).

Gomutbutra et al. (2013) focused on palliative care patients and the impact of benzodiazepines (BZDs) and/or opioids for managing moderate to severe dyspnea. Of the 115 medical records reviewed only six patients had COPD (Gomutbutra et al., 2013). The majority were cancer diagnoses (*n* = 73; Gomutbutra et al., 2013). A logistic regression analysis determined that patients prescribed both BZDs and opioids had improved dyspnea compared to those who did not receive BZDs or opioids alone (Gomutbutra et al., 2013).

Another retrospective research study evaluated 745 end stage COPD patients to better understand medications prescribed while receiving hospice care within a national hospice organization across 15 states in the United States (Afrane et al., 2016). End stage

COPD was defined as having disabling dyspnea at rest, and an increase in emergency room visits or prior hospitalizations for pulmonary infections; in addition to hypoxemia at rest on room air as evidenced by PO2 <55 mm Hg or oxygen saturation <88% on supplemental oxygen (Afrane et al., 2016, p. 639). For severe COPD patients with worsening symptoms the recommendation is to use a combination therapy of inhaled corticosteroids (ICSs), long acting B2 agonist (LABA), and long acting anticholinergic (LAAC; Afrane et al., 2016). An alternative recommendation is to include a mucolytic, such as N-acetylcysteine (Afrane et al., 2016, p. 639). GOLD guidelines recommend use opioids to relieve dyspnea. Nonpharmacologic therapy for severe COPD includes supplemental oxygen (Afrane et al., 2016, p. 639).

Prescribed medications were abstracted from medical records and analyzed according to therapeutic class (Afrane et al., 2016). Opioids were the most commonly prescribed medication for 62.8% of patients, oxygen for 36.5% of patients, short acting B2 agonist (SABA) for 33.3% of patients, short acting anticholinergic (SAAC) for 30.6% of patients, systemic corticosteroid for 20.3% of patients, and a combination of SAAC and SABA for 20% of patients (Afrane et al., 2016, p. 640). Other medication classes prescribed in less than 20% of patients include ICS, LABA, LAAC, expectorant, antitussives, leukotriene receptor antagonist, phosphodiesterase 4 inhibitor, methylxnathines, and mucolytics (Afrane et al., 2016). Based on the inconsistent therapies the researchers concluded that individualized therapy may be important to maintain comfort and quality of life for patients with severe COPD on hospice service (Afrane et al., 2016).

The studies conducted by Afrane et al. (2016) and Gomutbutra et al. (2013) provides an awareness that a one size fits all approach to pharmacologic management for end stage COPD is not always feasible to provide optimal comfort for the patient. The influence of prescribed medication by the palliative care provider versus the medication prescribed by a pulmonologist, or an attending physician needs further research. For researching the impact of palliative care on hospitalized patients with COPD and LTOT, it is important to recognize that variation in medication management is a reality in medical practice and may influence research validity.

## Summary of Literature Review Findings

There is little research examining the influence of palliative care on patients with COPD. Eleven of the 26 studies solely focused on COPD patients in the research population (Afrane et al., 2016; Batzlaff et al., 2014; Carlucci et al., 2016; Hajizadeh et al., 2015; Horton et al., 2013; Philip et al., 2012; Piquet et al., 2013; Rush et al., 2017; Schroedl et al., 2014; Vitacca et al., 2011). Rush et al. (2017) had the largest population base of 181,689 COPD patients and oxygen dependence; unfortunately, this study did not focus on outcomes resulting from a documented palliative care consultation. Philip et al. (2012) had the second largest population base of 20,019 individual COPD patients; however, the diagnosis codes suggested other respiratory diseases were included such as bronchitis and asthma. Hajizadeh et al. (2015) researched 4,791 Medicare beneficiaries hospitalized with COPD and LTOT requiring invasive mechanical ventilation, and Piquet et al. (2013) research population of consisted of 1,750 COPD patients. Both studies focused on mortality risks and hospital readmissions following a hospital admission for acute COPD exacerbation but did not consider palliative care services (Hajizadeh et al., 2015; Piquet et al., 2013). Afrane et al. (2016) had a large population group of 745 patients. The research took place in a hospice environment but this too did not factor in palliative care services (Afrane et al., 2016). Schroedl et al. (2014) and Chou et al. (2013) had very small research populations with outcomes that cannot be generalized among hospitalized COPD patients.

What is known from this literature review is that elderly COPD patients, COPD patients with lengthy and frequent hospitalizations, COPD patients with low BMI, presence of lung cancer, presence of cardiovascular disease, clinical signs of severity, and the need for long term oxygen therapy at hospital discharge have a significant disease burden and mortality risk (Batzlaff et al., 2014; Hajizadeh et al., 2015; Philip et al., 2012; Piquet et al., 2013). Due to the significant disease burden and mortality risk hospitalized COPD patients may benefit from palliative care services (Batzlaff et al., 2014; Philip et al., 2012). Outcomes from research conducted by Duenk et al. (2017) and Strang et al. (2013) indicated respiratory healthcare professionals recognize severe COPD patients as having palliative care requirements but infrequently provide palliative care services. Considering the increase in palliative services across the United States for COPD patients with LTOT (see Rush et al., 2017) a patient admitted to the hospital with a COPD exacerbation and LTOT may serve as a convenient trigger for a routine physician referral to palliative care service.

This literature review indicated palliative care provides cost savings, with the most significant cost savings in average intensive care costs per admission (Khandelwal et al., 2016; Morrison et al., 2011). Chou et al. (2013) did not find a significant difference in length of ICU stay but did find a less likelihood of ventilation support among COPD patients receiving palliative care. Based on my literature review, I could not make a generalization regarding cost savings specifically attributed to COPD patients receiving palliative care and ICU interventions. I concluded that further research is needed to determine if palliative care service is affiliated with a decrease in ICU stays, and a reduction in invasive ventilator support thereby potentially reducing healthcare costs.

Symptoms such as breathing difficulties and disease burden of COPD are equivalent to that of cancer (Weingaertner et al., 2014); however, palliative care consultation and discussions surrounding prognosis occurs more frequently for patients with cancer diagnosis than COPD (Beernaert et al., 2013; Brown et al., 2016; Hyasat & Sriram, 2016). Several studies indicated that health professionals frequently overlook COPD patients’ resuscitation status and a desire to die at home (Carlucci et al. 2016; Chou et al., 2013; Horton et al., 2013). A better understanding of a patient’s desired code status and place of death may impact the patient’s discharge disposition from the hospital. Research conducted by Rush et al. (2017) found COPD patients with LTOT and palliative care service during the time of a hospitalization to be more likely to die in the hospital and have a DNR. Rush et al. (2017) did not distinguish if the palliative care consultation influenced these outcomes. There is little evidence indicating whether or not palliative care influences physician’s orders for resuscitation or place of discharge from the hospital. A better understanding of outcomes affiliated with palliative care and COPD and an easily recognizable trigger for palliative care consultation; such as, long term oxygen therapy, may improve palliative care resource utilization for this patient population.

In the following Chapter 3, I will detail the research methods used to determine if there is a correlation between palliative care services and days spent in an ICU, days on invasive mechanical ventilation, physician orders for CPR code status, and hospital discharge to hospice services for hospitalized patients admitted with COPD exacerbation and receiving LTOT present on hospital admission. I will explain Donabedian's quality improvement theory as the theoretical framework of the research study and detail the palliative care model as the research intervention. The methodology discussion will include an overview of the research design and approach with use of secondary data. The identification and abstraction of the research sample, time period, and data is explained. Lastly, I will close the Chapter 3 by exploring the ethical considerations and threats to research validity.

# Chapter 3: Research Method

## Introduction

The purpose of this study was to determine if there is a correlation between palliative care services and days spent in an ICU, days on invasive mechanical ventilation, physician orders for CPR code status, and hospital discharge to hospice services for hospitalized patients admitted with COPD exacerbation and receiving LTOT present on hospital admission. Donabedian's (2005) quality improvement theory is comprised of three concepts, and the third concept of outcomes is impacted by the other two concepts: (a) structure and (b) process. In this chapter, I will further define the structure and process to include an explanation of determining the quantitative research-based outcomes. The research design, setting and population, data collection, and data analytics will also be discussed in greater detail.

## Research Design and Approach

In this study, I used a quantitative approach to examine the outcomes of palliative care on patients with severe COPD and LTOT upon hospital admission. I employed a quasi-experimental, nonequivalent groups design using secondary analysis of existing medical records from routine medical practice in an acute care hospital environment. The secondary analysis involved data abstraction from hospital medical records of patients previously admitted to the hospital with specific COPD and LTOT POA as identified by ICD-10 diagnostic codes.

I divided the identified COPD hospitalized patient population into two groups, those with and those without palliative care consultation for comparison of days spent in the ICU, days on invasive mechanical ventilator support, change in CPR code status, and place of hospital discharge over a 1-year period. The methods I used were practical and appropriate for data abstraction and analysis. The group assignment was naturally formed to the treatment or control group and not decided by myself as the researcher. The design allows for the comparison of the two groups. The intervention group that received the palliative care treatment and the control group that did not. The groups are nonequivalent which is convenient. I understood that the groups differed prior to the study. I limited selection bias by the use of preexisting data and identification of participants by ICD-10 diagnostic codes.

## Setting and Treatment

The structure concept of Donabedian's (2005) triad is recognized as the physical and organizational constructs of care settings to include human resources and the qualifications of providers. The structure, or setting, in this study was the acute care hospital environment with physician-driven palliative care consultants. The hospital is a large academic level-one trauma center based in the eastern United States. The palliative care program is a robust hospital based palliative care consultant physician practice group. The palliative care program is a specialist consultative service model consisting of physicians, nurse practitioners, nurses, chaplains, and social workers. This type of consultation model is largely utilized in acute care environments (Luckett et al., 2014). A consultation model generally involves a specialized palliative care service to assist with symptom treatment, goals of care, aid in medical decision-making and care coordination, psychosocial support, and bereavement services (Luckett et al., 2014).

