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Hospice Performance: Environmental and Organizational Correlates

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HOSPICE PERFORMANCE: ENVIRONMENTAL AND ORGANIZATIONAL CORRELATES

by

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ABSTRACT

The purpose of this dissertation is to explore hospice performance using a three paper format. Based on Structure-Conduct-Performance (SCP) and Structure-Process-Outcome (SPO) models, paper 1 conducts a systematic literature review to identify gaps in hospice performance research. Paper 2 explores the relationship between hospice market structure and inpatient services provision (Structure-Conduct). Market munificence is related to hospice inpatient services offering. Organizational factors such as hospice chain-affiliation, age, and ownership also play roles in predicting hospices' probability in providing inpatient services. Paper 3 examines the impact of hospice inpatient service provision on service utilization and financial performance (Structure-Process-Outcome). Hospices that not offering inpatient services have longer average length of stay (LOS) and better financial performance than hospices offering inpatient services. Average LOS partially mediates the relationship between inpatient services provision and financial performance.

Keywords: hospice, inpatient services, LOS, financial performance

DEDICATION

I dedicate this dissertation to my uncle, Houxi Wang, who passed away due to cancer. His end-of-life experience with cancer made me realize the important role of hospice care and his last words to me was “always pursue more knowledge”.

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LIST OF ABBREVIATIONS

ACA	Affordable Care Act
ACHC	accreditation commission for healthcare
CAHPS	consumer assessment of healthcare providers & systems
CHAP	community health accreditation program
CMS	Centers for Medicare and Medicaid Services
HHI	Herfindale-Hirschman Index
HIS	hospice item set
HQRP	hospice quality reporting program
IOM	Institute of Medicine
JCAHO	Joint Commission on Accreditation of Healthcare Organizations
LOS	length of stay
MHB	Medicare Hospice Benefit
NHPCO	national hospice and palliative care organization
QAPI	quality assessment performance improvement
RDT	resource dependence theory
RN	registered nurse
ROA	return on assets
TM	total margin

CHAPTER 1

INTRODUCTION

Introduction

This chapter begins with a brief introduction to the three papers comprising this dissertation study. A background section covers the history of hospice, the development of the hospice reimbursement method, and the importance of evaluating hospice performance. The specific contribution of each paper, and the literature gap in conducting hospice performance research will be reported following the background section. The conclusion section summarizes findings from those three papers that contribute to hospice performance literature.

Hospice care is the last, but also an important, health care episode for taking care of end-of-life patients with a main focus on caring rather than curing (NHPCO, 2012). Treating the whole person rather than just the disease and providing patient-and family-centered care are the principles of hospice, which also the learning examples for the US health care system (Holden, 1980). Hospice programs with better performance are associated with the provision of high quality hospice care to patients (Connor, Tecca, LundPerson, & Teno, 2004; S. O. Gandhi, 2012; Kirby, 2012; Kirby, Keeffe, & Nicols, 2007). The purpose of this dissertation is to explore hospice performance by adopting a three paper format. The first paper will conduct a systematic review to summarize the measurement of hospice quality and financial performance, factors contributing to

hospice performance, and gaps in the existing literature. Paper two will examine the association between hospice market environment and the provision of inpatient services. Paper three will study the impact of hospice inpatient services offering on service utilization and hospice financial performance.

Background

The History of Hospice

The concept of *hospice* originated from British physician and nurse, Dr. Dame Cicely Saunders who applied specialized care for dying patients. The first hospice--St. Christopher's Hospice was created by Dr. Saunders in 1948 in a suburban area of London. It was the first modern hospice in history. Later on, Dr. Saunders brought the idea of hospice care to the US in 1963 during her visit to Yale University (Clark, 1998; Connor, 2007). In 1974, the first US hospice program called Connecticut Hospice was founded in Branford, Connecticut by Florence Wald, who was an American nurse but also the Dean of the Yale School of Nursing (Buck, 2004). During the same time period, Dr. Elisabeth Kubler-Ross published a book entitled "On death and dying" based on interviews from 500 dying patients. She advocated a home based end-of-life care model that respected patients' choice and gave families greater assistance than restricting patients to institutional settings. Together, the hospice movement from England to America and the increasing attention on issues about death made hospice an attractive concept and a fast growing phenomenon in the US health care system (Holden, 1980).

Level of Hospice Care & Reimbursement

Regardless of the rapid development of hospice in the US, how to pay providers of hospice care in the health care system remains unclear. The National Hospice Study was born to evaluate the cost-effectiveness of hospice care by Brown University researchers (Greer, 1986). The former Health Care Financing Administration, now the Center for Medicare and Medicaid Services (CMS), provided experimental reimbursement to 26 hospices out of a total of 40 hospices in a study to ensure those 26 hospices did not face financial restrictions (Connor, 2007). The National Hospice Study shed light on the difference between hospice care and conventional terminal care and found that hospices utilized fewer medical services and experienced lower Medicare cost (Greer, 1986). The Medicare Hospice Benefit (MHB) was created through the Tax Equity and Fiscal Responsibility Act (TEFRA) of 1982 to provide hospice benefits to patients, and in 1986, as part of provisions in the Consolidated Omnibus Budget Reconciliation Act (COBRA), the benefit became permanent. Additionally, the COBRA of 1989 gave hospices a 20 percent increase in reimbursement rate in order to provide enough coverage of the cost of offering hospice care, especially dealing with end-of-life drug use (Cassileth & Donovan, 1983; S. Connor, 2009; Hoyer, 1998).

Medicare is the dominant source of payment for hospice care with 85.5 percent of hospice patients reimbursed by Medicare. This is followed by managed care or private insurance (6.9 percent), Medicaid Hospice Benefit (5 percent), uncompensated care (0.7 percent), self-pay patients (0.8 percent), and other payment source (1.2 percent) (NHPCO, 2015). Hospice care is reimbursed on a fixed per diem rate. Reimbursement rates may vary depending on the settings and levels of care (Kidder, 1992). Medicare categorizes

hospice care into four general levels and offer corresponding reimbursement rates: routine home care ($161.89 per day), continuous care (maximum daily rate for 24 hours care is $944.79), inpatient respite care ($167.45 per day), and general inpatient care ($720.11 per day)(CMS, 2015b). Routine home care is for patients who receive care at the place where they live including nursing homes and assisted living facilities. Routine home care is the major format of hospice care which comprised 93.8 percent of total hospice patient care days in 2014 (NHPCO, 2015). Continuous care is offered to deal with patient' crisis and to keep patients at home. General inpatient care is for patients who receive care in an inpatient facility for pain control and symptom management that cannot be provide in other settings. In 2014, general inpatient care comprised 4.8 percent of patient care days (NHPCO, 2015). Respite care is short-term, inpatient care provided to patients in an approved facility which can give primary caregivers some occasional relief (NHPCO, 2015).

Hospices' Quantity & Quality

The number of hospices in the US has increased steadily over the past forty years: from the first hospice that opened in 1974 to more than 6,100 hospices in 2014 (NHPCO, 2015). Figure 1 shows the distribution map of US hospices from the year 2009 to 2013. The first hospice started as a non-profit volunteer organization that was the early format of hospices. The early hospices adopted a home-care model and focused on the provision of care and support for patients and their families (Connor, 2007; Hutcheson, 2011). Moving forward, the structure of the hospice industry became more diverse. Hospices

have evolved from a mostly freestanding format, to a point where about forty percent of all US hospices are now linked to home health agencies, hospitals, or nursing homes (NHPCO, 2015; Paradis & Cummings, 1986). According to the 2014 National Hospice and Palliative Care Organization (NHPCO) report, 59.1 percent of hospices were independent, 19.6 percent belonged to hospital systems, 16.3 percent were part of home health agencies, and 5.0 percent were part of nursing homes (NHPCO, 2015). In terms of hospice ownership, for-profit hospices have increased over the past several years, while the number of not-for-profit hospices stayed the same and began to decrease over the same time period. In 2014, among all Medicare certified hospice care providers, 28 percent hospices were not-for-profit, 68 percent were for-profit, and about 4 percent were government owned (NHPCO, 2015).

As the number of hospices increases, hospice performance and quality of care have come under greater scrutiny. Paradis and Cummings (1986) pointed out that "while hospice is part of the medical mainstream, there is no evidence that competition for the market created by dying people and their families automatically dehumanizes care of the dying." While this fact may have applied to the hospice industry of the 1980s; it may not hold true today. Whoriskey and Keating (2014a) reported that the lack of public information in terms of hospice quality completely leave patients in the dark when choosing a hospice program. Specifically, there is a growing evidence showing that for-profit hospices may provide lower quality of care by selecting patients requiring less intensive levels of care (Wachterman, Marcantonio, Davis, & McCarthy, 2011a), have higher average length of stay (LOS) (R. C. Lindrooth & B. A. Weisbrod, 2007; O'Neill, Ettner, & Lorenz, 2008), offer fewer Registered Nurse (RN) visits (Lorenz et al., 2002)

and fewer noncore services (Carlson, Gallo, & Bradley, 2004), and have more quality violations (S. O. Gandhi, 2012). Hospice care is one of the least quality inspected areas of the US health care system. With recent legislation approved by Congress, the frequency to scrutinize hospices shifted from every six years to every three years. For comparison, nursing home quality is checked about once a year and home health agencies every three years (Whoriskey, 2014a). The high live discharge rates in hospice also draw attention to hospice quality performance issues. A recent study reveals that one in three patients left a hospice service due to inadequate care, or because they were not eligible for hospice care but were enrolled anyway (Teno, Plotzke, Gozalo, & Mor, 2014b).

Better performing hospices bring higher quality of care to patients and satisfaction to their families. A recently published Institute of Medicine (IOM) report identified the need to set up a high quality end-of-life care system that is person-centered and family-centered in order to honor individual preferences and improve the quality of life for the whole family (IOM, 2014). Early in 1998, the IOM released a report "Approaching Death: Improving Care at the End of Life" which highlighted the importance of outcome measures of hospice care and the need to understand links between hospice outcomes and environmental, structural, and processes of care that influence outcomes (Field & Cassel, 1997). Originating from the Affordable Care Act (ACA) of 2010, CMS initiated a hospice quality reporting program (HQRP) that requires all hospices to conduct public reporting of quality. The hospice performance measures of quality include four sets of performance measurements: Quality Assessment Performance Improvement (QAPI) structural measures, comfortable dying measures, hospice item set (HIS), and hospice experience of care survey (CMS, 2014c). A high functioning QAPI program is a

foundation to improve patient outcomes and a platform for public reporting. The comfortable dying measure was developed by NHPCO and endorsed by National Quality Forum (NQF) to measure whether patients' pain is effectively addressed and brought to a comfortable level within 48 hours of initial assessment (NHPCO, 2014b). Hospice Item Set (HIS) collected data from hospice records to report patient-level outcome in two periods (HIS-admission and HIS-discharge). Hospice experience of care survey is a post-death family caregiver survey to evaluate patients' and families' experience with hospice care. Financial penalty (2% reduction in Medicare payment) applies to hospices that fail to report quality or comply with the quality reporting requirements for the previous calendar year (CMS, 2014c).

Dissertation Outline

This dissertation focuses on hospice performance using a three paper format (see Figure 2). The first paper is a systematic review examining the hospice performance literature based on two research frameworks, which also serves as a foundation for the next two empirical study papers. Both Structure-Process-Outcome (SPO) and Structure-Conduct-Performance (SCP) are the appropriate frameworks to categorize and summarize the hospice performance literature (Bain, 1959; Avedis Donabedian, 1966a). The second paper examines the role of hospice environmental characteristics (munificence, dynamism, and complexity) on hospices' provision of inpatient services (Structure-Conduct/Process). The third paper assesses the association among hospice

inpatient services provision, service utilization, and financial performance by applying Donabedian's theory as a framework (Structure-Process-Outcome).

Paper 1: Systematic Literature Review on the Hospice Performance

Introduction

Hospice care is for end-of-life patients. A better performing hospice program brings high quality care to patients and satisfaction to their families. However, hospice performance has been questioned as quality inspections are infrequent (Whoriskey, 2014a), standardized measurement is lacking (Carlson et al., 2004), and quality varies among hospices (Whoriskey & Keating, 2014a). The 1998 IOM hospice quality report proposed the need to "understand links between outcomes of hospice care and environmental, structural, and process of care that influence outcomes". Based on this report, many studies have focused on hospice performance. The purpose of this systematic review is to elaborate the measurements that have been used to describe hospice performance and summarize factors that may contribute to hospice performance.