The involvement of a hospital palliative care consultant physician may be negotiated with the hospitalist or the intensivist managing the patient care (Luckett et al., 2014, p.4). A patient with a COPD exacerbation is typically admitted to the hospital through the emergency department or as a direct admission bypassing the emergency room (Healthcare Information Network, 2013). After the patient is admitted to the hospital their care is managed by the hospitalist or an intensivist (Healthcare Information Network, 2013). A hospitalist is an internist that specifically works in the hospital, and an intensivist is a pulmonologist with critical care training that works in the ICU (Healthcare Information Network, 2013). Hospitalists may consult an intensivist to assist in a patient evaluation or care management (Healthcare Information Network, 2013). The role of the hospitalist is limited once a patient reaches the ICU, while an intensivist is the primary care physician typically responsible for managing an ICU patient's care (Healthcare Information Network, 2013). The physician responsible for managing the patient's care, or the attending physician, may or may not decide to consult for palliative care provider services (Healthcare Information Network, 2013).

The process concept of Donabedian's (2005) triad focuses on the resources and mechanisms done in giving and receiving health care. This is otherwise known as the treatment or intervention. In this, it was the care delivery and care coordination of a palliative care consultation for patients admitted to the hospital with a COPD exacerbation with LTOT. The palliative care consultation is based on the attending physician's discretion and may be done at any point during the patient's hospital stay (Luckett et al., 2014). Palliative care aims to serve patients with multiple comorbidities and complex medical needs by assisting with medical collaboration, providing integrated care, clarification of goals of care, communication and treatment options, advanced care planning, self-management of goals, symptom management, and exploration of psychosocial and spiritual needs. According to the study site hospital network, patients served by palliative care may include, but are not limited to, individuals diagnosed with end-stage heart failure, end stage COPD, advanced dementia, metastatic cancer, end stage renal or liver disease, degenerative neuromuscular disease, and HIV or AIDS.

The problem I addressed with this study was that severe COPD is recognized as a significant cause of mortality and morbidity frequently complicated by additional chronic conditions often leading to costly health care interventions such as frequent hospitalizations, admissions to ICUs, and the need for invasive mechanical ventilation (Ford et al., 2015). These costly interventions may be unwanted or misunderstood by the patient or patient care giver. A palliative care consultant may assist with the patient's goals of care or clarify various treatment options available to the patient. According to the literature, COPD patients are recognized by providers as being appropriate for palliative care consultation but do not routinely receive palliative care services (Duenk et al. 2017; Rush et al., 2017; Strang et al., 2013). My aim with this study was to determine whether there is a correlation among the previously defined structure and process influencing health outcomes of the covariates of days spent in the ICU, days receiving invasive mechanical ventilator, physician orders for CPR, and likelihood of hospital discharge to hospice services (see Agency for Healthcare Research and Quality, 2007).

## Research Sample

The sample for this study consisted of patient hospital admissions with a primary diagnosis of COPD and LTOT from hospital discharge dates of October 1, 2015 through October 31, 2016. The population was identified based on the following admitting diagnosis ICD-10 codes: J43.0 unilateral pulmonary emphysema (MacLeod's syndrome); J43.1 panlobular emphysema; J43.2 centrilobular emphysema; J43.8 other emphysema; J43.9 emphysema, unspecified J44.9 COPD, unspecified; J44.0 COPD with acute lower respiratory infection; J44.1 COPD with (acute) exacerbation: and Z99.81 dependence on supplemental oxygen POA. The pulmonary disease codes are grouped in the following Medicare Severity Diagnosis Related Groups Version 32.0: COPD with Major Complications and Comorbidities (MCC) 190, COPD with Complications and Comorbidities (CC) 191, and COPD with CC/MCC 192 (U.S. Centers for Medicare & Medicaid Services, n.d.).

I strategically chose the time period based on the Centers for Disease Control and Prevention (CDC) and Centers for Medicare and Medicaid Services implementation of ICD-9 to ICD-10 medical billing coding system on October 1, 2015 (CMS, n.d.). This was a significant change transitioning from 13,000 diagnosis codes under ICD-9 to more than 68,000 billing codes under ICD-10 (CMS, n.d.). The study period ending date was also significant due to a health network trial involvement of nursing-driven clinical care teams to assist with post hospital care coordination for patients with severe COPD implemented after October 2016 that could have possibly skewed research outcomes.

## Data Collection

I retrieved the research sample from McKesson Performance Analytics Performance Manager Release 18.0WSP2 data warehouse clinical performance analytics software in the form of inpatient account numbers for the research sample. A worksheet was created using the indicated principal COPD diagnosis ICD-10 codes. This was cross referenced with a sample qualified with ICD-10 Diagnosis Code Z99.81 indicating dependence on supplemental oxygen and hospital discharge dates between 10/1/2015 through 10/31/2016. This resulted in a sample size of 359 patients admitted with a COPD diagnosis and supplemental oxygen on hospital admission. Based on palliative care billing inquiries, 56 out of the 359 patients (15.6%) were admitted with a COPD diagnosis and supplemental oxygen on hospital admission and received an inpatient palliative care consult.

The palliative care intervention group represented 15.6% of the research population. This percentage was slightly less than the 18.6% palliative care intervention group from Chou et al.'s (2013) study that involved reviewing the medical records of 91 hospitalized COPD patients with (*n* = 17) and without (*n* = 74) palliative care. Ramos et al. (2017) had a 7% palliative care intervention group, while Rush et al. (2017) had only a 1.73% palliative care intervention group.

I added the 359 patient account numbers, medical record numbers, hospital admission dates, and discharge dates to a Microsoft Excel spreadsheet. Each patient was assigned a case number to maintain patient confidentially and honor the regulations of the Health Insurance Portability and Accountability Act of 1996 regulations to eliminate all identifiable patient information. I completed manual patient data abstraction via Epic electronic medical records. Data for abstraction included discharge disposition, ICU stay (yes or no), number of days in the ICU during hospital admission, invasive ventilator support (yes or no), number of vent days during hospital admission, and code status during hospital discharge and code status change during hospital stay (yes or no). Patient age, patient gender, race, ethnicity, and preferred language were also collected for informational purposes and generalization.

## Data Analytics

I divided the experimental group and the control group without random assignment. There were 56 patients out of 359 that received an inpatient palliative care consult. The data collected from the patients' medical records was then recorded, organized, and coded on the Microsoft Excel spreadsheet in nominal scale. I analyzed the data using SPSS, Version 23 licensure software. The descriptive statistics of frequencies, percentages, means, +/- standard deviation, and medians were used to describe the data of the two groups allowing for generalizations in relation to the following research questions and hypotheses:

> Research Question 1: What relationship does palliative care have on days spent in the ICU for COPD patients with LTOT admitted to a hospital?
>
> > $H_0$1: COPD patients with LTOT receiving palliative services is not associated with days in an ICU compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

$H_A1$: COPD patients with LTOT receiving palliative services is associated with a greater number of days in an intensive care unit compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Research Question 2: What relationship does palliative care have on days receiving invasive mechanical ventilator support for COPD patients with LTOT admitted to a hospital?

$H_02$: COPD patients with LTOT receiving palliative services is not associated with days receiving invasive mechanical ventilator support compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

$H_A2$: COPD patients with LTOT receiving palliative services is associated with a greater number of days receiving invasive mechanical ventilator support compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Research Question 3: What relationship does palliative care have on physician orders for CPR code status for COPD patients with LTOT admitted to a hospital?

$H_03$: An inpatient palliative care consult for COPD patients with LTOT is not associated to a physician order for no CPR code status compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

*H*A3: An inpatient palliative care consult for COPD patients with LTOT is less frequently ordered a no CPR code status compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Research Question 4: What relationship does palliative care have on hospital discharge to hospice services for COPD patients with LTOT admitted to a hospital?

*H*04: An inpatient palliative care consult for COPD patients with LTOT is not associated to hospital discharge to hospice services compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

*H*A4: An inpatient palliative care consult for COPD patients with LTOT is less likely to be discharged to hospice compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Inferential statistics was used to do group comparisons. An independent-sample *t* test was done to compare the means of the data sets to determine the difference for average number of days spent in the ICU and average number of days on invasive mechanical ventilator support. A one-way MANOVA and follow-up univariate ANOVAS was used to examine the statistical significance of palliative care on days in an ICU, and days on invasive mechanical ventilator support. Several chi-square tests of independence and a Pearson's correlation were used for analysis of the differences in the nonparametric nominal data of physician ordered code status. A chi-square test of independence and Fisher exact test was used for the analysis of the differences in the nonparametric nominal data of place of hospital discharge. Similar to the data analysis of Reyes-Ortiz et al. (2015) and Riggs et al. (2016), a $p$-value of $< 0.05$ was determined to be significant, and a $p$-value $> 0.05$ was determined to be insignificant.

## Ethical Considerations and Threats

This research was approved by the study site hospital network's institutional review board (IRB) research participant protection office and approved by Walden University IRB. The greatest risk in this research was the identification of patient protected information. All patient identifiers were removed from data collection and analysis; the data were stored and password protected that was only accessible by me.

The quasi-experimental, nonequivalent groups design lacks research population randomization; therefore, any preexisting differences between the two groups may affect study outcomes. This threat was considered in conducting inferential statistics and in determining if generalizations can be made. The research design prevents personal bias from influencing the data outcomes.

## Summary

The purpose of this quantitative research study was to determine if there is a correlation between palliative care services and days spent in an ICU, days on invasive mechanical ventilation, physician orders for CPR code status, and hospital discharge to hospice services for hospitalized patients admitted with COPD exacerbation and receiving LTOT present on hospital admission. The quasi-experimental, nonequivalent groups design divided COPD hospitalized patient population into two groups; those with, and those without, palliative care consultation for comparison of days spent in the ICU, days on invasive mechanical ventilator support, change in code status, and place of hospital discharge. The patient population was identified by ICD-10 diagnostic codes and the data elements were abstracted from patient electronic medical records. The methods were practical, selection bias was limited, and the identification of the participants were protected.

In Chapter 4, I will reintroduce the research questions and hypothesis, and review the methods I used for gathering data. Next, I will discuss patient demographics by group comparisons for age, gender, race, ethnicity, and language preference. I will explain my research findings and interpretations for each of my four research questions, followed by a disclosure of the research limitations. I will close Chapter 4 with my recommendations and the implications of this research.

# Chapter 4: Results

## Introduction

In this chapter, I will review the process for data collection and outline the data analysis as it relates to the purpose of the study and the research questions in alignment to Donabedian's quality improvement theory. The purpose of this quantitative research study was to determine if there is a correlation between palliative care services and days spent in an ICU, days on invasive mechanical ventilation, physician orders for CPR code status, and hospital discharge to hospice services for hospitalized patients admitted with COPD exacerbation and receiving LTOT present on hospital admission. The research questions and hypothesis were:

Research Question 1: What relationship does palliative care have on days spent in the ICU for COPD patients with LTOT admitted to a hospital?