Methods

Articles for the systematic review were identified from five databases (PubMed/MEDLINE, ABI/Inform, Business Source Premier, CINAHL, and Scopus) for the years 1998- 2015. The inclusion criteria were set to involve articles that are empirical, peer-reviewed, written in English, and based on US hospices. Information related to

study design, measurements of hospice performance, factors that were associated with hospice performance, and major findings, of each article is extracted. Through summarizing the extracted information, hospice performance is categorized, factors associated with hospice performance are summarized, and literature gaps in hospice performance are identified. Moreover, other related information like published journal, management theory/framework use, and data utilization in the identified hospice performance studies is reported.

Contribution to the Literature

No systematic review has been conducted to examine hospice performance. Mularski et al. (2007) performed a systematic review on the measures of patient end-of-life care and how these measures were related to patient outcomes. Similarly, Lorenz et al. (2008) summarized the evidence about how to improve palliative care at the end-of-life stages for patients. Also from Lorenz et al. (2005), a systematic review of methodology used in conducting end-of-life care research was presented. However, these reviews focused on patient end-of-life care, not from the hospice organizational perspective. As mentioned earlier, hospice performance has a broad impact: not only influencing patients and their families' decision to select hospices, but also patients' quality of care and family satisfaction with care. This study identifies articles that have examined hospice performance. Information related to the measurements of hospice performance and indicators of hospice performance is presented. Moreover, literature

gaps in terms of conducting hospice performance research are identified as the foundation to develop the next two empirical papers in this dissertation.

Paper 2: Factors Associated with the Provision of Inpatient Care in Hospices

Introduction

Hospices offer four general levels of hospice care: two of them are home-based care including routine home care and continuous home care, general inpatient care and inpatient respite care are provided at the inpatient level (NHPCO, 2012; OIG, 2013). Only about one in three hospices also operate an inpatient facility (NHPCO, 2013). Hospices are the care providers to end-of-life patients who have complex health care needs. Some hospices were observed to not have inpatient care for patients, requiring transportation to an inpatient facility (Whoriskey & Keating, 2014b). Understanding why certain hospices already offer inpatient care could bring more evidence for policy makers to focus on the role of inpatient care in hospice. However, very little is known about the characteristics of hospices that are associated with the presence of inpatient facilities.

Methods

The data for this study is derived from three sources. The main source comes from the 2009 to 2013 Hospice Cost Reports from Centers for Medicare and Medicaid Services (CMS) and Provider of Services (POS) files. These data sets reported the information about hospices' demographics and financial performance. Another data

source is the Area Health Resources Files (AHRF). Hospice market environment is measured based on resource dependence theory to include market munificence, market dynamism, and market complexity. The dependent variable is measured as a hospice's probability of offering inpatient services. A generalized linear mixed-effects model (GLMM) is used to examine the association between market and organizational factors and hospice inpatient services offering.

Contribution to the Literature

Previous studies have focused on the impact of organizational and patient factors on a hospice's provision of services to patients. Only one study has considered the role of market competition in the hospice industry (Lorenz, Asch, Rosenfeld, Liu, & Ettner, 2004). Market competition in that study was estimated from hospice administrators instead of using more objective data retrieved from available sources. Moreover, only a few studies' employed research frameworks based on organizational management theories when examining hospice performance (Kirby, 2012; Kirby et al., 2007; McCue & Thompson, 2005). This study will adopt resource dependence theory to examine the role of hospice market factors in hospice performance. Resource dependence theory has been utilized in different health care settings (e.g., hospitals, nursing homes) (Yeager et al., 2014), but not in hospices. Thus, this study will be the first study to apply resource dependence theory in the hospice setting and add more knowledge in what specific market factors are contributing to hospices' provision of inpatient services.

Paper 3. Hospice Inpatient Services Provision, Utilization, and Financial Performance

Introduction

The 1998 IOM report "Approaching Death: Improving Care at the End of Life" highlighted the importance of outcome measure of hospice care and the need to understand links between outcomes of hospice care and environmental, structural, and processes of care that influence outcomes. Based on the IOM's recommendation about hospice care, Donabedian's Structure-Process-Outcome framework in quality research is an appropriate one for examining hospice performance. The purpose of this study is to examine the impact of hospice inpatient services on service utilization, and their influence on hospice financial outcome by applying this research framework.

Methods

A longitudinal secondary data set (2009 to 2013) was merged from three sources: (a) Hospice Cost Reports from the Centers for Medicare and Medicaid Services (CMS), (b) the Provider of Services (POS) files, and (c) the Area Health Resources Files (AHRF). The dependent variable in this study was hospice financial performance measured by total margin (TM) and return on assets (ROA). The independent variable was hospice inpatient services offering. Mixed effects regression models were used in the multivariate regression analyses. The mediation effect of hospice service utilization measured by average length of stay (LOS) in the relationship between hospice inpatient services provision and two financial performance measures was also tested.

Contribution to the Literature

Hospices are operated under low profit margins (O'Neill et al., 2008). Researchers have empirically examined the relationship between hospice structure and financial performance. They found that for-profit (FP) hospices earned higher profits than not-for-profit (NFP) hospices by lowering operational costs (Noe & Forgione, 2014; O'Neill et al., 2008). In comparison to existing hospices, new hospices (operated after January 1, 2000) served fewer patients, but increased revenue and overall profitability through longer length of stays (LOS) (McCue & Thompson, 2006). However, no studies have included all three aspects in Donabedian's framework to examine the relationship among structure, process, and outcome. Guided by Donabedian's structure-process-outcome (SPO) framework, this study examines the presence of hospice inpatient services on services utilization, and their influence on hospice financial performance using national hospice data from 2009 to 2013.

Conclusion

The purpose of this dissertation to examine hospice performance by using two research frameworks: Structure-Conduct-Performance (SCP) and Dodabedian's Structure-Process-Outcome (SPO) (Avedis Donabedian, 1966a). The first paper is a systematic review to summarize measurements of hospice performance, factors that are associated with performance, and the literature gaps for the second and third paper. The second paper focuses on the relationship between hospice environmental factors (structure) and inpatient services provision (conduct/process) based on resource

dependence theory (RDT). The third paper examines the relationship among all three aspects (structure-process-outcome): the impact of hospice inpatient services provision on services utilization and financial performance.

Figure 1. The distribution map of U.S. hospices from 2009 to 2013

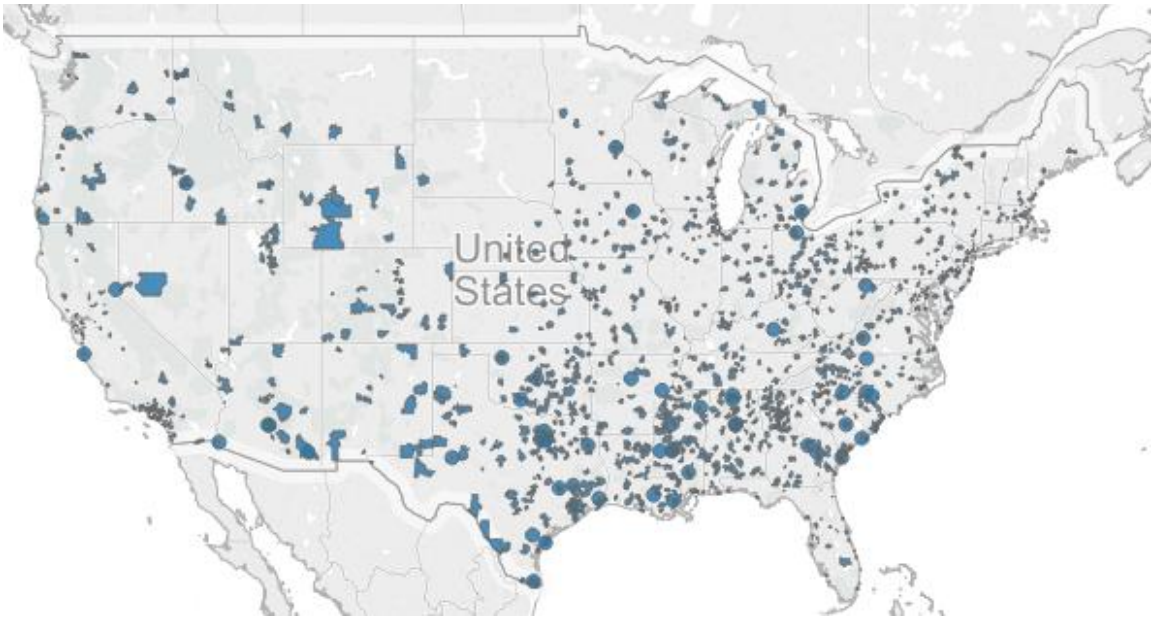
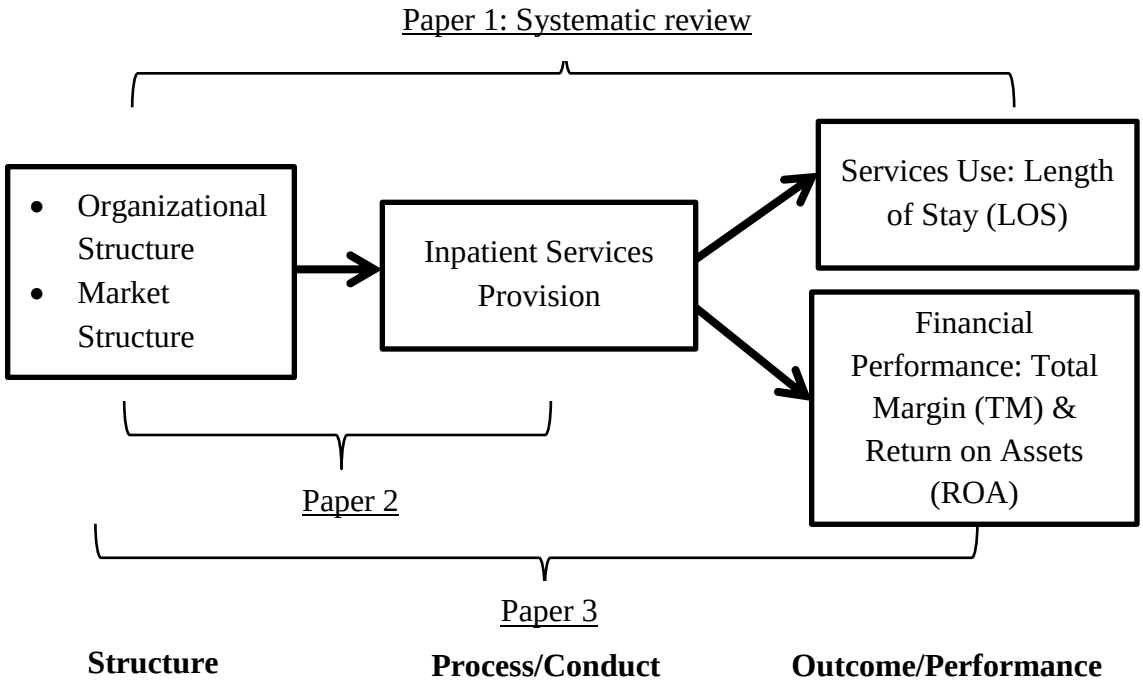


Figure 2. Dissertation Framework (Structure-Process/Conduct-Performance/Outcome)



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CHAPTER 2

SYSTEMATIC REVIEW OF THE HOSPICE PERFORMANCE LITERATURE

by

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CHAPTER 2

SYSTEMATIC REVIEW OF THE HOSPICE PERFORMANCE LITERATURE

Abstract

Hospice is the key provider of end-of-life care to patients. As the number of hospices has rapidly increased, the performance has been scrutinized more deeply. To foster understanding of how hospice performance is measured and what factors are associated with performance, we conducted a systematic review of empirical research on hospice performance. Both Structure-Process-Outcome (SPO) and Structure-Conduct-Performance (SCP) frameworks were applied to categorize and summarize the hospice performance literature. A total of 36 studies were included in the systematic review. Hospices adopted different strategies (e.g., service provision strategy, staffing strategy) to improve performance. Two strategic approaches (innovation and volunteer usage) were associated with better outcomes. Hospice organizational factors, market environment, and patient characteristics were related to hospice strategic conduct and performance. The majority of hospice performance studies have examined the relationship between hospice structure and strategic conduct/process, fewer studies focusing on structure-performance, and even fewer concentrating on strategy-performance.

Keywords

hospice performance, systematic review, organization, strategic conduct, structure

INTRODUCTION

The hospice care industry has evolved over the past 40 years as social norms, funding opportunities, and environmental factors changed (Kirby et al., 2007). The number of hospices in the U.S. continues to increase. By the year of 2013, the U.S. had 5,800 hospice programs including both primary locations and satellite offices (NHPCO, 2015). The fast development of the hospice industry is partially due to the reimbursement of hospice care from the Medicare Hospice Benefit (MHB) started in 1982 (Hoyer, 1998) and the increased acceptance of the hospice concept by patients and their families (Han, Remsburg, McAuley, Keay, & Travis, 2006). Another part of hospice growth is related to the entry of for-profit (FP) hospices in the market. As the number of for-profit hospices has increased, the number of not-for-profit (NFP) and government hospices has declined over the same period (Connor, 2007; NHPCO, 2015). In 2013, about 66 percent of hospices were for-profit hospices, according to the Medicare hospice provider list (NHPCO, 2015).

With the rapidly increased number of FP hospices in the market, the quality of hospice care becomes more important. Hospice performance has been questioned in terms of infrequent quality inspection (Whoriskey, 2014a), lack of standardized measurement (Lorenz et al., 2002), and quality performance variation among hospices (Whoriskey & Keating, 2014a). Research interest in hospice performance has also been increasing (Carlson et al., 2004; Cherlin et al., 2010; Lorenz et al., 2002). Several studies found that FP hospices compromise quality performance (e.g., staffing pattern, service provision) in order to achieve higher profitability (Carlson et al., 2004; Cherlin et al., 2010; S. O. Gandhi, 2012; Lorenz et al., 2002; O'Neill et al., 2008). Policy makers have

taken several initiatives to address hospice performance issues. Recently, Congress approved tighter scrutiny of hospices: from one inspection every 6 years to one every 3 years (Whoriskey, 2014a). Moreover, as part of the Affordable Care Act (ACA), the Center for Medicare and Medicaid Services (CMS) introduced a hospice quality reporting program (HQRP) which requires hospices to provide quality reports to the public (CMS, 2014b). However, there is still no clear conclusion about how hospice performance was measured in the literature and what factors were attributed to hospice performance.

According to a recent consensus report published by the Institute of Medicine (IOM), "Dying in America: Improving Quality and Honoring Individual Preferences Near the End of Life" advocated the need to "improve the quality and availability of medical and social services for patients and their families" because high quality hospice care "could not only enhance quality of life through the end of life, but may also contribute to a more sustainable care system" (IOM, 2014). Early in 1998, the Institute of Medicine (IOM) released another report "Approaching Death: Improving Care at the End of Life" highlighted the importance of outcome measures of hospice care and the need to understand links between hospice outcomes and environmental, structural, and processes of care that influence outcomes (Field & Cassel, 1997). Lorenz et al. (2002) pointed out the lack of standardized measurement for hospice quality of care and suggested the need to "develop a standard, nationalized measurement for hospice performance based on patient experiences." Connor et al. (2004) implied hospices vary in performance and services provision because there are no consistent measurement standards for hospice care (Connor et al., 2004). The Medicare Payment Advisory Commission (MedPAC)'s report in 2008 also requested "developing standardized empirical measures that can be

used for program administration—either to compare provider performance or to adjust payments under future pay-for-performance programs—presents unique challenges" (MedPAC, 2008).

This systematic review attempts to: 1) present the Structure-Conduct-Performance (SCP) paradigm and Donabedian's Structure-Process-Outcome (SPO) model as analytic frameworks to measure hospice performance; 2) find out what factors are related to hospice performance; and 3) summarize the existing research and identify the future research direction of hospice performance research.

NEW CONTRIBUTION

There have been three systematic reviews of end-of-life care. Lorenz et al. (2005) presented a methodological approach about how to conduct systematic review of end-of-life care and gave a general review of the end-of-life care literature. He reviewed the end-of-life care literature with a picture of breadth instead of one with depth. Mularski et al. (2007) performed a systematic review on the measures of patients' end-of-life care and how these measures are related to patient outcomes. Similarly, Lorenz et al. (2008) summarized the clinical evidence of patient outcomes as it related to treating cancer pain, dyspnea, depression, advance care planning, continuity, and caregiving. End-of-life care is a broader concept than hospice care, with hospice care only limited to patients whose life expectancy is less than six months. Since hospice performance is our focus, we are conducting this systematic review on hospice care rather than end-of-life care.

Based on the 1998 IOM hospice quality report, many studies were started to examine the quality of hospice and end-of-life care. The three reviews covering the end-of-life care literature that published between 1990 and 2005 (Lorenz et al., 2008; Lorenz et al., 2005; Mularski et al., 2007), new studies that published after 2005 were not included in these reviews. Since many studies started to focus on hospice quality of care after the publication of IOM report, this review summarizes studies that were published after 1998. Additionally, the existing reviews focused exclusively on patient outcomes. In contrast, this systematic review encompasses both patient and organizational outcomes of hospice care, guided by a research framework.

CONCEPTUAL FRAMEWORK

Our conceptual framework (Figure 1) is an integration between Bain's model and Donabedian's theory. The Structure-Conduct-Performance (SCP) paradigm (Bain, 1959) and Donabedian's Structure-Process-Outcome (SPO) framework (Avedis Donabedian, 1966b) were proposed in different areas but contained similar elements. SCP is the foundation of industrial organization theory and was developed by Joe S. Bain Jr. in his book entitled "Industrial Organization" in 1959. SCP became popular in the field of strategic management and was adopted as an analytic tool for examining business functioning in a competitive market environment (Porter, 1980). SCP describes how industry structure can influence a firm's conduct which, in turn, could impact the performance of both industry and firm. Structure contains a set of market and industry indicators that are stable overtime which could affect a firm's behavior. Conduct

describes how firms behave and performance covers both industry and market performance. The Donabedian model is a conceptual framework that provides health care researchers an outline for evaluating quality of care. It contains three main components: structure, process, and outcome. Structure refers to physical or organizational characteristics of health care entities. Process refers to the care that patients have received. Outcome refers to the result or consequences of provided health care. Donabedian's SPO model suggests that structure and process maybe the cause of outcome (Avedis Donabedian, 1966b, 1980; A. Donabedian, 1988). The SPO model has been widely used to explain variation in quality of care at patient level; it can also be used to explain variation in quality of care from the organizational level. Several empirical studies have used the SPO model to explain the variation of quality of care in hospital and nursing home settings (Gile, 2011; Needleman, Kurtzman, & Kizer, 2007; Weech-Maldonado, Neff, & Mor, 2003; Wu & Hsieh, 2011). Donabedian's theory has also been adopted to evaluate hospice programs (Richie, 1987).

Structure. Using the SCP framework, structure refers as market structure which encompasses a set of market indicators such as hospice industry growth demand and barriers to enter the hospice market. From the perspective of SPO, structure is referred to resources that are available and accessible from hospices to patients. Richie (1987) offered examples of hospice structure and its measurements: characteristics of hospices (freestanding, hospital-based, home health agency based, nursing home based), licensure from state, Medicare certification, equipment including medical and office supplies, and continuing education workshops/seminars attended by hospice staff. In the empirical hospice performance literature, market structure (S. O. Gandhi, 2012; Lorenz, Asch, et al.,

2004) and organizational structure (Carlson et al., 2004; McCue & Thompson, 2005, 2006) were used as structural measures.

Conduct/Strategy/Process. By responding to the changing hospice market environment, hospices may choose specific strategies to increase their competitive advantage and improve performance. In 1986, Paradis and Cummings (1986) published a conceptual paper exploring and examining the evolution of hospices in America. Based on the institutional theory developed by DiMaggio and Powell (1982), Paradis and Cummings (1986) found that hospices become more isomorphic overtime due to the influence of market uncertainty in the external environment. In a recent empirical study of freestanding hospices, Apenteng, Nayar, Yu, Adams, and Opoku (2014) suggested that hospices may adopt a nursing facility focus strategy when facing increasing competition in the hospice market. Hospice process in the SPO framework is referred to as resources used and activities occurring during the delivery of services from hospices to patients. Type and length of treatment, equipment usage, provided services, and continuing education workshops/seminars that have been attended by hospice staff are listed examples (Richie, 1987). Hospice length of stay (LOS) (S. O. Gandhi, 2012; R. C. Lindrooth & B. A. Weisbrod, 2007; Noe & Smith, 2012), service provision and staffing pattern (Carlson et al., 2004; Cherlin et al., 2010) were used in the hospice empirical literature to represent hospice process quality.

Performance/Outcome. The outcome of hospice care primarily focuses on changes occurring in organizations due to the influenced structure and process. Hospice outcomes can occur at both the organizational and patient level. Financial viability is a measurement example of organizational outcome. Level of patients' comfort and

caregivers/families' satisfaction are examples of patient level outcomes (Richie, 1987). Hospice financial performance (McCue & Thompson, 2005, 2006; O'Neill et al., 2008; O'Neill, Ettner, & Lorenz, 2009) and quality citations/deficiencies (S. O. Gandhi, 2012; Kirby, 2012; Kirby et al., 2007) were adopted to measure hospice performance. Recently, patient live discharge status was used to measure patient outcome (Teno, Plotzke, Gozalo, & Mor, 2014a).

METHODS

Literature Search and Selection

Step 1: Bibliographic search. Articles for the systematic review were identified from five databases (PubMed/MEDLINE, ABI/Inform, Business Source Premier, CINAHL, and Scopus) to make sure articles from a wider interdisciplinary field including business and medicine were covered. ABI/Inform and Business Source Premier are common business research databases that collect publications related to hospice strategic management and performance. CINAHL, PubMed, and Scopus provide article resources from medicine, nursing, and the allied health care field. Scopus covers a broader journal range than PubMed, and for articles that were published after 1996 (Falagas, Pitsouni, Malietzis, & Pappas, 2008).

The search criteria were set to include studies that were conducted after 1998 and were limited to studies that were empirical, peer-reviewed, and written in English language. With assistance from a reference librarian, we performed abstract searches using a set of strings that combined the following terms: hospice, organizational,

performance, outcome, quality, productivity, effectiveness, and efficiency. The search process began in PubMed/MEDLINE using the Medline Medical Subject Headings (MeSH) terms “hospices/organization and administration” together with terms “performance”, “outcome”, “quality”, “productivity”, “effectiveness”, and “efficiency”. The similar search terms were used to search ABI/Inform and Business Source Premier databases as well. For CINAHL and Scopus, “organizational” was added to the search strings to narrow down the number of searched articles.

Step 2: Title and abstract review. A total of 413 articles were identified after conducting the bibliographic search in five databases, with some duplicated articles (ABI/Inform=72, Business Source Premier=53, PubMed=211, CINAHL=29, and Scopus=48). After a title and abstract review of all the identified articles, 383 articles were excluded because they were not relevant to hospice performance (n=151), not empirical (n=106), not in English-language (n=10), published before 1998 (n=115), and not peer-reviewed (n=1) (see Figure 2). A total of 18 articles were kept for detailed review after applying the exclusion criteria with the abstract review.

Step 3: Hand search. Realizing that some relevant hospice performance studies have been published in journals that were not recorded in the searched databases or missed in the initial search process, a hand search was performed to explore reference lists (backward search) of 18 articles identified after Step 1 & 2. Backward reference searching is a way to learn the development of knowledge on a topic of interest by examining the cited references. Additionally, a forward search for articles that cited the 18 studies in their reference lists was conducted. A forward reference searching helps researchers expand the knowledge on a topic by locating follow-up studies. 18 more

articles were eligible for the inclusion criteria that were not captured in the initial search process. Finally, a total of 36 articles were included in this systematic review.

Data Abstraction, Coding, and Synthesis

Eligible articles were reviewed to extract and record key information (e.g., publication year, journal, title, theoretical perspective, study design, data use, predictors, and outcome). Based on the proposed conceptual framework (Structure-Conduct-Performance), studies were categorized by the empirical relationship they examined: structure to conduct, structure to performance, conduct to performance, and structure-conduct-performance.

In the results section, we will report the characteristics of the reviewed studies, summarize the measurements of hospice performance, describe factors or strategies that have been found to be indicators of hospice performance, and discuss the major patterns of findings.

RESULTS

Characteristics of Reviewed Articles

Table 1 describes characteristics of the total 36 reviewed studies. Only 4 articles were published between 1998 and 2004; the majority of studies were published after 2010 (58.33%). Fifty percent of the articles were published in palliative care related journals (e.g., Journal of Palliative Medicine, Journal of Pain and Symptom Management, and The American Journal of Hospice & Palliative Care). The rest of the reviewed

studies were published in health care services and management, aging, and economics/finance journals.