$H_0 1$: COPD patients with LTOT receiving palliative services is not associated with days in an ICU compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

$H_A 1$: COPD patients with LTOT receiving palliative services is associated with a greater number of days in an intensive care unit compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Research Question 2: What relationship does palliative care have on days receiving invasive mechanical ventilator support for COPD patients with LTOT admitted to a hospital?

$H_0$2: COPD patients with LTOT receiving palliative services is not associated with days receiving invasive mechanical ventilator support compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

$H_A$2: COPD patients with LTOT receiving palliative services is associated with a greater number of days receiving invasive mechanical ventilator support compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Research Question 3: What relationship does palliative care have on physician orders for CPR code status for COPD patients with LTOT admitted to a hospital?

$H_0$3: An inpatient palliative care consult for COPD patients with LTOT is not associated to a physician order for no CPR code status compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

$H_A$3: An inpatient palliative care consult for COPD patients with LTOT is less frequently ordered a no CPR code status compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Research Question 4: What relationship does palliative care have on hospital discharge to hospice services for COPD patients with LTOT admitted to a hospital?

> $H_0$4: An inpatient palliative care consult for COPD patients with LTOT is not associated to hospital discharge to hospice services compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.
>
> $H_A$4: An inpatient palliative care consult for COPD patients with LTOT is less likely to be discharged to hospice compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

I data mined the research population from the McKesson Performance Analytics Performance Manager Release 18.0WSP2 data warehouse clinical performance analytics software and retrieved the 359 inpatient account numbers for the research population based on hospital admissions with a principal COPD diagnosis ICD-10 codes: J43.0 unilateral pulmonary emphysema (MacLeod's syndrome); J43.1 panlobular emphysema; J43.2 centrilobular emphysema; J43.8 other emphysema; J43.9 emphysema, unspecified; J44.9 COPD, unspecified; J44.0 COPD with acute lower respiratory infection; J44.1 COPD with (acute) exacerbation: Z99.81 dependence on supplemental oxygen POA; and a hospital discharge date 10/1/2015 through 10/31/2016. This population was compared to palliative care billing inquiries indicating 56 out of the 359 patients (15.6%) were admitted with a COPD diagnosis and supplemental oxygen on hospital admission and received an inpatient palliative care consult. Palliative care consults were also confirmed by manually reviewing electronic medical records of the 359 hospital-admitted COPD patients with LTOT. A palliative care consult was further confirmed by the documentation of the palliative care assessment in the patient medical record. I manually abstracted data relating to patient demographics, days spent in the ICU, days receiving invasive mechanical ventilator support, physician orders for CPR code status, and place of hospital discharge from electronic patient medical records and recorded them on an Excel spreadsheet. The variables were defined and entered into SPSS, Version 23 licensure for statistical testing.

## Demographics

The sample consisted of 359 patient hospital admissions with a primary diagnosis of COPD and LTOT from hospital discharge dates of October 1, 2015 through October 31, 2016. I split the sample into two groups: (a) patients with COPD and LTOT with a palliative care consult (*n* = 56) and (b) patients with COPD and LTOT without a palliative care consult (*n* = 303). Frequencies and means were analyzed for overall length of hospital stay in days and age in years. The average overall length of hospital stay was measured in days for patients with COPD and LTOT. Patients with a palliative care consult had an overall hospital stay of approximately 3 days longer (*M* = 7.77, *SD* = 6.464) than the patients with COPD and LTOT without a palliative care consult (*M* = 4.92, *SD* = 3.696). Patients with COPD and LTOT with a palliative care consult (*n* = 56) received the palliative care consult approximately 3.6 days into the hospital stay (*M* = 3.57, *SD* = 4.588). Patients with COPD and LTOT with a palliative care consult (*n* = 56) were slightly older in years (*M* = 73.36, *SD* = 9.247) than the patients with COPD and LTOT without a palliative care consult (*M* = 69.6, *SD* = 10.153).

I analyzed patient demographics to include gender for patients with COPD and LTOT with cross tabulations and a chi-square test of independence. Race, ethnicity, and language preference for patients with COPD and LTOT were analyzed with a Fisher exact test due to expected counts of less than five. I found no significant relationship among gender and palliative care services [$X^2(1, n = 359) = .589, p = .44$]. Patients with COPD and LTOT with a palliative care consult were 53.6% female (*n* = 30), and 46.40% male (*n* = 26). Patients with COPD and LTOT without a palliative care consult were 59.10% female (*n* = 179), and 40.90% male (*n* = 124).

I found no significant relationship among race and palliative care services (*p* = .486) as indicated in Table 1 and Table 2. There were 94.4% (*n* = 286) predominantly White patients with COPD and LTOT without a palliative care consult. These findings were similar to patients with COPD and LTOT with a palliative care who were also predominantly White at 91.1% (*n* = 51).

Table 1

*Cross Tabulations for Palliative Care Consult by Race*

| Palliative Care | Race | | | | | |
|---|---|---|---|---|---|---|
| | Asian | Black | Multiracial | Other | White | Total |
| No | 4 | 6 | 4 | 3 | 286 | 303 |
| Yes | 1 | 2 | 1 | 1 | 51 | 56 |
| Total | 5 | 8 | 5 | 4 | 337 | 359 |

Table 2

*Fisher Exact Test for Palliative Care Consult by Race*

| | Value | *df* | Asymptotic Significance (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
|---|---|---|---|---|---|---|
| Pearson chi-square | 1.008 | 4 | .909 | .946 | | |
| Likelihood ratio | .898 | 4 | .925 | .977 | | |
| Fisher exact test | 2.577 | | | .486 | | |
| Linear-by-linear association | .710 | 1 | .399 | .462 | .224 | .053 |
| *N* of valid cases | 359 | | | | | |

I found no significant relationship among ethnicity and palliative care services (*p* = 1.000) as noted in Table 3 and Table 4. Patients with COPD and LTOT without a palliative care consult were predominantly non-Hispanic at 94.7% (*n* = 287). These findings were similar to patients with COPD and LTOT with a palliative care consult. The non-palliative care group were also predominantly non-Hispanic at 96.4% (*n* = 54).

Table 3

*Cross Tabulations for Palliative Care Consult by Ethnicity*

| Palliative Care | Ethnicity | | |
|---|---|---|---|
| | Hispanic | Non-Hispanic | Total |
| No | 16 | 287 | 303 |
| Yes | 2 | 54 | 56 |
| Total | 18 | 341 | 359 |

Table 4

*Fisher Exact Test for Palliative Care Consult by Ethnicity*

| | Value | *df* | Asymptotic Significance (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
|---|---|---|---|---|---|---|
| Pearson chi-square | .290 | 1 | .590 | .750 | .447 | |
| Continuity correction | .042 | 1 | .837 | | | |
| Likelihood ratio | .315 | 1 | .574 | .750 | .447 | |
| Fisher exact test | | | | 1.000 | .447 | |
| Linear-by-linear association | .289 | 1 | .591 | .750 | .447 | .250 |
| *N* of valid cases | 359 | | | | | |

As indicated in Table 5 and Table 6, I found no significant relationship among language and palliative care ($p$ = .112). Patients with COPD and LTOT without a palliative care consult were predominantly English speaking 97.7% ($n$ = 296). A total of five patients had a language preference for Vietnamese, four for Spanish, and one for

Italian. At the hospital research site there were certified telephone healthcare interpreter services available 24 hours, 7 days a week. The use of the certified telephone healthcare interpreter services was not considered when doing my analysis. These findings were similar to patients with COPD and LTOT with a palliative care. The non-palliative care group were also predominantly English speaking 94.6% (*n* = 53).

Table 5

*Cross Tabulations for Palliative Care Consult by Language*

| Palliative Care | Language | | | | |
|---|---|---|---|---|---|
| | English | Italian | Spanish | Vietnamese | Total |
| No | 296 | 0 | 3 | 4 | 303 |
| Yes | 53 | 1 | 1 | 1 | 56 |
| Total | 349 | 1 | 4 | 5 | 359 |

Table 6

*Fisher Exact Test for Palliative Care Consult by Ethnicity*

| | Value | *df* | Asymptotic Significance (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) | Point Probability |
|---|---|---|---|---|---|---|
| Pearson chi-square | 5.798 | 3 | .122 | .203 | | |
| Likelihood ratio | 4.065 | 3 | .255 | .242 | | |
| Fisher exact test | 5.128 | | | .112 | | |
| Linear-by-linear association | .638 | 1 | .424 | .463 | .250 | .091 |
| *N* of valid cases | 359 | | | | | |

## Analysis: Research Question 1

An independent-samples *t* test was done to compare the mean number of ICU days for the 56 patients in the experimental group who received palliative care compared to the 303 patients in the control who did not receive palliative care. There is a significant difference in the means of the two groups ($t(58.96) = 3.175$, $p = .002$) as designated in Table 7 and Table 8. The mean of the experimental group, patients who received a palliative care consult, was significantly higher ($M = 2.29$, $SD = 4.254$) than the mean of the control group ($M = .45$, $SD = 2.08$). This result favors the alternative hypothesis that COPD patients with LTOT receiving palliative services is associated with a greater number of days in an ICU compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Table 7

*Group Statistics for Palliative Care and ICU Length of Stay*

| Palliative Care | *n* | *M* | *SD* | Std. Error Mean |
|---|---|---|---|---|
| Yes | 56 | 2.29 | 4.254 | .568 |
| No | 303 | .45 | 1.864 | .107 |

Table 8

*Independent Samples Test for Palliative Care and ICU Length of Stay*

| Levene's Test for Equality of Variances | | | | | | | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|---|
| *F* | Sig. | *t* | *df* | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| 45.048 | .000 | 5.277 | 357 | .000 | 1.837 | .348 | 1.152 | 2.521 |
| | | 3.175 | 58.957 | .002 | 1.837 | .578 | .679 | 2.994 |

There were 24 out of the 56 patients (42.9%) who received palliative care and were admitted to the ICU during their hospitalization. There were 32 out of the 56 patients (57.1%) who received palliative care and were not admitted to the ICU during their hospitalization. As pointed out in Table 9, none of the 24 patients who received palliative care and admitted to the ICU during their hospitalization had the palliative care consult prior to being admitted to the ICU. Patients with COPD and LTOT with a palliative care consult and admitted to the ICU (*n* = 24) received the palliative care consult approximately 5.42 days into the hospital stay (*M* = 5.42, *SD* = 6.372) with an overall average length of hospital stay of 10.92 days (*M* = 10.92, *SD* = 8.351).

Table 9

*Timing of Palliative Care Consult in Relation to ICU Stay*

| Variables | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| No palliative care consult and no ICU stay | 266 | 74.1 | 74.1 | 74.1 |
| Palliative care consult occurred in the ICU | 21 | 5.8 | 5.8 | 79.9 |
| Palliative care consult occurred before admission to the ICU | 0 | 0 | 0 | 0 |
| Palliative care consult occurred after the ICU stay | 2 | .6 | .6 | 80.5 |
| Palliative care consult and no ICU stay | 33 | 9.2 | 9.2 | 89.7 |
| No Palliative care consult and ICU stay | 37 | 10.3 | 10.3 | 100.0 |
| Total | 359 | 100.0 | 100.0 | |

## Analysis: Research Question 2

An independent-samples *t* test was done to compare the mean number of invasive mechanical ventilator days for the 56 patients in the experimental group who received palliative care compared to the 303 patients in the control group who did not receive palliative care. As indicated in Table 10 and Table 11, I found a significant difference in the means of the two groups (*t*(64.7) = 3.375, *p* = .001). The mean number of invasive mechanical ventilator days for patients who received a palliative care consult was significantly higher (*M* = 6.43, *SD* = 9.067) than the mean of the control group (*M* = 2.17, *SD* = 6.162). This result favors the alternative hypothesis that COPD patients with LTOT receiving palliative care services is associated with a greater number of days receiving invasive mechanical ventilator support compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Table 10

*Group Statistics for Palliative Care and Invasive Mechanical Ventilator Days*

| Palliative Care | *n* | *M* | *SD* | Std. Error Mean |
|---|---|---|---|---|
| Yes | 56 | 6.43 | 9.067 | 1.212 |
| No | 303 | 2.17 | 6.162 | .354 |

Table 11

*Independent Samples Test for COPD patients with LTOT and Invasive Mechanical Ventilator Days*

| Levene's Test for Equality of Variances | | | | | | | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|---|
| F | Sig. | *t* | *df* | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| 42.054 | .000 | 4.376 | 357 | .000 | 4.260 | .973 | 2.346 | 6.175 |
| | | 3.375 | 64.706 | .001 | 4.260 | 1.262 | 1.739 | 6.781 |

A one-way MANOVA was calculated examining the effect of palliative care on days in an ICU, and days on invasive mechanical ventilator support. A nonsignificant effect was found using the Wilks' Lambada of .920 with two and 356 degrees of freedom

(*Lambda*(2,356) = .920, $p$ = >.05) as designated in Table 12. Follow-up univariate ANOVAS indicated that days spent in an ICU significantly increased with palliative care ($F$ (1, 357) = 27.848, $p$ = .000). Days on invasive mechanical ventilator also significantly increased with palliative care services ($F$ (1, 357) = 19.152, $p$ = .000).

Table 12

*Multivariate Tests$^a$ Examining the Effect of Palliative Care on Days in an ICU, and Days on Invasive Mechanical Ventilator Support*

| Effect | | Value | $F$ | Hypothesis *df* | Error *df* | Sig. |
|---|---|---|---|---|---|---|
| Intercept | Pillai's Trace | .204 | 45.669$^b$ | 2.000 | 356.000 | .000 |
| | Wilks' Lambda | .796 | 45.669$^b$ | 2.000 | 356.000 | .000 |
| | Hotelling's Trace | .257 | 45.669$^b$ | 2.000 | 356.000 | .000 |
| | Roy's Largest Root | .257 | 45.669$^b$ | 2.000 | 356.000 | .000 |
| Palliative care | Pillai's Trace | .080 | 15.549$^b$ | 2.000 | 356.000 | .000 |
| | Wilks' Lambda | .920 | 15.549$^b$ | 2.000 | 356.000 | .000 |
| | Hotelling's Trace | .087 | 15.549$^b$ | 2.000 | 356.000 | .000 |
| | Roy's Largest Root | .087 | 15.549$^b$ | 2.000 | 356.000 | .000 |

a. Design: Intercept + Palliative Care
b. Exact statistic

Table 13

*Tests of Between-Subjects Effects of Palliative Care on Days in an ICU, and Days on Invasive Mechanical Ventilator Support*

| Source | Dependent Variable | Type III Sum of Squares | *df* | Mean Square | *F* | Sig. |
|---|---|---|---|---|---|---|
| Corrected model | ICU LOS | 159.475[a] | 1 | 159.475 | 27.848 | .000 |
| | Vent DAYS | 857.842[b] | 1 | 857.842 | 19.152 | .000 |
| Intercept | ICU LOS | 353.436 | 1 | 353.436 | 61.719 | .000 |
| | Vent DAYS | 3493.162 | 1 | 3493.162 | 77.989 | .000 |
| Palliative care | ICU LOS | 159.475 | 1 | 159.475 | 27.848 | .000 |
| | Vent DAYS | 857.842 | 1 | 857.842 | 19.152 | .000 |
| Error | ICU LOS | 2044.386 | 357 | 5.727 | | |
| | Vent DAYS | 15990.130 | 357 | 44.790 | | |
| Total | ICULOS | 2398.000 | 359 | | | |
| | Vent DAYS | 19729.000 | 359 | | | |
| Corrected total | ICU LOS | 2203.861 | 358 | | | |
| | Vent DAYS | 16847.972 | 358 | | | |

a. R Squared = .072 (Adjusted R Squared = .070)
b. R Squared = .051 (Adjusted R Squared = .048)

## Analysis: Research Question 3

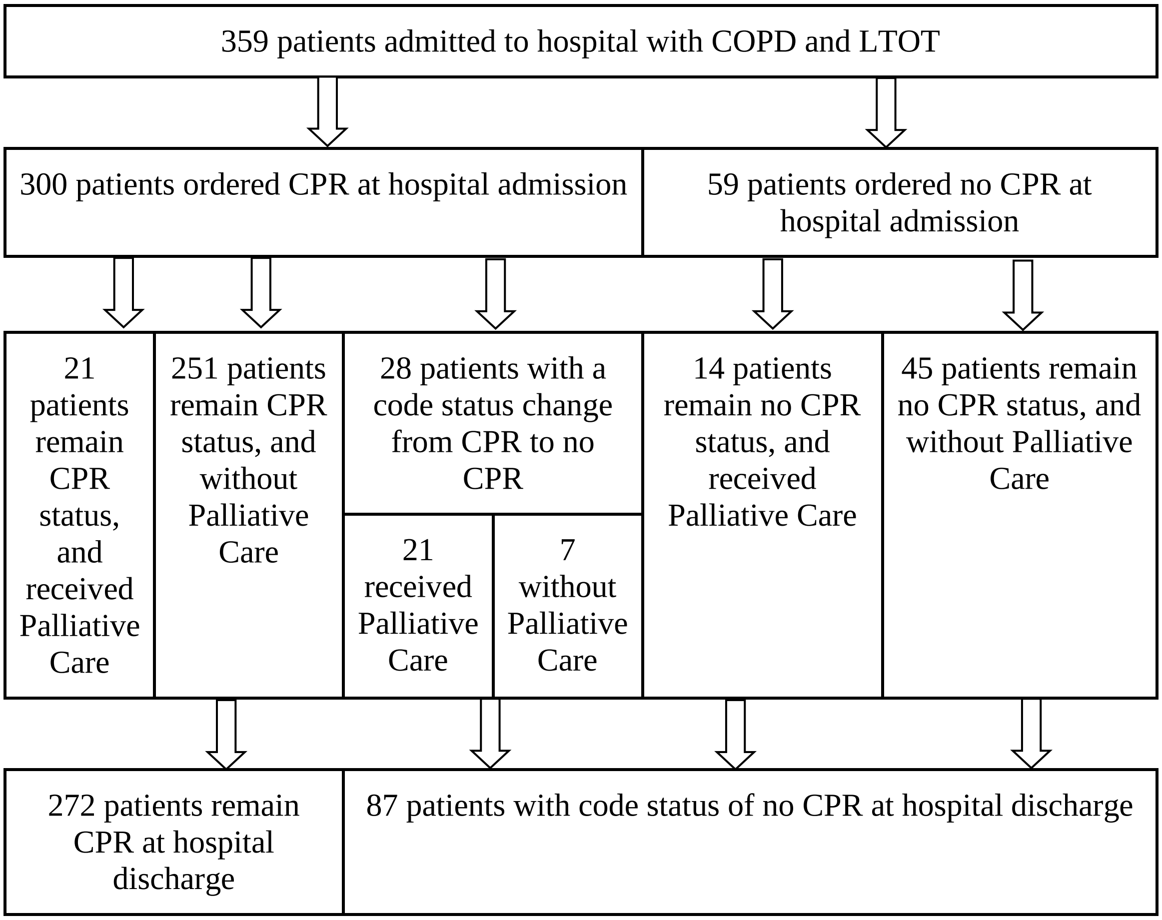
A total of 359 patients with COPD and LTOT were admitted to the hospital. Out of the 359 patients, a total of 300 patients were admitted to the hospital with orders for CPR, and 59 patients were admitted to the hospital with orders for no CPR. There were 28 out of 300 patients admitted with orders for CPR that changed to an order for no CPR during the course of the hospital stay. There were 21 of the 28 patients with a code status change from CPR to no CPR that also received palliative care services during the course of the hospital stay. The additional seven patients that changed from a hospital admission order for CPR to a no CPR during the hospital stay did not receive palliative care as recorded in Table 14. Figure 1 demonstrates the code status orders for the 359 patients admitted to hospital with COPD and LTOT compared to the code status orders upon hospital discharge.

Table 14

*Frequencies and Percent of Code Status Changes among Palliative Care Groupings*

| Variable | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Palliative care consult and code status did not change during hospital stay | 35 | 9.7 | 9.7 | 9.7 |
| No palliative care consult and code status did not change during hospital stay | 296 | 82.5 | 82.5 | 92.2 |
| Palliative care consult and code status did change during hospital stay | 21 | 5.8 | 5.8 | 98.1 |
| No palliative care consult and code status did change during hospital stay | 7 | 1.9 | 1.9 | 100.0 |
| Total | 359 | 100.0 | 100.0 | |

*Figure 1* Code status orders at hospital admission to hospital discharge.