In terms of conceptual framework and theory use, only 5 out of 36 (13.89%) studies were theoretically grounded. Management theories such as agency theory (Noe & Forgione, 2014), institutional theory (Kirby, 2012; Kirby et al., 2007; Lindley et al., 2013), and resource dependency theory (RDT) (Apenteng, Nayar, et al., 2014; Lindley et al., 2013) were adopted as guidelines for hospice performance research. RDT examines how the external resources of hospices affect the behavior of hospices. It also follows the structure and conduct relationship in the Structure-Conduct-Performance framework. Based on the availability of hospice data, 30 out of 36 (83.33%) studies used secondary data including the California Office of Statewide Health Planning and Development (OSHPD) annual home care and hospice survey (25%), national hospice organizational and patient level data (38.89%), and national freestanding hospice data (22.22%). Only six studies (16.67%) collected primary data including a national level data collection from 2008-2009 by randomly selecting hospices from the providers list of 2006 CMS Provider of Services (POS) survey file and Texas hospice survey. For study designs, 26 out of 36 (72.22%) articles used one year cross-sectional designs, 5 studies (13.89%) also adopted cross-sectional designs but with aggregation of multiple years' data. Only 4 studies (11.11%) utilized a longitudinal study design and one study did a survival analysis of hospice patients' length of stay (LOS).

The reviewed articles covered the three aspects of hospice performance research: structure, process/conduct/strategy, and outcome/performance. As some studies may have more than one research focus, the total of number of research foci is 44. Among the 44

research foci, 29 studies examined the relationship between structure and process/conduct (65.91%), 12 articles (27.27%) focused on the impact of structure on outcome/performance, and only 3 (6.82%) studied the relationship between hospice process/conduct and performance. Notably, no study put the research focus of all three aspects together. In the following section, we present detailed results based on the categories of different studies' research foci.

Hospice Structure to Process/Conduct/Strategy

The majority of hospice quality performance studies (n=29) examined the relationship between structure and process/conduct/strategy. Table 2 summarizes the measurements of process outcome and categorizes the structure factors by market, organization, and patient. Hospice length of stay (LOS) was a common process outcome measurement in the literature. Hospice service offering was also used to represent hospice process and strategy. Studies evaluated hospices' probability to offer specific services (e.g., provision of bereavement services, complementary and alternative medicine, and complex palliative services) and calculated the number of total services (including core and noncore services). In addition, other studies assessed different strategies adopted by hospices as it related to outcome: hospice enrollment/admission policy, staffing strategy (e.g., volunteer usage), and quality improvement strategy (e.g., electronic documentation, implementation of preferred practices). Nearly all studies examined the impact of hospice organizational factors (e.g., ownership, size) on hospice conduct/process/strategy. Five out of 29 studies considered market factors (e.g., market

competition) and 6 out of 29 studies evaluated the influence of patient factors (e.g., gender, patient diagnosis).

Nine out of 29 (31.03%) studies investigated the relationship between hospice structural factors and LOS. O'Neill et al. (2008) suggested that hospice LOS was associated with better financial performance. For the organizational predictors, McCue and Thompson (2005) found that small hospices owned by publicly traded companies have longer LOS. Later, McCue and Thompson (2006) compared the LOS between newly established hospices and existing hospices and observed that new hospice patients have longer LOS. Wachterman, Marcantonio, Davis, and McCarthy (2011b) and Noe and Forgione (2014) utilized different data sets but had similar findings in term of hospice ownership: FP hospices had longer LOS than NFP hospices. Similarly, S. O. Gandhi (2012) and R. C. Lindrooth and B. A. Weisbrod (2007) found that FP hospices were significantly more likely to admit more patients with longer LOS. Sengupta, Park-Lee, Valverde, Caffrey, and Jones (2013) examined several years of national hospice data in detail and discovered that FP hospices were more likely to have patients stay for more than 1 year.

Hospice organizational factors were associated with conduct/strategy. Fourteen studies (48.28%) examined the impact of structure on hospices' service offering strategies. Service offering strategy encompassed hospices' probability of providing specific services: complex palliative care services (e.g., radiation services) (Jarosek, Virnig, & Feldman, 2009; Lorenz et al., 2002), complementary and alternative medicine (CAM) services (Olotu, Brown, Barner, & Lawson, 2013), hospice care for children (Lindley et al., 2013), culturally relevant services (Lorenz, Ettner, et al., 2004),

bereavement services to the family (Barry et al., 2012), and core and noncore services (Carlson et al., 2004; McCue & Thompson, 2005, 2006; Noe & Smith, 2012; Rich & Gruber-Baldini, 2009). Hospice membership and certification played a role in improving hospice services offering. Carlson et al. (2008) suggested that Medicare hospice certification was associated with a broader provision of hospice services and Lindley et al. (2013) found that hospices holding membership in a professional association were more likely to offer hospice care for children. Other organizational factors (e.g., ownership, size) were also related to hospice strategic conduct. Compared to FP hospices, NFP hospices were more likely to offer uncompensated care (Lorenz et al., 2003), radiation services (Jarosek et al., 2009), CAM (Olotu et al., 2013), bereavement services to the community (Barry et al., 2012) and community benefits (Aldridge et al., 2014), more likely to use volunteers (Apenteng, Linder, Opoku, Lawrence, & Upchurch, 2014) and employ skilled nursing and social services (S. O. Gandhi, 2012), and more likely to provide a wider range of services (Carlson et al., 2004). However, compared to NFP hospices, FP hospices were more likely to adopt a nursing focus strategy (Apenteng, Nayar, et al., 2014) and more likely to report the limitation of enrollment restriction (Carlson, C. Barry, E. Cherlin, R. McCorkle, & E. H. Bradley, 2012). Hospice size was also an important organizational factor. Larger hospices were more likely to offer culturally relevant services (Lorenz, Ettner, et al., 2004), radiation services (Jarosek et al., 2009), hospice care for children (Lindley et al., 2013), CAM (Olotu et al., 2013), community bereavement services (Barry et al., 2012) and more likely to implement preferred practice (Carlson et al., 2011) and adopt a nursing focus strategy (Apenteng, Nayar, et al., 2014). In addition, larger hospices had greater preparation for quality

improvement (QI), electronic documentation, and research focus (Cagle et al., 2012; Hanson et al., 2010) and they put less restriction on patient enrollment (Carlson et al., 2012; Lorenz, Asch, et al., 2004). Compared to freestanding hospices, chain affiliated hospices put fewer limitations on admission (Lorenz, Asch, et al., 2004) and had greater use of electronic documentation to improve quality (Cagle et al., 2012). Chain-affiliated hospice were more likely to use volunteers (Apenteng, Linder, et al., 2014) and implement preferred practice strategy (Carlson et al., 2011). Preferred practice was a survey instrument developed by National Quality Forum (NQF) and National Consensus Project (NCP) to improve quality of hospice and palliative care. It contains two components: patient-centered preferred practice and family-centered preferred practice. Freestanding hospices offer more services than mixed home and hospices (Rich & Gruber-Baldini, 2009) and were more likely to offer uncompensated care to patients (Lorenz, Rosenfeld, Asch, & Ettner, 2003). Other organizational predictors of hospice strategic conduct are hospice age and location. New hospices (operated after January, 2000) offered fewer services to patients (e.g., radiation service) (Jarosek et al., 2009; McCue & Thompson, 2006). Hospices' usage of electronic documentation for QI and enrollment policy varied by hospice locations: non-rural hospices had greater usage of electronic documentation (Cagle et al., 2012) and hospices in certain regions had higher levels of enrollment restriction than other hospices (Carlson et al., 2012).

Among the five studies examining the role of market factors on hospice strategic conduct, two studies observed significant environmental predictors (e.g., competition, unemployment rate). Apenteng, Linder, et al. (2014) found that hospices located in regions with higher unemployment rates and competition were less likely use volunteers.

Additionally, hospices located in wealthy communities and competitive markets were more likely to adopt a nursing focus strategy (Apenteng, Nayar, et al., 2014). Among the six studies that included patient factors in the model, only Wachterman et al. (2011b) found that patient diagnosis was associated with nursing staff and social worker visits. Other studies did not put much emphasis on patient factors as they were normally included as control variables.

Hospice Structure to Outcome/Performance

Twelve studies directly examined the effect of structural factors on hospice performance (Table 3). There were two levels of hospice performance/outcome: patient level and agency level. Carlson et al. (2009) utilized patients' disenrollment from hospices and Teno et al. (2014a) used patient live charge status to measure hospice quality performance. For studies that examined organizational level outcomes, hospice financial performance was a common measurement (6 out of 12 studies). Three studies (25%) employed a direct measurement of hospice quality performance: the number of quality citations and complaints (S. O. Gandhi, 2012; Kirby, 2012; Kirby et al., 2007). One study used average daily cost and CEO compensation as hospice outcome variables (Noe & Forgione, 2014).

Hospice organizational factors were associated with outcome and performance. Newer hospices had more patient disenrollment (Carlson et al, 2009) and higher live discharge rates (Teno et al., 2014a). Smaller hospices and hospices located in highly competitive markets had higher patient disenrollment rates (Carlson et al. 2009). Kirby et

al. (2007) also observed a negative relationship between hospice size and quality of care. FP hospices without chain affiliations had a very high live charge rate (Teno et al., 2015). Compared to FP and NFP hospices, publicly traded FP hospices achieved higher revenue per day and profit margin (McCue & Thompson, 2005). McCue and Thompson (2006) also found that newer hospices (operated after January, 2000) had better financial performance than old hospices.

Hospice Process/Conduct/Strategy and Outcome/Performance

Only three studies examined the impact of hospice strategic conduct on hospice performance (Table 4). Two studies focused on organizational level outcomes: quality deficiencies (Kirby, 2012; Kirby et al., 2007) and financial performance (Kirby, 2012). Block et al. (2010) used the family evaluation survey to examine family members' satisfaction and overall ratings of hospice care. Studies found that hospice innovative practice was related to better quality performance (Kirby, 2012; Kirby et al., 2007) and higher volunteer usage in hospices was associated with higher family satisfaction and quality of care (Block et al., 2010).

Even though no studies examined the full relationship among structure, process, and outcome, we could extend the link based on the results of structure-process and process-outcome. NFP hospices (Apenteng, Linder, et al., 2014; Cherlin et al., 2010) and hospices with parent organizations (Apenteng, Linder, et al., 2014) were more likely to use volunteers, which were associated with better family satisfaction and quality performance (Block et al., 2010). In a study by Kirby et al. (2007), hospice innovation

strategy was measured by the proportion of private pay patients and the number of specialized services in a hospice. Based on studies that focused on hospice service provision strategy, NFP hospices (Aldridge et al., 2014; Barry et al., 2012; Carlson et al., 2004; Olotu et al., 2013), older hospices (Jarosek et al., 2009; McCue & Thompson, 2006), larger hospices (Barry et al., 2012; Lindley et al., 2013; Lorenz, Ettner, et al., 2004; Olotu et al., 2013), hospices with Medicare certification (M. Carlson et al., 2008), and hospices that were members of professional organizations (Lindley et al., 2013) were more likely to offer specialized services. These organizational factors may link to hospice performance, which were similar to Kirby's conclusion that hospice ownership and accreditation were the driving forces of hospice innovation and quality performance (Kirby, 2012).

DISCUSSION

Hospice performance literature is less likely to use management theories and conceptual frameworks. Only 5 out of 36 studies stated a specific management theory and conceptual framework. It is possible that since the majority of studies (50%) were published in palliative care medicine related journals, evidence-based studies may be preferred over theory-based studies. The number of hospice performance articles continued to increase over time with the majority of studies being published after 2010. Moreover, similar to the time and number of studies trend, more recent studies tended to use longitudinal data to examine the relationship among structure, process, and outcome. The examined hospice performance studies were published after 2010, but the most

recent secondary data employed was from 2010. No studies utilized secondary data available after 2010.

The literature on hospice performance provides several important takeaway points. First, even as the measures of hospice performance are evolving, there is still a need to "develop a standard, nationalized measurement for hospice performance based on patient experiences" (Lorenz et al., 2002). Second, hospices adopt strategies (e.g., service provision, QI) to improve outcomes. Finally, hospice performance and strategic conduct are often associated with different organizational characteristics and market conditions. Specifically, these factors encompass hospice age, ownership, size, chain-affiliation status, hospice membership and certification, location, community wealth and unemployment rate, and market competition.