A cross tabulation and chi-square test of independence was calculated comparing the frequency of code status orders changing among hospitalized patients with COPD and LTOT with and those without a palliative care consult. As indicated in Table 15, a significant interaction was found between palliative care services and code status change [$X^2$(1, *N*=359) = 81.390, p = .000]. Twenty one out of 56 patients (37.5%) received palliative care and a code status change compared to seven out of 303 patients (2.3%) without palliative care and received a code status change. The Null hypothesis is rejected: An inpatient palliative care consult for COPD patients with LTOT is not associated to a physician order for no CPR code status compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Table 15

*Cross Tabulations and Chi-Square Results for Palliative Care Consult and Change in Code Status*

| | Code Status Change | | | | | |
|---|---|---|---|---|---|---|
| Palliative Care | Yes | No | Total | $X^2$ | *df* | p |
| No | 7 | 296 | 303 | 81.390 | 1 | .000 |
| Yes | 21 | 35 | 56 | | | |
| Total | 28 | 331 | 359 | | | |

The number of days in the hospital when a palliative care consult occurred and the number of days in the hospital when a code status change occurred is not assumed to be normally distributed; therefore, an analysis was completed with Spearman rho correlation coefficient in Table 16. The Spearman rho correlation coefficient calculated the relationship between the days in the hospital when palliative care consult occurred to the day in the hospital the change of code status occurred. I found a weak correlation among the day in the hospital when palliative care consult occurred to the day in the hospital the change of code status occurred that was not significant (*r*(2) = .214, *p* = .113).

Table 16

*Spearman's Rho for Hospital Day when the Palliative Care Consult Occurred in Correlation to Hospital Day the Change of Code Status Order Occurred*

| | | Hospital stay day when palliative care consult occurred | Hospital stay day when a code status changed occurred |
|---|---|---|---|
| Hospital stay day when palliative care consult occurred | Spearman's Rho Correlation | 1.000 | .214 |
| | Sig. (2-tailed) | | .113 |
| | *n* | 56 | 56 |
| Hospital stay day when a code status changed occurred | Spearman's Rho Correlation | .214 | 1.000 |
| | Sig. (2-tailed) | .113 | |
| | *n* | 56 | 56 |

A second chi-square test of independence was calculated comparing the code status order at hospital discharge among palliative care groupings as indicated in Table 17. Table 17 does not take into consideration whether or not the code status order changed from hospital admission to hospital discharge as outlined in Figure 1. Code status order is defined as either CPR or no CPR. A significant interaction was found between palliative care and a physician order for no CPR at hospital discharge [$X^2(1, N=359) = 52.914$, $p = .000$]. Thirty five of the 56 (62.5%) patients who received palliative care had a no CPR physician order at discharge compared to 52 of the 303 (17.16%) patients who did not receive palliative care and had a no CPR physician order at discharge.

Table 17

*Cross Tabulations and Chi-Square Results for Code Status Orders at Hospital Discharge and Palliative Care*

| | Palliative Care | | | | | |
|---|---|---|---|---|---|---|
| Code Status order at Hospital Discharge | No | Yes | Total | $X^2$ | *df* | p |
| CPR | 251 | 21 | 272 | 52.914 | 1 | .000 |
| No CPR | 52 | 35 | 87 | | | |
| Total | 303 | 56 | 359 | | | |

A third chi-square test of independence was calculated comparing the code status order at hospital discharge to the number of code status order changes that occurred as shown in Table 18. A significant interaction was found among code status change and orders for no CPR [$X^2(1, N=359) = 94.945$, $p = .000$]. None of the 272 patients with COPD and LTOT ordered CPR upon discharge had their code status changed during the course of their hospitalization. There where 28 of the 87 patients ordered no CPR at hospital discharge who had their code status changed from CPR status to a no CPR status during the hospital stay; 21 of the 28 cases (75%) changed from a CPR status to no CPR status and seen by a palliative care provider.

Table 18

*Cross Tabulations and Chi-square Results for Code Status Orders at Hospital Discharge and Code Status Change*

| Code Status Change | Code Status Order at Hospital Discharge | | | $X^2$ | *df* | p |
|---|---|---|---|---|---|---|
| | CPR | No CPR | Total | | | |
| Yes | 0 | 28 | 28 | 94.945 | 1 | .000 |
| No | 272 | 59 | 331 | | | |
| Total | 272 | 87 | 359 | | | |

## Analysis: Research Question 4

A cross tabulation was calculated comparing the place of hospital discharge between patients with COPD and LTOT with palliative care. Table 19 is a cross tabulation of all categories for hospital discharge dispositions with or without palliative care. Half of patients who did not receive palliative care were discharged to home; *n* = 151 out of 303 (49.8%) compared to only nine of the 56 (16.1%) patients who received palliative care that were discharged to home. The majority of patients who received palliative care were discharged to home health care; *n* = 22 out of 56 (39.3%). Fifteen patients with palliative care were discharged to a skilled nursing facility. A total of seven patients died; five who received palliative care and two who did not receive palliative care.

Table 19

*Cross Tabulations for Hospital Discharge Disposition and Palliative Care*

| Palliative Care | Hospital Discharge Disposition<br>Home | Short term facility | Skilled nursing facility | Home health care | Left against medical advice | Died | Home hospice | Hospice facility | Rehab | Psych | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No | 151 | 0 | 33 | 107 | 2 | 2 | 2 | 2 | 2 | 2 | 303 |
| Yes | 9 | 1 | 15 | 22 | 0 | 5 | 2 | 1 | 1 | 0 | 56 |
| Total | 160 | 1 | 48 | 129 | 2 | 7 | 4 | 3 | 3 | 2 | 359 |

Due to the small volumes of discharge disposition categories, the home hospice (*n* = 4) and hospice facility (*n* = 3) were combined as the unique variable of hospice care (*n* = 7) compared to all other discharge dispositions. The two groups are represented as: hospice care (*n* = 7) and other (*n* = 352). A cross tabulation and Fisher exact test was calculated for hospital discharge to hospice compared to other discharge among those with and those without palliative care as shown in Table 20 and Table 21. The results of the Fisher exact test deemed insignificant (*p* = .079); thereby favoring the alternative hypothesis: An inpatient palliative care consult for COPD patients with LTOT is less likely to be discharged to hospice compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines. Seven of the 359 hospitalized COPD patients with LTOT were discharged to hospice care from the hospital. Four of the patients discharged to hospice were not seen by palliative care; three of the patients discharged to hospice were seen by palliative care.

Table 20

*Cross Tabulation of Discharge Disposition to Hospice and Palliative Care Groupings*

| Palliative Care | | Discharge Disposition | | |
|---|---|---|---|---|
| | | Other | Hospice Care | Total |
| Yes | Count | 299 | 4 | 303 |
| | Expected count | 297.1 | 5.9 | 303.0 |
| | % Within palliative care | 98.7% | 1.3% | 100.0% |
| | % Within discharge disposition | 84.9% | 57.1% | 84.4% |
| | % of total | 83.3% | 1.1% | 84.4% |
| No | Count | 53 | 3 | 56 |
| | Expected count | 54.9 | 1.1 | 56.0 |
| | % Within palliative care | 94.6% | 5.4% | 100.0% |
| | % Within discharge disposition | 15.1% | 42.9% | 15.6% |
| | % of total | 14.8% | 0.8% | 15.6% |
| Total | Count | 352 | 7 | 359 |
| | Expected count | 352.0 | 7.0 | 359.0 |
| | % Within palliative care | 98.1% | 1.9% | 100.0% |
| | % Within discharge disposition | 100.0% | 100.0% | 100.0% |
| | % of total | 98.1% | 1.9% | 100.0% |

Table 21

*Fisher Exact Test of Discharge Disposition to Hospice and Palliative Care Groupings*

| | Value | *df* | Asymptotic Significance (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|---|---|---|---|---|---|
| Pearson chi-square | 4.029[a] | 1 | .045 | | |
| Continuity correction[b] | 2.194 | 1 | .139 | | |
| Likelihood ratio | 3.023 | 1 | .082 | | |
| Fisher exact test | | | | .079 | .079 |
| Linear-by-linear association | 4.018 | 1 | .045 | | |
| *N* of valid cases | 359 | | | | |

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.09.
b. Computed only for a 2x2 table

## Summary of Findings

Patients with COPD and LTOT are recognized as a significant cause of mortality and morbidity and being appropriate for palliative care consultation (Duenk et al. 2017; Rush et al., 2017; Strang et al., 2013). The analysis of the data was done to determine if there is a correlation between palliative care services and days spent in an ICU, days on invasive mechanical ventilation, physician orders for CPR code status, and hospital discharge to hospice services for hospitalized patients admitted with COPD exacerbation and receiving LTOT present on hospital admission. I analyzed the patient demographics to include age, gender, race, ethnicity, and language preference in frequencies, means, cross tabulations, a chi-square test of independence test, and Fisher exact tests without significant findings between the palliative care group and non-palliative care group. An independent-samples *t* test, one-way MANOVA, and follow-up univariate ANOVAS was done to compare the mean number of ICU days and invasive mechanical ventilator days for the 56 experimental group patients who received palliative care compared to the 303 control group patients who did not receive palliative care.

Days spent in an ICU significantly increased with palliative care (*t*(58.96) = 3.175, *p* = .002), (*F* (1, 357) = 27.848, *p* = .000). Days on invasive mechanical ventilator also significantly increased with palliative care services (*t*(64.7) = 3.375, *p* = .001), (*F* (1, 357) = 19.152, *p* = .000). In relation to palliative care services and days spent in an ICU and number of days on invasive mechanical ventilation this research supports the Null hypotheses: a) COPD patients with LTOT receiving palliative services is not associated with days in an ICU compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines, and b) COPD patients with LTOT receiving palliative services is not associated with days receiving invasive mechanical ventilator support compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

A significant interaction was found between palliative care services and code status change from CPR to no CPR. A cross tabulation and chi-square test of independence was calculated comparing code status orders changes among hospitalized patients with COPD and LTOT with a palliative care consult and those without a palliative care consult. Out of the 28 code status changes that occurred during the hospitalization, 21 (75%) patients also received palliative care. This was followed by a

Spearman rho correlation coefficient correlation analysis to determine the strength of the linear relationship between the day of the palliative care consult occurred and the day the code status change was ordered. I found a weak correlation among the day in the hospital when palliative care consult occurred to the day in the hospital the change of code status occurred that was not significant ($r(2) = .214$, $p = .113$). Therefore, it cannot be assumed that the palliative care consult is directly related to the change in a code status order.