Hospice Performance

The existing measurements of hospice performance are related to the availability of hospice data. The measurements of hospice performance are limited in the literature, because the existing hospice data sources, including California hospice survey and NHHCS, do not have variables related to hospice quality performance. Thus, the number of hospice performance studies that used outcomes as dependent variables (structure-outcome and process-outcome) was fewer in number compared to structure-process studies. After combining data between California hospice survey and quality citation data, studies were able to examine the association between hospice organizational factors and quality performance (S. O. Gandhi, 2012; Kirby et al., 2007) . Several studies used

financial indicators such as revenue and cost to measure hospice financial performance (Kirby, 2012; McCue & Thompson, 2005, 2006; O'Neill et al., 2008, 2009).

The measurement of organizational performance has evolved from the purely management accounting standards to a financial perspective, and toward an integrative perspective which includes strategy, quality, and financial perspective (Yadav & Sagar, 2013). As a newly developing area of research, hospice performance research picked up the integrative perspective and examined hospice performance to include both the practice-related performance (quality citations, live discharge rate) and financial performance. While the common measurement of quality of care or performance-related quality measures (e.g., readmission rates) in other types of health care settings do not apply to hospice organizations, a similar type of measurement (e.g., live discharge rates) to capture hospice quality performance has been developed in the hospice literature (Teno et al., 2014a). High live discharge rates is becoming an issue in some hospices: hospices could not fulfill their responsibilities if many patients were discharged alive from hospices to other health care settings. The worst situation is that these patients could end up going to the emergency room, which is not the goal for hospices in taking care of patients (Whoriskey and Keating, 2014). More research based measurement of hospice performance could help researchers and policy makers to better understand hospices and make it easier to identify problematic hospices.

Patient and family satisfaction with hospice is an important measurement of hospice performance. Using the 2006 Family Evaluation of Hospice Care (FEHC) data, Block et al. (2010) utilized family members' ratings of hospice care to measure hospice performance. With the passage of ACA in 2010, hospice quality reporting was required

by CMS (CMS, 2014b). The Hospice Quality Reporting Program (HQRP) required data submitted by hospices through the Hospice Item Set (HIS), and the Hospice Consumer Assessment of Healthcare Providers & Systems (CAHPS) Survey. Hospice CAHPS were intended to gather information on the experiences of hospice patients and their caregivers' perspectives of their loved ones' care with hospice services. With the implementation of HQRP, more data related to hospice patients' experience and family members' perspectives will become publicly available soon.

Hospice Strategic Conduct and Structure

Hospices have adopted different strategies to improve performance. Much of the hospice performance literature focuses on hospice service provision strategy. Fewer studies examine strategies such as hospice staffing, nursing home focus, volunteer usage, and enrollment policy. Block et al. (2010) and Kirby et al. (2007) found that volunteer usage and hospice adoption of innovation strategy (providing specialized services and having more private/self -pay patients) were associated with better quality performance.

Hospices face pressures from social norms and policy, market environment, and funding opportunities, which influence hospices adopt certain quality improvement (QI) strategies to survive, gain competitive advantage, and differentiate themselves from other competitors. No studies in the hospice performance literature have examined the link among hospice structure, strategic conduct, and outcomes (both patients and hospices). It is interesting to look at what strategies hospices may adopt to improve performance and what outcomes would be.

Patient, organizational, and market factors are associated with hospice strategic conduct and performance. The majority of the literature considered the impact of hospice organizational characteristics, while only a few studies included patient and market factors. Hospice age, ownership, size, chain-affiliation status, membership, and certification were related to hospice strategic conduct and performance. Market factors including location, community wealth, unemployment rate, and market competition were predictors of hospice strategic performance. Patient diagnosis was also associated with outcomes. The summarization of factors that may influence hospice performance provides insight to different stakeholders. When conducting hospice quality related studies, researchers need to take these factors into account because they have influence on hospice strategic conduct and performance. For policy makers, special attention is needed to hospices that are low quality performers in order to understand what they did to compromise quality and how the low quality of care will impact patients and their families. The results of this review give patients and their families evidence about factors to consider when choosing a hospice with better performance.

CONCLUSION

This review summarizes hospice performance literature in terms of how hospice organizational performance is measured, how to apply SCP and SPO frameworks to summarize hospice performance literature, and what factors contribute to explain the differences in hospice performance. A total of 36 studies were included in the systematic review. The majority of hospice performance studies examined the relationship between

hospice structure and strategic conduct/process, but fewer studies focused on structure-performance and even fewer concentrated on strategy-performance. Hospices adopted different strategies (e.g., service provisional strategy, staffing strategy) to improve performance. Two strategic areas (innovation and volunteer usage) were associated with better outcomes. Hospice innovation strategy was measured by the proportion of private pay patients and the number of specialized services in a hospice. Hospice volunteer usage was defined as the use of direct patient volunteer hours. Hospice organizational factors, market environment, and patient characteristics were related to hospice strategic conduct and performance.

Figure 1. Systematic Review Conceptual Model: SPO and SCP Frameworks

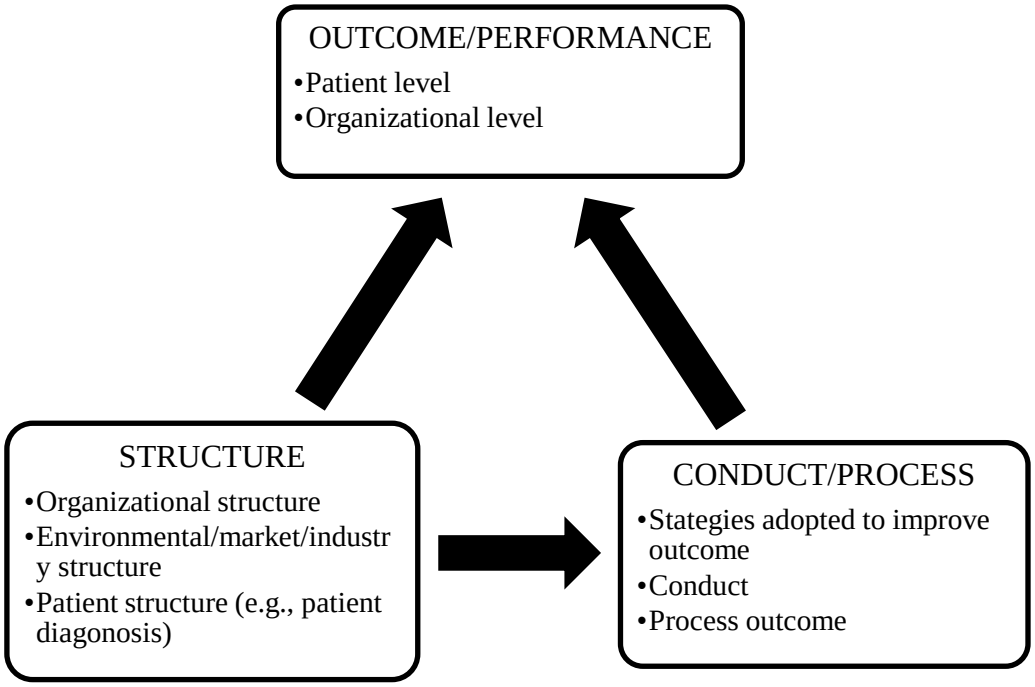

Figure 2. Process of Hospice Quality and Performance Literature Identification

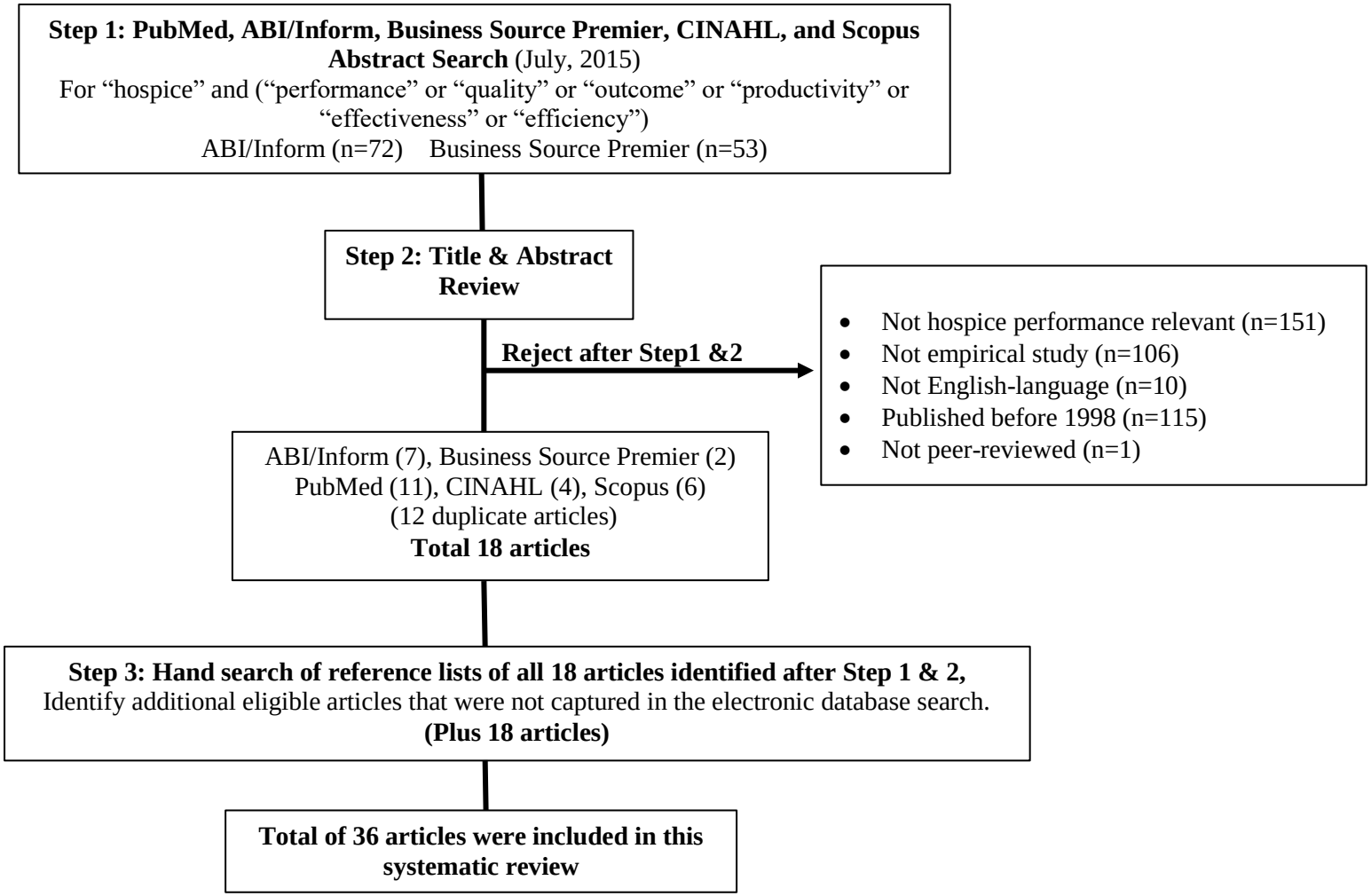

Table 1. Descriptive table of hospice performance literature

Literature Characteristics	# of Articles	% of Articles
Publication Year		
1998-2004	5	13.89%
2005-2009	10	27.78%
2010-2015	21	58.33%
Journal Type		
Palliative Medicine & Pain Management	18	50.00%
Health Care Sciences & Services & Quality	8	22.22%
Health Care Management & Policy	5	13.89%
Aging	2	5.56%
Economics/Finance	3	8.33%
Theory/Framework Use		
Yes	5	13.89%
No	31	86.11%
Data Use		
California State Data	9	25.00%
National Data (Organizational & Patient)	14	38.89%
National Data (Freestanding Hospices)	7	19.44%
Primary Data Collection (State)	1	2.78%
Primary Data Collection (National)	5	13.89%
Study Design		
Cross-sectional (One year)	26	72.22%
Cross-sectional (Multiple years)	5	13.89%
Time to event (Survival)	1	2.78%
Longitudinal	4	11.11%
Research Focus*		
Structure to Process/Conduct	29	65.91%
Structure to Outcome/Performance	12	27.27%
Process/Conduct to Outcome/Performance	3	6.82%
Total	36	

*Note: A study may have more than one research focus, so the total of number of research focuses is 44.