The initial cross tabulation and chi-square test of independence was calculated comparing code status orders changes among hospitalized patients with COPD and LTOT with a palliative care consult and those without a palliative care consult. A second chi-square test of independence was calculated comparing the code status order of either CPR, or no CPR, at hospital discharge among those with and without palliative care. A significant interaction was found between the code status order for no CPR and palliative care services [$X^2(1, N=359) = 52.914$, $p = .000$]. There were 272 patients (75.8%) ordered CPR upon hospital discharge compared to 87 (24.2%) patients ordered no CPR among the 359 patients with COPD and LTOT. There were a higher number of no CPR orders within the palliative care group (62.5%) compared to the non-palliative care group (17.2%).

A third chi-square test of independence was calculated comparing the code status order at hospital discharge to the number of code status order changes that occurred during the hospitalization. None of the 272 patients with COPD and LTOT ordered CPR upon discharge had their code status changed from no CPR to CPR during their hospitalization. There where 28 of the 87 patients ordered no CPR at hospital discharge who had their code status order changed from CPR to no CPR; 21 of the 28 (75%) patients changed from CPR to no CPR were also seen by a palliative care provider. It is inconclusive if the change in CPR orders occurred as a result of a palliative care consult, or if the change in CPR orders served as a driver for a palliative care consult. Further research is needed in this regard. I conclusively rejected the Null hypothesis: An inpatient palliative care consult for COPD patients with LTOT is not associated to a physician order for no CPR code status compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

I found the relationship between palliative care and hospital discharge to hospice services for COPD patients with LTOT to be insignificant ($p$ = .079). Out of the 359 COPD and LTOT hospitalizations there were four of the patients discharged to hospice that were not seen by palliative care provider, and three of the patients discharged to hospice that were seen by a palliative care provider. This favors the alternative hypothesis: An inpatient palliative care consult for COPD patients with LTOT is less likely to be discharged to hospice compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

In Chapter 5, I will further explore the interpretation of my findings for each of the four research questions in relation to the research I reviewed in Chapter 2. I will discuss research design limitations and generalizability challenges as well as future recommendations for research. The study outcomes will be reviewed as it relates to implications for positive social change. I will close Chapter 5 with final conclusions.

# Chapter 5: Interpretation

## Introduction

The purpose of this quasi-experimental, nonequivalent groups design quantitative study was to determine if there is a correlation between palliative care services and days spent in an ICU, days on invasive mechanical ventilation, physician orders for CPR code status, and hospital discharge to hospice services for hospitalized patients admitted with COPD exacerbation and receiving LTOT POA. The theoretical framework for this research was Donabedian's conceptualization for quality of care in organized health care institutions (Berwick & Fox, 2016). Donabedian's methodology factors in structure and process as an influence on outcomes (Berwick & Fox, 2016). The structure is the hospital environment and the palliative care program, the process is the act of consulting a palliative care provider for COPD and LTOT hospitalized patients, and the outcome is days spent in an ICU, days on invasive mechanical ventilation, physician orders for CPR code status, and hospital discharge to hospice services.

I identified the COPD and LTOT hospitalized patient sample from ICD-10 medical billing codes and divided it into two groups. The intervention group were those with a palliative care consultation, the dependent group were those without a palliative consultation, and the covariates were days spent in the ICU, days on invasive mechanical ventilator support, change in code status, and place of discharge over a 1-year period. Statistical analysis led to no significant findings in patient demographics analysis for age, gender, race, ethnicity, and language preference between the palliative care group and non-palliative care group. In relation to palliative care services and days spent in an ICU and days on invasive mechanical ventilation analysis, the findings supported Null Hypotheses 1 and 2: (a) COPD patients with LTOT receiving palliative services is not associated with days in an ICU compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines and (b) COPD patients with LTOT receiving palliative services is not associated with days receiving invasive mechanical ventilator support compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

In relation to code status orders changing among hospitalized patients with COPD and LTOT with a palliative care consult and those without a palliative care consult, as the researcher, I rejected Null Hypothesis 3: An inpatient palliative care consult for COPD patients with LTOT is not associated to a physician order for no CPR code status compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines. I found a significant interaction between palliative care services and code status change [$X^2(1, N{=}359) = 81.390$, p = .000]. Twenty one out of 56 patients (37.5%) that received palliative care and had a code status changed compared to seven out of 303 patients (2.3%) without palliative care that received a code status change.

Based on the findings, I accepted Alternative Hypothesis 4: An inpatient palliative care consult for COPD patients with LTOT is less likely to be discharged to hospice compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines. The relationship between palliative care and hospital discharge to hospice services for COPD patients with LTOT admitted to a hospital was found to be insignificant ($p = .079$). Out of the 359 COPD and LTOT hospitalizations there were four of the patients discharged to hospice that were not seen by palliative care provider, and three of the patients discharged to hospice that were seen by a palliative care provider.

## Interpretation of Findings

I found a significant difference when comparing the mean number of ICU days for the 56 patients who received palliative care compared to the 303 patients who did not receive palliative care. The mean of the days spent in an ICU for patients who received a palliative care consult was significantly higher (*M* = 2.29, *SD* = 4.254) than the mean of the days spent in an ICU for patients who did not received a palliative care consult (M = .45, *SD* = 2.08). This finding contradicts the research conducted by Khandelwal et al. (2016) and Ramos et al. (2017). Khandelwal et al. assumed palliative care could reduce length of ICU stay by 1.7 days resulting in a direct and indirect cost savings. This cost savings was applied to an example of a patient being admitted to the hospital with COPD (Khandelwal et al., 2016). Ramos et al. determined patients receiving palliative care before the ICU referral had a shorter ICU stay (median, 2.0 [IQR, 1.5 – 24.0] vs 12.0 [IQR, 5.0 – 21.0] days; *p* = .065); however, this research was not exclusive to patients with COPD and LTOT.

Khandelwal et al.’s (2016) study had a research population of 572 ICU mortalities (90% intubated on mechanically invasive ventilation within the last week of life) in comparison to my study that included both mortalities (*n* = 7) and patients discharged alive (*n* = 352). Khandelwal et al. (2016) illustrated based on cost patterns that if a COPD patient died at home instead of the hospital, an assumed cost savings from advance care planning and palliative care intervention was estimated at $6,200, and the direct variable cost savings from palliative care intervention was estimated at $1,300 for that particular patient. The majority of cost savings determined by Khandelwal et al. (2016) may be attributed to expensive end of life care in an ICU leading up to death. The median ICU stay was 3 days with only 33 patients represented with respiratory disease out of the 572 research sample (Khandelwal et al., 2016). It is difficult to compare outcomes found in Khandelwal et al.’s (2016) research to this research because the majority of the research sample in my study was discharged alive (*n* = 352) versus dead (*n* = 7) with cost opportunity assumed from lengthier ICU stays, and lengthier days spent on an invasive mechanical ventilator. Unlike the research by Khandelwal et al. (2016) my research compared patients with a palliative care consult to those without a palliative care consult to better understand impact of ICU utilization. More research is needed to determine true cost savings in relation to ICU stays for palliative care patients with COPD and LTOT.

Ramos et al. (2017) divided patients with a palliative care referral prior to the urgent ICU referral (*n* = 29, 16%) and patients with a palliative care referral after the urgent ICU referral (*n* = 150, 84%) in their study. Similar to Khandelwal et al.’s research, Ramos et al. (2017) included all ICU patients in the patient cohort regardless of disease burden. Out of the 843 palliative care assessments, only 29 patients received palliative care before the ICU referral. These patients had shorter hospital stays (median, 19.0 [IQR, 8.5 – 26.5] vs 32.0 [IQR, 15.5 – 52.0] days; *p* = .003) and shorter ICU stays (median, 2.0 [IQR, 1.5 – 24.0] vs 12.0 [IQR, 5.0 – 21.0] days; *p* = .065; Ramos et al., 2017). None of the palliative care consults occurred before an admission to the ICU in my study; 21 palliative care consults occurred in the ICU and two consults occurred after the ICU visit. Unfortunately, I did not consider the timing of the palliative care consult in relation to ICU stay in my study. An inference cannot be made about preventing an ICU stay for the 32 patients with a palliative care consult that did not have an ICU visit; therefore, a conclusion cannot be made about palliative care and cost savings in relation to ICU stays for palliative care patients with COPD and LTOT. Further research is warranted on this topic.

Patients with COPD and LTOT with a palliative care consult (*n* = 56) received the palliative care consult approximately 3.6 days into the hospital stay (*M* = 3.57, *SD* = 4.588) with an overall average length of hospital stay of 7.77 days (*M* = 7.77, *SD* = 6.464). Twenty four of the 56 patients with COPD and LTOT, had received a palliative care consult and were admitted the ICU. The 24 patients with COPD and LTOT, a palliative care consult and, admitted the ICU, had received the palliative care consult approximately 5.42 days into the hospital stay (*M* = 5.42, *SD* = 6.372) with an overall average length of hospital stay of 10.92 days (*M* = 10.92, *SD* = 8.351). This ICU subpopulation (*n* = 24) had a lengthier hospital stay of 1.82 days prior to the palliative care consult in comparison to all patients in the experimental group (*n* = 56). Perhaps the palliative care consult extended the hospital and ICU stay because the act of involving a palliative care consultant requires administrative time to prompt the consult, the act of the palliative care provider doing their clinical assessment takes time, and communications with the patient, their family, and other interdisciplinary health care providers also takes time. Or, the patients ordered a palliative care consult may have a more complex disease state requiring longer hospitalizations. The significance of these findings was not tested;

therefore, I could not conclude if timeliness of palliative care services influenced an ICU stay for who received palliative care.

In Chapter 2, I outlined a study conducted by Duenk et al. (2017) indicating that 98.8% (*n* = 253) of respiratory medical professionals agreed that palliative care is desirable for patients with COPD (p. 301). However, 7.4% (*n* = 19) found no distinguished palliative care phase in the COPD disease trajectory (Duenk et al., 2017). This may have been due to the unpredictable course of the COPD disease process creating a challenge to providing timely palliative care. An outpatient palliative care consult, or a clinic setting might influence days spent in an ICU more so than providing palliative care in a hospital environment. Further research is needed to determine if timely palliative care intervention impacts subsequent days spent in an ICU.