Table 2. Summaries of Hospice Structure and Conduct/Process/Strategy Literature

Study	Year & Design	Data & Sample	Method	Process/Conduct/Strategy	Structure Predictors		
					Market	Organizational	Patient
Lorenz et al. (2002)	1997 Cross-sectional	California hospices (N=176)	Multivariate regression	LOS; Provision of nursing and complex Palliative care services		√	√
Lorenz et al. (2003)	1998 Cross-sectional	NHHCS (N=1,876)	Robust logistic regression	Provision of uncompensated care		√	√
Carlson, Gallo, Bradley (2004)	1998 Cross-sectional	NHHCS (N=422; n=2080)	Logistic regressions	Provision of specific services; Number of core and noncore services		√	√
Lorenz et al. (2004)	1999 Cross-sectional	California hospices (N=100)	Logistic regression	Admission/enrollment policy	√	√	
Lorenz et al. (2004)	1997 Cross-sectional	California hospices (N=149)	Multivariate regression	Provision of culture-related services		√	
McCue & Thompson (2005)	2003 Cross-sectional	Medicare freestanding hospices (N=575)	Nonparametric median test	LOS; Number of core and noncore services		√	
McCue & Thompson (2006)	2003 Cross-sectional	Medicare freestanding hospices (New=44) (Old=312)	Nonparametric median test	LOS; Service offering		√	
Lindrooth & Weisbrod (2007)	1993-1996 Time to event	Hospice patient data (N=638; n=106,698)	Survival analysis	LOS		√	
Carlson et al. (2008)	1992-2000 Cross-sectional	NHHCS (N=2,066; n=9,409)	Multivariate regression	Provision of hospice services		√	
O'Neil, Ettner, Lorenz (2008)	2003 Cross-sectional	California hospice data (N=185)	Linear regression with robust standard errors	LOS; Staff care intensity		√	√
Jarosek, Virnig, Feldman (2009)	2002 Cross-sectional	Medicare freestanding hospices (N=953)	Logistic regression	Provision of radiation services		√	
Rich & Gruber-Baldini (2009)	2000 Cross-sectional	NHHCS (N=760)	Logistic regression	Provision of services		√	
Cherlin et al. (2010)	2006 Cross-sectional	Medicare provider of service survey (N=3,927)	Multivariate logistic regression & linear regression	Staffing strategy		√	

Hanson et al. (2010)	2007 Cross-sectional	NHPCO survey (N=652)	Regression	Quality Improvement (QI); Research Focus (RF)		√	
Carlson et al. (2010)	2009 Cross-sectional	National hospice survey (N=591)	Multivariate logistic regression	Implementation of NQF preferred practices		√	
Wachterman et al. (2011)	2007 Cross-sectional	NHHCS (N=1,036; n=4,705)	Regression	LOS; Staff visits		√	√
Barry et al. (2012)	2009 Cross-sectional	National hospice survey (N=591)	Multivariate regression	Provision of bereavement services to the family		√	
Cagle et al. (2012)	2007 Cross-sectional	NHPCO survey (N=652)	OLS regression	Use of electronic documentation (ED) and QI		√	
Carlson et al. (2012)	2009 Cross-sectional	National hospice survey (N=591)	Poisson regression	Enrollment policy (admission practice)		√	
Gandhi (2012)	2002-2004 Longitudinal	California hospice survey (N=335)	Multiple regressions	LOS; Staff visits	√	√	√
Noe & Smith (2012)	2000-2007 Cross-sectional	Freestanding hospices (N=7,039)	Wilcoxon two sample test	Core and noncore services; LOS; staff visits		√	
Canavan et al. (2013)	2009 Cross-sectional	National hospice survey (N=509)	ANOVA	Staffing strategy		√	
Lindley et al. (2013)	2002-2008 Longitudinal	California hospice survey (N=1,368)	GEE	Provision of hospice care to children	√	√	
Olotu et al. (2013)	2014 Cross-sectional	Texas hospice survey (N=369)	Logistic regression	Provision of CAM		√	
Carlson et al. (2014)	2009 Cross-sectional	National hospice survey (N=591)	Poisson regression	Provision of community benefits		√	
Apenteng et al. (2014)	2000-2010 Longitudinal	Freestanding hospices (N=15,446)	Mixed effect regression	Extent of volunteer use	√	√	
Noe&Forgione (2014)	2000-2009 Longitudinal	Freestanding hospices (N=6,191)	Logistic regression	LOS; Staffing strategy		√	
Sengupta et al. (2014)	1996-2007 Cross-sectional	NHHCS	Regression	LOS		√	
Apenteng et al. (2015)	2004-2008 Longitudinal	Freestanding hospices (N=6,239)	Mixed effect regression	Nursing focus strategy	√	√	

Note: N=number of hospices; n=number of hospice patients.
GEE= Generalized Estimating Equations; LOS=Length of Stay; QI=Quality Improvement; Freestanding hospices represent Medicare freestanding hospices

Table 3. Summaries of Hospice Conduct/Process/Strategy and Outcome/Performance Literature

Study	Year & Design	Data & Sample	Method	Outcome/Performance	Structure		
					Market	Organizational	Patient
McCue & Thompson (2005)	2003 Cross-sectional	Medicare freestanding hospices (N=575)	Nonparametric median test	Financial performance		√	
McCue & Thompson (2006)	2003 Cross-sectional	Medicare freestanding hospices (New=44) (Old=312)	Nonparametric median test	Financial performance		√	
Kirby, Keeffe, Nicols(2007)	2005 Cross-sectional	California hospice survey (N=111)	Hierarchical regression	Quality deficiencies/complains		√	
O'Neil, Ettner, Lorenz (2008)	2003 Cross-sectional	California hospice data (N=185)	Linear regression with robust standard errors	Financial performance		√	√
Carlson et al. (2009)	1998-2002 Longitudinal	SEER-Medicare data (N=1,384; n=90,826)	GEE	Patient disenrollment from hospices	√	√	
O'Neil, Ettner, Lorenz (2009)	2003 Cross-sectional	California hospice data (N=185)	OLS regression	Financial performance		√	√
Gandhi (2012)	2002-2004 Longitudinal	California hospice survey (N=335)	Multiple regressions	Quality deficiencies	√	√	√
Kirby (2012)	2005 Cross-sectional	California hospice survey (N=93)	Cluster analysis, ANOVA	Quality deficiencies/complains; Financial performance		√	
Noe & Smith (2012)	2000-2007 Cross-sectional	Medicare freestanding hospices (N=7,039)	Wilcoxon two sample test	Financial performance		√	
Noe & Forgione (2014)	2000-2009 Longitudinal	Medicare freestanding hospices (N=6,191)	Logistic regression	Average cost per day; CEO compensation and profit		√	
Teno et al. (2014)	2010 Cross-sectional	Medicare hospice discharge data	Multivariate logistic regression	Live discharge status		√	
Teno et al. (2015)	2010 Cross-sectional	Medicare hospice discharge data (N=3,028; n=996,208)	Multivariate logistic regression	Rate of live charge		√	

Note: N=number of hospices; n=number of hospice patients; GEE= Generalized Estimating Equations; LOS=Length of Stay; QI=Quality Improvement.

Table 4. Summaries of Hospice Structure and Outcome/Performance Literature

Study	Year & Design	Data & Sample	Method	Outcome/Performance	Strategy
Kirby, Keeffe, Nicols(2007)	2005 Cross-sectional	California hospice survey (N=111)	Hierarchical regression	Quality deficiencies/complains	Innovation strategy; efficiency strategy
Block et al. (2010)	2006 Cross-sectional	Family evaluation of health care data (N=305, n=57,353)	Multivariate regression	Satisfaction, Overall ratings of hospice quality of care	Volunteer usage
Kirby (2012)	2005 Cross-sectional	California hospice survey (N=93)	Cluster analysis, ANOVA	Quality deficiencies/complains; Financial performance	Strategic group (innovation & efficiency)

Note: N=number of hospices; n=number of hospice patients.

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CHAPTER 3

FACTORS ASSOCIATED WITH THE PROVISION OF INPATIENT CARE IN HOSPICES

by

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CHAPTER 3

FACTORS ASSOCIATED WITH THE PROVISION OF INPATIENT CARE IN HOSPICES

Abstract

Objectives. The purpose of this study was to examine the association between environmental and organizational factors and the provision of hospice inpatient care.

Methods. This study used a retrospective, longitudinal design (2009 to 2013). The data were drawn from three sources: the Area Health Resources Files (AHRF), the Provider of Services (POS) files, and Hospice Cost Reports from Centers for Medicare and Medicaid Services (CMS). The sample size was 2,884 hospices or 12,103 hospice observations over five years. A generalized linear mixed-effects model (GLMM) was used to examine the association between market and organizational factors and hospice inpatient services offering.

Results. On average, 15 percent of hospices directly offer inpatient services to patients. Proportion of adults who were over 65 years old (OR=1.24) and urban location (OR=17.76) were associated with the provision of hospice inpatient services. Chain-affiliated hospices were more likely to offer inpatient services (OR=3.29). Other factors such as hospice age, ownership, LOS, and census region were also associated with inpatient services offering.

Conclusion. Market munificence is related to hospice inpatient services offering. Organizational factors such as hospice chain-affiliation, age (years in operation), and ownership also play roles in predicting hospices' probability in providing inpatient services.

INTRODUCTION

Hospice, the provider of end-of-life care for patients, has experienced fast growth in the last decade (Connor, 2007; NHPCO, 2012). A large part of the growth in the hospice industry was attributed to increases in for-profit (FP) and freestanding hospices. The 2014 Centers for Medicare and Medicaid Services (CMS) Provider of Medicare Service File showed that 66 percent of hospices were for-profit in status and 30 percent of hospices were not-for-profit (CMS, 2014a). Although there was no direct evidence showing the link between growth in FP hospices and low quality of hospice care (Gunten, 2011), previous studies indicated that FP hospices made more profit by recruiting less expensive patients who also lived longer (O'Neill et al., 2008; Wachterman et al., 2011a), reducing cost by providing less non-core services to patients (Carlson et al., 2004), and hiring fewer and less skilled staff (Cherlin et al., 2010).

Hospices offer four general levels of care: two of them are home-based care including routine home care and continuous home care, general inpatient care and inpatient respite care are provided at the inpatient level (NHPCO, 2012; OIG, 2013). In 2013, routine home care comprised the majority of hospice patient care days (94.1%). General inpatient care has increased from 2.7 percent of patient care days in 2012 to 4.8

percent in 2013 (NHPCO, 2012, 2013). Only about one in three hospices also operated an inpatient facility. The percentage of hospice patients who were receiving care in a hospice inpatient facility was 26.4% (NHPCO, 2013).

Hospices provide end-of-life care to patients who have complex health care needs. Some hospices were accused of not having available inpatient care for patients who need to be transferred to inpatient facilities (Whoriskey & Keating, 2014b). The US Office of Inspector General (OIG) suggested that "CMS should focus on hospices that do not provide inpatient care and ensure that these hospices are providing beneficiaries access to needed levels of care at the end of their lives" (OIG, 2013). Understanding why some hospices already offer inpatient hospice care to patients could bring more evidence for policy makers and researchers to focus on factors that are associated with inpatient services offering. However, very little is known about the characteristics of hospices that are associated with the provision of inpatient services. In addition, the hospice industry is facing changes in social norms, funding opportunities, and other environmental factors (Kirby et al., 2007), which make it more interesting to examine the role of environmental factors on the provision of hospice inpatient care. Thus, the purpose of this study is to examine the association between organizational and environmental factors and the provision of hospice inpatient care.

CONCEPTUAL FRAMEWORK

This study was guided by Structure-Conduct-Performance (SCP) framework and resource dependence theory (RDT) (Figure 1). SCP is the foundation of industrial

organization theory and was adopted as an analytic tool for examining business functioning in a competitive market environment (Bain, 1959; Porter, 1980). SCP describes how industry structure can influence a firm's conduct which, in turn, could impact the performance of both industry and firm. This study only examines the relationship between structure and conduct (S-C). Structure contains a set of market and industry indicators that are stable overtime which could affect a firm's behavior. Conduct describes how firms behave. RDT was introduced to explore the effect of environmental context in determining organization's conduct (J. Pfeffer & G. Salancik, 1978). RDT conceptualizes the exchange relationship among organizations: they do not have all the required resources and capabilities to survive which make them depend on resources from other organizations based on exchange relationships. On the other hand, organizations also strive to maintain their independence from other organizations and environment by acquiring control of more resources. This autonomous relationship is dependent on organizational resources and the amount of competition in the environment. Organizations may alter their patterns of behavior or structure in order to obtain resources from the environment (Ulrich & Barney, 1984). Hospice organizations that have more resources (e.g., financial resources) are more likely to survive within an environment and to provide inpatient care in order to gain market share. Additionally, competition with other hospices will lead to the provision of inpatient care where hospices can differentiate themselves from other care providers in order to gain competitive advantage (Porter, 2008).