In this study, I did not factor in patients' comorbidities, medications, chronic disease state, symptoms, or anthropometric measurements to determine the severity of the patient's illness. The patients were chosen based on a hospitalization from COPD exacerbation as the primary diagnosis with oxygen therapy POA during a 1-year period. It may be assumed that the COPD with LTOT patient population with palliative care consults are more acutely ill lending itself to longer hospitalizations. The COPD and LTOT patients with a palliative care consult (*n* = 56) were slightly older (*M* = 73.36, *SD* = 9.247) than the COPD and LTOT patients without a palliative care consult (*M* = 69.6, *SD* = 10.153). This is similar to the findings of Rush et al. (2017) who reported COPD and LTOT patients receiving palliative care were older by an average of 3.76 years and had a longer hospitalization (7.77 days vs 4.92 days). Further research is needed to determine the impact of palliative care and complex severe illness with various comorbidities.

## Palliative Care Services and Days Spent on an Invasive Mechanical Ventilator

I found a significant difference in the means of the two groups (*t*(64.7) = 3.375, *p* = .001) in comparing the number of days on invasive mechanical ventilator support. The mean of the experimental group, patients who received a palliative care consult, was significantly higher (*M* = 6.43, *SD* = 9.067) than the mean of the control group (*M* = 2.17, *SD* = 6.162). Rush et al. (2017) determined, of the 3,145 COPD and LTOT palliative care patients, 5% were on noninvasive mechanical ventilation, and 8% were on invasive mechanical ventilation, indicating invasive mechanical ventilation is more likely associated with a palliative care referral. This may be related to providers being more inclined to consult palliative care for patients with a higher severity of illness requiring longer hospitalizations, ICU stays, and an increased risk for invasive mechanical ventilator support. Further research is needed to determine the impact of palliative care, complexity of severe illness, and invasive mechanical ventilator support.

Chou et al. (2013) reviewed the medical records of 91 hospitalized COPD patients with (*n* = 17) and without (*n* = 74) palliative care who expired in Saint Paul’s Hospital located in Taoyuan, Taiwan. The COPD patients suffered from end stage lung disease with comparable symptoms to the GOLD criteria Stage III or Stage IV (Chou et al., 2013). Patients in their study were either referred to palliative care by their primary care physician or recruited by the palliative care team based on a signed DNR consent form. No significant difference was found in the rate of ICU care, length of ICU stays, and ventilator support; however, the frequency of ventilation was higher in the non-palliative care group (57% vs. 29%, *p* = 0.04; Chou et al., 2013). The frequency of ventilation being higher in the non-palliative care group is most likely the result of the DNR consents (100%) used to trigger the palliative care consult; therefore, all patients who received palliative care were already ordered a DNR by their primary physician. Therefore, it is difficult to say if the DNR status, or if the palliative care consult triggered by the DNR status contributing to the reduction of invasive mechanical ventilator support (Chou et al., 2013). Patients requiring invasive mechanical ventilation are typically more acutely ill than non-mechanically (GOLD, 2017). The need for invasive mechanical ventilation may possibly influence the likelihood of ordering a palliative care consults by the attending provider. The palliative care consult may be initiated for patients on invasive mechanical ventilator requiring tracheostomy for long term ventilator use. The rational for consulting palliative care was not considered. More research is needed to determine if there is a correlation between invasive mechanical ventilator support and a palliative care consult.

## Palliative Care Services and Code Status

Resuscitation status and treatment agreements in the form of advance care planning have been identified as the important aspects of palliative care (Duenk et al., 2017). Browne et al. (2016) compared palliative care implementation for patients with COPD (*n* = 592) and/or ILD (*n* = 79) to patients with metastatic cancer (*n* = 158) who died in ICUs. They found that patients with ILD or COPD were less likely to have a DNR order in place at the time of death compared to metastatic cancer patients (*OR*, 0.40; 95%

CI, 0.19–0.86; and *OR*, 0.49; 95% CI, 0.27–0.86, respectively). This may have been due to the uncertain disease trajectory of patients with ILD or COPD compared to patients with a cancer diagnosis.

The literature review revealed that hospitalized COPD patients may benefit from palliative care services to better understand their disease trajectory and make informed decisions about future medical interventions to include the decision for CPR or no CPR in the event of a medical emergency (Batzlaff et al., 2014; Philip et al., 2012). I analyzed patients with a code status change during the course of their hospitalization, as well as the code status at hospital discharge. I found a significant interaction between code status order at hospital discharge and palliative care [$X^2$(1, *N*=359) = 52.914, *p* = .000] and a significant interaction among code status change and orders for no CPR [$X^2$(1, *N*=359) = 94.945, *p* = .000]; thereby leading me to reject Null Hypothesis 3: An inpatient palliative care consult for COPD patients with LTOT is not associated to a physician order for no CPR code status compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

I found a significant interaction between palliative care services and code status change [$\mathrm{X}^2$(1, *N*=359) = 81.390, p = .000], but a weak correlation among the day in the hospital when palliative care consult occurred to the day in the hospital the change of code status occurred that was not significant (*r*(2) = .214, *p* = .113). Therefore, it is difficult to attribute the code status change to the palliative care consult. The code status change may have been recommended by the palliative care provider and ordered after the palliative care provider had a discussion with the attending provider. This could skew the correlation if the code status order change was placed a day or two after the palliative care consultation.

There were 272 (75.8%) patients ordered CPR upon hospital discharge compared to 87 (24.2%) patients ordered no CPR among the 359 patients admitted with COPD and LTOT. Among the 87 patients discharged with a no CPR order, 35 (40.23%) were seen by a palliative care provider, and among the 35 patients with orders for no CPR and a palliative care consult, 21 patients had a code status order changed from CPR at hospital admission to no CPR at hospital discharge. None of the patients had a code status change from no CPR to CPR. This aligns with the research conducted by Rush et al. (2017) that found COPD patients receiving palliative care were more likely to have a DNR order than patients without palliative care (29.0% vs 3.4%; Rush et al., 2017).

My review of the literature revealed a disassociation between patients' end of life wishes and the end of life care provided (Carlucci et al., 2016; Chou et al., 2013; Horton et al., 2013). Chou et al. (2013) reviewed the medical records of 91 hospitalized COPD patients with (*n* = 17) and without (*n* = 74) palliative care who expired in Saint Paul's Hospital located in Taoyuan, Taiwan. Patients receiving palliative care had a higher rate of DNR consents (100%; Chou et al., 2013). This was due to an automatic palliative care consult for patients with a DNR consent (see Chou et al., 2013). Regardless of the DNR orders 44% of patients received CPR (Chou et al., 2013).

Another prospective study conducted in Italy used a semi-structured interview with a scenario-based decision aid to determine 43 severe COPD patients' end of life preferences (Carlucci et al., 2016). Similar to the findings of Chou et al. about half of those who indicated their end of life preference had their wishes honored at the time of death (Carlucci et al., 2016). The rationale for not honoring the patient’s order for no CPR was not explored. Physicians may assume heroic CPR measures are warranted regardless of the patient wishes for no CPR (Carlucci et al., 2016; Chou et al., 2013). I did not explore whether or not a patient’s code status was honored at the time of death. A patient’s code status needs to accurately reflect a patient’s preference for resuscitation before it can be effectively honored during the time of a lifesaving medical emergency. Palliative care may play an important role in communicating and understanding a patient’s goals of care to include the clarification of code status orders for resuscitation. Further research is needed to determine how palliative care influences this type of shared medical decision making among patients and providers.

## Palliative Care Services and Discharge Disposition

Palliative care is often seen as a bridge between aggressive medical treatments and hospice services (Reyes-Ortiz et al., 2015). Out of the 359 patients admitted to the hospital with COPD and LTOT, seven (1.9%) were discharged to hospice care. Of those seven patients discharged to hospice services, three patients received palliative care. A Fisher exact test was used to calculate hospital discharge to hospice to other places of discharge among those with and those without palliative care ($p$ = .079). I favored the alternative hypothesis: An inpatient palliative care consult for COPD patients with LTOT is less likely to be discharged to hospice compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines. Reyes-Ortiz et al. (2015) found that early palliative care consultation compared to late palliative care consultation was affiliated to fewer deaths in the hospital (13.7% vs 21.2%) and higher deaths in hospice after hospitalization (53% vs 45.4%). The early palliative care consults were defined as 3 days or less after hospital admission, and the late palliative care consults were defined as greater than 3 days after hospital admission. In my study the patients with COPD and LTOT with a palliative care consult (*n* = 56) received the palliative care consult approximately 3.6 days into the hospital stay (*M* = 3.57, *SD* = 4.588; Reyes-Ortiz et al., 2015). According to the criteria defined by Reyes-Ortiz et al. the average timing of the palliative care consults in my study are considered late (greater than 3 days). Unlike the research conducted by Reyes-Ortiz et al. I did not consider the timeliness of palliative care in analyzing results of hospital discharge to hospice services.

The initial literature review indicated that providers recognize patients with severe COPD as being appropriate for a palliative care consultation (Batzlaff et al., 2014; Duenk et al., 2017; Reyes-Ortiz et al., 2015). The challenge is identifying the most appropriate time to involve palliative care services to achieve the most desirable patient outcomes (Batzlaff et al., 2014; Duenk et al., 2017; Reyes-Ortiz et al., 2015). COPD patients with comorbidities of respiratory failure or right heart failure who are further evaluated with pulse oximetry resulting in a PaO2 ≤ 55 mmHg or SaO2 ≤ 88% at rest, or PaO2 56 – 59 mmHg with either a diagnosis of pulmonary hypertension or hematocrit ≥ 55%, is an indication for LTOT (GOLD, 2017; Jindal & Agarwal, 2012; Mehta et al., 2016). The consequences of COPD requiring LTOT are increased risk of mortality, decreased functional status, frequent hospitalizations, emergency room visits, assisted ventilation, severe dyspnea, increased dependence on others, pain, anxiety, and depression (Diaz-

Lobato et al., 2015; Hajizadeh et al., 2015; Jindal & Agarwal, 2012). This research did not identify whether or not hospitalized patients with COPD and a LTOT should automatically receive a palliative care consult considering their vulnerable status and disease trajectory. I concluded that more research is needed to better understand the influence of palliative care on the health outcomes for hospitalized patients with COPD and LTOT.