RDT has been used to assess the impact of the external environment on health care organizations' strategy adoption and performance by many researchers (Banaszak-

Holl, Zinn, & Mor, 1996; Hsieh, Clement, & Bazzoli, 2010; Trinh & O Connor, 2002). The majority of the health care literature using RDT was conducted in hospital and nursing home settings (Yeager et al., 2014). The key constructs of RDT are munificence, dynamism, and complexity (Dess & Beard, 1984). Environmental munificence refers to the availability and accessibility of resources that are necessary for organizational survival. Both dynamism and complexity involve some levels of uncertainty of information in the market (Kreiser & Marino, 2002). Dynamism refers to the uncertainty in the environment, while complexity is related to the unreliability of resources present in the environment.

Two studies have applied RDT in the hospice setting as it relates to strategic conduct. Lindley et al. (2013) found that hospices that had membership in professional groups or were medium-sized (26-100 patients/day), were more likely to develop specific hospice care for children. More recently, Apenteng et al. (2014) explored the organizational and market factors that were related to hospice adoption of a nursing facility focus strategy. They reported that market factors (community wealth and competition region) and organizational factors such as size and ownership were associated with hospice adoption of a nursing facility focus strategy.

Munificence. Environmental munificence represents the availability and accessibility of resources that are necessary to organizational survival. Organizations could gain competitive advantage by having control over more valuable resources in the market (J. Barney, 1991; J. B. Barney & Clark, 2007). Hospices are generally smaller in size and operate with lower profit margins (O'Neill et al., 2008, 2009). O'Neill et al. (2009) conducted a study to find out if rural hospices faced financial disadvantages.

However, due to the small profit margin in the hospice industry and data source limitations, they did not observe differences between rural and urban hospices. Hospices depend on resources available in the external environment in which they operate in order to provide inpatient care to patients. Munificent environments, in terms of patients' greater ability to pay for hospice care will bring more financial resources to hospices. Previous studies showed that compared to government insurance plans, private insurance plans with higher reimbursement rates and self-pay patients give health care providers incentives to adopt innovative practices (Castle, 2001; Huskamp, Buntin, Wang, & Newhouse, 2001; Kirby et al., 2007). Hospices that locate in wealthier communities are more likely to adopt a nursing facility focus strategy (Apenteng, et al., 2014). Urban location (Menachemi, Shin, Ford, & Yu, 2011; Zinn, Proenca, & Rosko, 1996), availability of higher per capita income (Apenteng, Nayar, et al., 2014; Hsieh et al., 2010; Kazley & Ozcan, 2007; Menachemi et al., 2011; Zinn et al., 1996), and high percentage of population that are 65 years or older (Menachemi et al., 2011) have been used to measure environmental munificence.

Hypothesis 1: Hospices in markets with relatively munificent environmental conditions are more likely to offer inpatient services.

Dynamism & Complexity. Environmental dynamism and complexity are closely related to the information uncertainty perspective (Duncan, 1972). Dynamism represents the rate of change in an industry and the level of uncertainty in the environment from competitors and customers (Miller, 1987), while complexity reflects the complex and

unreliable nature of resources needed to understand the environment (Dess & Beard, 1984). As resources are limited in a market, organizations located in competitive environments have a disadvantage in accessing resources (J. Pfeffer & G. R. Salancik, 1978). In the nursing home industry, studies found that greater regulatory constrains in the market will limit the likelihood of nursing homes becoming innovative (Banaszak-Holl et al., 1996; Castle, 2001). Hospices facing a changing and uncertain environment and competitive pressures are more likely to maintain the status quo by not offering inpatient services to patients. Environmental dynamism is operationalized using change in unemployment rate (Kazley & Ozcan, 2007) and number of managed care contracts (Menachemi et al., 2011). Environmental complexity is envisioned as market competition, which is measured by the Herfindahl index (Menachemi et al., 2011; Weech-Maldonado, Qaseem, & Mkanta, 2009; Zinn et al., 1996).

Hypothesis 2. Hospices in markets with relatively dynamic environmental conditions are less likely to offer inpatient services.

Hypothesis 3. Hospices in markets with relatively complex environmental conditions are less likely to offer inpatient services.

Organizational factors

Size. Hospice size has been found to be an indicator for service provision and quality of services. “If a hospice of any decent size provides zero days of general inpatient care, I consider that suspect”, quoted from Dr. Joan Teno, a hospice quality of care expert (Whoriskey & Keating, 2014b). Larger hospices control more resources so

they are more likely to provide specialized services to patients (M. Carlson, C. L. Barry, E. J. Cherlin, R. McCorkle, & E. H. Bradley, 2012; Lorenz, Asch, et al., 2004), more likely to report the adoption of patient- and family-centered preferred practice strategies (Carlson et al., 2011), and have better quality performance with lower quality citations and violations (Kirby, 2012; Kirby et al., 2007).

Hypothesis 4. Larger hospices are more likely to offer inpatient services.

Accreditation. In order to get approval from accreditation agencies, hospices need to meet standards in terms of patient safety, quality of care, and overall performance. There are three major hospice accreditation organizations: Accreditation Commission for Health Care (ACHC), Community Health Accreditation Program (CHAP), and Joint Commission on Accreditation of Healthcare Organizations (JCAHO). Kirby (2012) found that JCAHO accredited hospices were more likely to adopt innovative practices (provision of specialized services and more private pay patients). Several studies identified hospices' provision of specialized services as an indicator for service quality, which is an important element in hospice performance (Lorenz et al., 2002; Noe & Smith, 2012; O'Neill et al., 2008). Hospice accreditation agencies also have specific requirements related to service provision as part of their accreditation process.

Hypothesis 5. Accredited hospices are more likely to offer inpatient services.

Chain affiliation. Originally structured as freestanding entities, hospices have evolved toward a system affiliation-based structure (Paradis & Cummings, 1986). There are two types of hospice affiliation: vertical integration and horizontal integration. Vertically integrated hospices refer to hospices that are part of hospitals, nursing homes, or home health agencies. Horizontally integrated hospices represent chain-affiliated hospices or hospices that have parent hospices. Paradis and Cummings (1986) pointed out that compared to health care system based hospices, freestanding hospices were more likely to be subject to resource limitations and financial pressures. Chain-affiliated hospices were more likely to offer specialized services (Lorenz, Asch, et al., 2004) and adopt patient- and family-centered preferred practices (Carlson et al., 2011). Similarly, Castle (2001) found that nursing homes that have chain membership were more likely to adopt innovative practices.

Hypothesis 6. Chain-affiliated hospices are more likely to offer inpatient services.

Financial resources. Even though CMS has higher reimbursement rates for hospice general inpatient care, it is still costly for hospices to offer inpatient services. Compared to routine home care (payment rate equals to $156.06 per day), hospices received higher reimbursement ($694.19 per day) from Medicare by providing general inpatient care (CMS, 2014a). Hospices with more financial resources had advantages in offering different services to patients. O'Neill et al. (2008) suggested that low profitability became a barrier for hospices to provide more costly palliative services such as chemo therapy and radiation therapy to patients.

Hypothesis 7. Hospices with better financial performance are more likely to offer inpatient services.

METHODS

Study Design, Sample, and Data Sources

This study utilized a longitudinal, retrospective design to assess relationships between environmental and organizational factors and the provision of hospice inpatient care. The data for this study was obtained from three sources: the Area Health Resources Files (AHRF), the Provider of Services (POS) files, and Hospice Cost Reports from Centers for Medicare and Medicaid Services (CMS).

The dependent variable, hospice inpatient services offering, was extracted from the Medicare POS file, which captures the organizational information of Medicare providers. The data representing environmental factors were derived from the AHRF, which provides information about county-level market characteristics from all U.S. states (e.g., population census, number of hospitals, socioeconomic status). The organizational variables representing hospice characteristics were obtained from the combination of POS and Medicare Hospice Cost Report. The Medicare Hospice Cost Report provides the financial information of all freestanding hospices. A summary of dependent and independent variables with their measurements and data sources is presented in Table 1.

The sampling frame consists of U.S. freestanding hospices that were operational from the years 2009 through 2013. In addition, individual hospices in the POS file needed

to have a value for the dependent variable: the inpatient services offering. There were 229 (1.1%) hospices with a missing value on hospice inpatient services offering. The numbers of freestanding hospices reporting their cost information to CMS were 2,278 in 2009, 2,347 in 2010, 2,434 in 2011, 2,563 in 2012, and 2,710 in 2013, respectively. After applying the inclusion criterion, the final sample sizes were 2,247 for 2009, 2,313 for 2010, 2,383 for 2011, 2,502 for 2012, and 2,658 for 2013, resulting in a data set with 12,103 hospice observations for 5 years and 2,884 unique hospices. The unit of analysis was the individual freestanding hospice, and the market characteristics were defined at the county level.

Measures and Variables

Dependent Variable. The dependent variable, the provision of inpatient services, was measured using data from the Medicare POS file. The POS file provides information on the status of hospice short-term inpatient care services: not provided, provided by staff, provided under arrangement, and combination. The offering of inpatient services from staff to patients means hospices directly provide the services while services under arrangement represents hospices contracting with other health care organizations (e.g., hospitals, nursing homes) or staff to provide services to patients. In this study, we only examine the inpatient strategy so hospices that provided inpatient services by staff and combination were categorized as “directly offer inpatient services”, the rest were recoded as “not directly offer inpatient services”.

Independent Variable. According to resource dependence theory, all main independent variables are categorized as market munificence, dynamism, and complexity. Based on the existing literature, munificence was operationalized using urban location (Menachemi et al., 2011; Zinn et al., 1996), per capita income (Apenteng, Nayar, et al., 2014; Hsieh et al., 2010; Kazley & Ozcan, 2007; Menachemi et al., 2011; Zinn et al., 1996), and the percentage of population aged 65 years or older (Menachemi et al., 2011). Per capita income was log transformed because it was not normally distributed. Dynamism was measured by the unemployment rate change (Kazley & Ozcan, 2007; Menachemi et al., 2011, 2012). Complexity was measured using a measure of market concentration, the Herfindale-Hirschman Index (HHI) (Banaszak-Holl et al., 1996; Kazley & Ozcan, 2007; Menachemi et al., 2011; Zinn et al., 1996). HHI is defined as the sum of squared hospice patient days market share in a county and calculated as:

$$HHI = Sum\left(\frac{Hospice\ patient\ days}{County\ total\ hospice\ patient\ days}\right)^2$$

HHI equal to 1 represents hospice market monopoly (there is only one hospice in the county), while the HHI approaching 0 means a perfectly competitive market. The scale was reversed (1-HHI) to represent the competition in the hospice market where the higher value means more competition in the market. In addition, counts of the number of hospitals with hospice programs were used as additional measures to evaluate competition from alterative hospice care providers.

Hospice organizational factors include hospice size, accreditation, chain-affiliation, and financial performance. Hospice size captures the internal resources in hospices. It was calculated as the annual patient census and was log transformed because

of non-normal distribution. Hospice accreditation was defined as whether or not a hospice was accredited by ACHA, CHAP, or JCAHO. Hospices that were part of chain hospices or had a parent hospice were coded as chain-affiliated hospices. Total operating margin was utilized to measure hospice financial performance.

To control for other factors which may contribute to hospices' probability in offering inpatient services, hospice ownership, census regions (Northeast, Midwest, South, and West), age (number of years being operated in the market), Medicare payer mix (the percentage of Medicare patients), nursing skill mix (the percentage of RN to all nursing staff), volunteer dependence (volunteer to staff ratio), and log transformed average length of stay (LOS) were also included in the model.