## Limitations

I identified the use of nonequivalent comparison groups with a relatively small intervention group (less than 16%) as a research limitation. I did not consider variation in provider medical management and medication use among the two groups. The research population was not risk stratified based on demographics, age, or other medical conditions. It is important to recognize that there are factors other than medical care that influence patient outcomes (see Donabedian, 2005). Ideally comparative research under controlled environments strengthens outcome attribution; unfortunately, it is difficult to create a controlled environment in social science methodology (Donabedian, 2005).

This sample was restricted to a single hospital geographic location with a robust palliative care consultation service largely populated with English speaking, White, Non Hispanic men and women. This creates generalizability challenges in applying this research as a normative standard of care throughout the U.S. healthcare system. However, the focus on established diagnosis codes and the review of palliative care operations gives insight on a segment of practice that can be replicated as an empirical standard derived in actual practice (Donabedian, 2005).

## Recommendations

A tri-fold problem was identified for hospitalized patients with severe COPD: a) patients hospitalized with COPD with LTOT have a high mortality rate, are at risk of frequent hospitalizations, and suffer a declining quality of life as the disease progresses; b) the disease burden is costly to society due to expensive hospital stays and treatments, loss of patient and caregiver productivity, and increasing health care expenditures; and c) there is little research regarding the correlation between palliative care services and days spent in an ICU, days on invasive mechanical ventilation, physician orders for CPR code status, and hospital discharge to hospice service for hospitalized patients with COPD and LTOT.

The findings of this research study show that patients with palliative care involvement have a longer ICU stay and extended days on invasive mechanical support than those without palliative care. Therefore, it cannot be assumed that palliative care indirectly plays a role in cost savings by decreasing expensive ICU stays and ventilator treatments in an acute care hospital environment. Further research is needed to determine if timeliness of palliative care further impacts ICU stays and ventilator treatments outcomes.

My findings indicate a relationship with patients receiving palliative care and a code status order change from CPR to no CPR within the hospital environment; but this relationship could not be linked to a direct correlation to the timeliness of a palliative care consult and the timeliness of a code status order change. These patients are identified to have a high mortality rate, are at risk of frequent hospitalizations, and suffer a declining quality of life as the disease progresses. Palliative care can potentially play an important role in identifying goals of care resulting in a code status change but further research is needed in this regard. Understanding a patient’s end of life wishes and honoring those wishes may prevent unnecessary hospitalizations and unwanted life-saving treatments indirectly decreasing health care costs while proving appropriate care. It may be beneficial to further research the timing of a consult palliative care services in relation to advance care planning for patients with COPD and LTOT. Unfortunately, I had insignificant findings relating to palliative care and discharge to hospice services. More research is needed regarding the correlation between palliative care services and hospital discharge to hospice services for hospitalized patients with COPD and LTOT.

## Implications

Severe COPD is recognized as a significant cause of mortality and morbidity frequently complicated by additional chronic conditions (GOLD, 2017). There is a direct and indirect cost burden due to frequent hospitalizations, admissions to ICUs, and the need for invasive mechanical ventilation (Ford et al., 2015). These patients are recognized as being appropriate for palliative care consultation (Duenk et al. 2017; Rush et al., 2017; Strang et al., 2013). Patients receiving palliative care received a code status order change from CPR to no CPR more frequently within the hospital environment than patients without palliative care. I question if palliative care has a direct role in identifying goals of care resulting in a code status change, or confirmation. Further research is needed to better understand palliative care’s role in understanding a patient’s end of life wishes and the prevention of unnecessary hospitalizations and unwanted life-saving treatments thereby decreasing health care costs.

Hospital 30-day mortality rates and 30-day readmissions are hospital specific outcome measures for COPD populations in the Centers for Medicare & Medicaid Services Hospital Value-Based Purchasing and Hospital Readmissions Reduction Program. Both programs impact payments to hospitals based on quality of care as indicated by specific clinical outcomes (Quality Net, 2017). Palliative care services offered in a hospital environment does not decrease ICU or invasive ventilator support days, and does not influence a patient being discharged to hospice services but may help patients make informed decisions about emergency medical treatments at end of life that may lead to alternative therapies preventing hospital mortalities and hospital readmissions decreasing healthcare costs.

## Conclusions

COPD is the third leading cause of death in the United States and a widely recognized public health burden (CDC, 2017; U.S. Department of Health and Human Services, 2014). The prognosis for a patient with severe COPD is similar to a patient suffering from cancer. Despite this, the COPD patient is less frequently considered to receive palliative care compared to patients with cancer and other chronic diseases (Beernaert et al., 2013; Brown, Engelberg, Nielsen, & Curtis, 2016; Hyasat & Sriram, 2016; Weingaertner et al., 2014). After an extensive literature review, I found little research investigating the role of palliative care for patients with severe COPD in comparison to patients with cancer diagnosis (Riffin et al., 2015). This quantitative research aimed to determine if palliative care serves as an important role for patients suffering from severe COPD and LTOT by specifically analyzing days in an ICU, days on invasive mechanical ventilation, physician orders for CPR code status, and hospital discharge to hospice services.

The quasi-experimental, nonequivalent groups research design used preexisting data collected by patient medical record abstraction. The patients admitted to the hospital with a COPD exacerbation, as identified with specific diagnosis codes, and LTOT were divided into two groups. The intervention group consisted of patients with a palliative care consultation, the control group consisted of patients without a palliative consultation, and the covariates were identified as days spent in the ICU, days on invasive mechanical ventilator support, change in code status, and place of discharge over a one-year period.

The following research questions and hypotheses guided this study:

Research Question 1: What relationship does palliative care have on days spent in the ICU for COPD patients with LTOT admitted to a hospital?

$H_0$1: COPD patients with LTOT receiving palliative services is not associated with days in an ICU compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

$H_A$1: COPD patients with LTOT receiving palliative services is associated with a greater number of days in an ICU compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Research Question 2: What relationship does palliative care have on days receiving invasive mechanical ventilator support for COPD patients with LTOT admitted to a hospital?

> $H_0$2: COPD patients with LTOT receiving palliative services is not associated with days receiving invasive mechanical ventilator support compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.
>
> $H_A$2: COPD patients with LTOT receiving palliative services is associated with a greater number of days receiving invasive mechanical ventilator support compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Research Question 3: What relationship does palliative care have on physician orders for CPR code status for COPD patients with LTOT admitted to a hospital?

> $H_0$3: An inpatient palliative care consult for COPD patients with LTOT is not associated to a physician order for no CPR code status compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.
>
> $H_A$3: An inpatient palliative care consult for COPD patients with LTOT is less frequently ordered a no CPR code status compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

Research Question 4: What relationship does palliative care have on hospital discharge to hospice services for COPD patients with LTOT admitted to a hospital?

$H_0$4: An inpatient palliative care consult for COPD patients with LTOT is not associated to hospital discharge to hospice services compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

$H_A$4: An inpatient palliative care consult for COPD patients with LTOT is less likely to be discharged to hospice compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

I found a significant difference in comparing the mean number of ICU days for the 56 patients who received palliative care compared to the 303 patients who did not receive palliative care. The mean of the days spent in an ICU for patients who received a palliative care consult was significantly higher ($M$ = 2.29, $SD$ = 4.254) than the mean of the days spent in an ICU for patients who did not received a palliative care consult (M = .45, $SD$ = 2.08). Further analysis revealed that all 24 of the patients received the palliative care consult during the course of their ICU stay opposed to receiving palliative care before the ICU transfer. I did not investigate whether or not receiving palliative care influenced avoiding an ICU stay among the 32 out of 56 (57.1%) patients who received palliative care and were not admitted to the ICU during their hospitalization.

In relation to the number of days on invasive mechanical ventilator support, a significant difference was found in the means of the two groups ($t$(64.7) = 3.375, $p$ =

.001). The mean of the experimental group, patients who received a palliative care consult, was significantly higher (*M* = 6.43, *SD* = 9.067) than the mean of the control group (*M* = 2.17, *SD* = 6.162). Patients requiring an ICU admission or invasive mechanical ventilation are more acutely ill than patients on medical-surgical hospital units, or non-mechanically ventilated patients. A higher acutely ill patient may increase the likelihood of ordering a palliative care consult by the attending provider. More research is needed to determine if the timeliness of a palliative care consult in relation to the disease prognosis influences the patient's decision to pursue an ICU stay, or invasive mechanical ventilator support.

I found a significant interaction between palliative care and a physician order for no CPR at hospital discharge [$X^2(1, N=359) = 52.914$, $p = .000$]. Thirty five of the 56 (62.5%) patients who received palliative care had a no CPR physician order at discharge compared to 52 of the 303 (17.16%) patients who did not receive palliative care and had a no CPR physician order at discharge. This study had 100% of all changed code status orders changed from CPR to no CPR. I found a weak correlation among the day the palliative care consult occurred to the day the change of code status occurred that was not significant (r(2) = .214, $p = .113$). Therefore, it is difficult to conclude if palliative care is consulted as a result of a code status change from CPR to no CPR; or if palliative care is consulted to clarify the code status orders resulting in a change in physician orders from CPR to no CPR. The rationale for consulting a palliative care provider was not considered. Further research is needed to determine if palliative care plays a role in communicating and understanding a patient’s goals of care to include the clarification of code status orders for resuscitation during an acute care hospital visit.

Out of the 359 patients admitted to the hospital with COPD and LTOT, seven or 1.9% were discharged to hospice care. Of those seven patients discharged to hospice services, three patients received palliative care. The results of the Fisher exact test were insignificant (*p* = .079); thereby favoring the alternative hypothesis: An inpatient palliative care consult for COPD patients with LTOT is less likely to be discharged to hospice compared to COPD patients with LTOT receiving routine treatment in accordance to the GOLD guidelines.

I conclude that palliative care did not serve as a cost reduction measure by reducing ICU days and days on a mechanical ventilator for patients with COPD and LTOT. Further research is needed to determine if the timeliness of palliative care consultation serves as an important role for patients suffering from severe COPD and LTOT specifically by analyzing days spent in an ICU, and days on invasive mechanical ventilation. Palliative care is correlated to patients suffering from severe COPD and physician orders for resuscitation status during a hospitalization. Further research is needed to determine if palliative care plays a role in communicating and understanding a patient’s goals of care to include the clarification of code status orders for resuscitation during an acute care hospital visit. I determined it was inconclusive if palliative care served as a role for patients suffering from severe COPD and a hospital discharge to hospice services.

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