Data Analyses

Descriptive analyses were performed to examine the variable distributions and to make sure the assumptions of subsequent analyses were met (Table 2). Moreover, chi-square analysis and means comparisons were used to explore the bivariate relationship between the dependent variable (inpatient services offering) and each of the environmental and organizational variables. Next, a correlation analysis was performed to make sure there was no collinearity among the continuous variables. The variance inflation factor (VIF) score of all paired variables was lower than 4 (O'brien, 2007), indicating that there was no multicollinearity in the data. A generalized linear mixed-effects model (GLMM) was used to examine the association between market and organizational factors and hospice inpatient services offering. The mixed-effects model,

also known as a multilevel model, is usually used in longitudinal studies with repeatedly correlated data. Parameter estimates from GLMM for binary outcomes are interpreted equivalently to those obtained in logistic regression. Thus, odds ratios were derived to measure the strength of associations between independent variables and hospice services offering. All statistical analyses were performed by Statistical Analysis System software (version 9.4; SAS Institute, Cary, NC). Model selection is applied based on AIC (Akaike information criterion) and BIC (Bayesian information criterion) (smaller AIC and BIC values indicate better model fitting). The final model for the analysis was stated as:

$$Logit\,[p\,(Inpatient\ Services)] = \beta_0 + \beta_1 \times (LnPer\ Capita\ Income) + \beta_2 \times (\%\ of\ 65\ older) + \beta_3 \times Urban + \beta_4 \times (Unemployment\ Rate) + \beta_5 \times (1\text{-}HHI) + \beta_6 \times (\#\ of\ Hospital\ with\ hospices) + \beta_7 \times LnSize + \beta_8 \times Accreditation + \beta_9 \times Chain\text{-}affiliation + \beta_{10} \times TOM + \beta_{11} \times Age + \beta_{12} \times LnLOS + \beta_{12} \times FP + \beta_{13} \times Government + \beta_{14} \times (Payer\ Mix) + \beta_{15} \times (Nursing\ skill\ mix) + \beta_{16} \times (Volunteer\ Dependence) + \beta_{17} \times Midwest + \beta_{18} \times South + \beta_{19} \times West + \beta_{20} \times Year$$

RESULTS

The descriptive analyses results are presented in Table 2. Using the pooled 5-year sample data (2009-2013), 15 percent of hospices directly offered inpatient services to patients. The mean logged per capita income was 10.57 (mean per capita income was $39,823.48). The mean proportion of adults in the county who were aged 65 years or older was 13.4%. About 78.8% of hospices were located in urban areas. The average county unemployment rate was 8.5%. The mean market competition scale (1-HHI) was

0.89, with 1 representing perfect competition in the market and 0 referring to monopoly. The mean number of hospitals with hospice programs per 10,000 county population was 1.62. Hospice log transformed size (the annual patient census) was 5.28 (538.76). 28.7 percent of hospices were accredited by JCAHO, CHAP, or ACHC and 54.1 percent of hospices were chain-affiliated. The average total margin of all freestanding hospices was -42.86, indicating that about half of hospices did not earn a profit during that five year period. Hospices' mean age (the number of years they have been operating in the market) was 13.59 years. Approximately three quarters of hospices (74.1%) were for-profit and 24.2% were not-for-profit. The remaining hospices (1.7%) were government operated hospices. The mean proportion of Medicare paid patient days (Medicare payer mix) was 91.53 and the mean percentage of RNs to all nurses (nursing skill mix) was 84.4. The mean number of volunteer dependence ratio was 0.42, which means volunteers played important roles in hospices. The average length of stay in hospices was 4.25 (78.89 days). More than half of hospices (50.6%) were located in the south census region; only 9.4% of hospices in the study were located in the northeast census region, 19.6% in the Mideast region, and 20.1% in the west area.

Based on Figure 2, the number of hospices continued to increase from 2009 to 2013. The number of hospices that offer inpatient services increased from 330 in 2009 to 383 in 2011 and 2012, but decreased to 369 in 2013, while the number of hospices that not offering inpatient services continued to increase (from 1,917 in 2009 to 2,289 in 2013).

Bivariate analyses between hospices with inpatient services and hospices without inpatient services were also performed with pooled data (Table 3). Hospices offering

inpatient services and those not offering inpatient services differed in market conditions: the percentage of 65+ year old adults, urban location, census region, unemployment rate, market competition, and number of hospitals with a hospice program. They also differed in size, age, chain affiliation, ownership, Medicare payer mix, volunteer dependence, and average length of stay.

Table 4 presents the results of the multivariate regression analysis. Among the environmental factors, proportion of adults who were 65 years or older was positively related to the direct provision of inpatient services (OR=1.24, $p<.05$). Hospices located in urban areas had higher odds of offering inpatient services to patients (OR=17.76, $p<.01$). For organizational factors, chain-affiliated hospices had higher odds of providing inpatient services (OR=3.29, $p<.01$). Control variables like hospice age (OR=1.18, $p<.01$) was positively associated with hospices' provision of inpatient services. Average length of stay (LOS) was positively associated with hospice inpatient service offering. When the average LOS was doubled, hospices' odds of providing inpatient services will be 129% what they have been otherwise (OR=0.37, $p<.01$; $2^{0.37}=1.29$). Compared to not-for-profit hospices, for-profit hospices were less likely to offer inpatient services to patients (OR=0.09, $p<.01$). Compared to hospices located in the northeast, hospices located in the Midwest region (OR=19.09, $p<.01$) and South region (OR=28.22, $p<.01$) were more likely to offer inpatient services.

DISCUSSION

Based on resource dependence theory, this study was intended to identify the environmental and organizational correlates of hospice inpatient services offering. The findings suggest hospices' that directly provide inpatient services are associated with percentage of adults 65+ years old in the county, urban location, and chain-affiliation. Other factors like census region, hospice age, average LOS, and ownership were also related to the provision of hospice inpatient services. In sum, these findings indicate market munificence and certain organizational characteristics (e.g., chain-affiliation, age, ownership) of hospices are correlated with hospices' inpatient services offering strategy. Table 5 presents the hypotheses testing results as they related to the role of environmental and organizational factors in hospice inpatient services provision.

Hypothesis 1 was partially supported by this study. As hypothesis 1 stated, hospices located in a munificent market will be more likely to offer inpatient services. In this study, market munificence was measured by per capita income, proportion of 65+ adults, and urban location. Except for per capita income, urban location and proportion of 65+ adults were significantly related to the provision of hospice inpatient services. Markets with more 65+ adults may have higher demands for hospice inpatient services to better serve patients' complex health care needs. A previous study found that hospices were more likely to be located in markets with high elderly populations (Silveira, Connor, Goold, McMahon, & Feudtner, 2011). Compared to rural hospices, urban hospices had access to more resources in the market so they were more likely to offer inpatient services. This is similar to the literature indicating that non-rural hospices were more likely to adopt electronic documentation strategies in order to improve quality (Cagle et

al., 2012). However, as concern grew that rural hospices had higher financial pressures and challenges (Casey, Moscovice, Virnig, & Durham, 2005), O'Neill et al. (2009) did not find rural hospices having worse financial performance than urban hospices. Inconsistent with the finding of Apenteng, Nayar, et al. (2014) that per capita income was related to the adoption of nursing facility focus strategy, this study found that per capita income was not a predictor of hospice inpatient services offering. Compared to community wealth, urban location with access to resources, and demand created by 65+ adults were the driving forces for hospices to offer inpatient services.

Hypotheses 2 and 3 about market dynamism and complexity were not supported in this study. Market dynamism, as measured by unemployment rate, was not related to the provision of hospice inpatient services. In the hospice literature, Apenteng, Linder, et al. (2014) found that hospices located in counties with higher unemployment rates were less likely to use volunteers. HHI and number of hospitals with hospices in the county were used to measure market complexity. However, no significant relationship was found between market complexity and hospice inpatient services offering. The possible reason is that when compared to market dynamism and complexity, market munificence plays a more important role in determining the presence of hospice inpatient services. Market demand is related to hospices' provision of inpatient services rather than market complexity and dynamism.

Hypothesis 4 stated that larger hospices were more likely to offer inpatient services was not supported. Previous studies have found that larger hospices were more likely to offer diverse services (Barry et al., 2012; Carlson et al., 2012; Jarosek et al., 2009; Lindley et al., 2013; Lorenz, Asch, et al., 2004; Lorenz, Ettner, et al., 2004; Olotu

et al., 2013), were more likely to adopt a nursing facility focus strategy (Apenteng, Nayar, et al., 2014), were more likely to implement patients and family preferred practice strategies (Carlson et al., 2011), were better prepared for quality improvement and research (Hanson et al., 2010), and had greater use of electronic documentation (Cagle et al., 2012). Apenteng, Linder, et al. (2014) discovered that larger hospices were less likely to use volunteers. In summary, larger hospices had access to more resources and they were more likely to implement strategies and offer services in order to improve performance. Even though Medicare provides higher reimbursement of hospice inpatient services compared to home services, it is still costly for hospices to directly offer inpatient services to patients. Large hospices have more concerns about operating costs and have bargaining power in the market to negotiate contracts with other health care organizations to offer services, so they may choose to offer inpatient services indirectly.

This study did not support Hypothesis 5, which specified that accredited hospices are more likely to offer inpatient services. Kirby et al. (2007) also found that there was no association between hospice accreditation and quality of care. In order to obtain accreditation, hospices need to have established infrastructure, processes, and policies for the provided services (Connor, 2007). Hospices do not have incentives to offer inpatient services directly since it was not required by the accreditation agencies. Specifically, hospices can contract with other health care facilities that already provided inpatient services to offer the care and still meet the requirements from accreditation agencies. About 80 percent of hospices contracted with health care organizations (e.g., hospitals, nursing homes) in providing inpatient services to patients. Thus, accreditation was not a significant factor for hospices to offer inpatient services directly.

This study did find that chain-affiliated hospices were more likely to offer inpatient services (Hypothesis 6 was supported). Compared to freestanding hospices, chain-affiliated hospices had access to more resources that enable them to provide inpatient services to patients. This finding was consistent with other studies about chain-affiliation in the hospice literature. Hospices belonging to hospice chains were more likely to provide patient and family-centered care, which was suggested by the National Quality Forum (NQF) as a preferred practice strategy (Carlson et al., 2011). Chain-affiliated hospices were essential providers of hospice care. Stevenson, Dalton, Grabowski, and Huskamp (2015) discovered that hospices as part of chains provide care to almost half of Medicare hospice beneficiaries. As it relates to quality of care, hospices that were part of a chain were less likely to have problematic live discharges (Teno et al., 2015). Chain-affiliated hospices were more likely to offer inpatient services to provide better care to patients/families and to avoid the occurrence of problematic live discharges.

Hypothesis 7 proposed that hospices with better financial performance were more likely to offer inpatient services was not supported in this study. Compared to other health care organizations, hospices had low profitability (O'Neill et al., 2008). In our study, about 30 percent of hospices lost money. Compared to routine home care (payment rate equals $167.45 per day), hospices received higher reimbursement ($720.11 per day) from Medicare by providing general inpatient care (CMS, 2015b). However, the cost of providing inpatient care was high enough that only fifteen percent of hospices chose to offer inpatient care directly. Since many hospices already operated with low profit margins, cost control was a more vital issue than expanding services (e.g., offering inpatient services) to generate extra revenue.

In addition to testing the hypotheses, this study also found that hospice age, ownership, average LOS, and census regions were related to inpatient services offering. Hospices located in the Midwest and South areas were more likely to offer inpatient services. Other studies also found geographic variation in hospice enrollment policy (Carlson et al., 2012) and nursing facility focus strategy adoption (Apenteng, Nayar, et al., 2014). Hospices located in the South and Midwest regions may have better access to the inpatient resources and patients may have higher needs for inpatient services making them significantly more likely to offer inpatient services. Hospice age was positively associated with the presence of inpatient services. As the provider of end-of-life care to patients, some hospices delivered inpatient services to serve patients' complex health care needs. Hospices that operated longer in a market understood the necessary role of inpatient services in the process of end-of-life care, so they were more likely to offer inpatient services. The findings regarding for-profit hospices offering a narrower range of services were well established in the hospice performance literature (Aldridge et al., 2014; Barry et al., 2012; Carlson et al., 2012; Carlson et al., 2004; Olotu et al., 2013). It was not surprising to notice that in this study for-profit hospices were less likely to offer inpatient services to patients. Compared to not-for-profit hospices, for-profit hospices were more likely to focus on cost control. Since hospice care was reimbursed by a fixed daily payment rate, for-profit hospices had higher incentives to keep patient stays longer but also offer fewer costly services (Gandhi, 2012; Noe & Forgione, 2014; O'Neill et al., 2008; Wachterman et al., 2011b). Hospices' average LOS was negatively associated with the provision of inpatient services. This was consistent with the National Hospice & Palliative Care Organization's (NHPCO) report (NHPCO, 2014a, 2015). However, we

cannot make conclusions about the negative relationship found in this study since both a short stay (less than 7 days) and a long stay (over 180 days) indicated problems in hospices (Teno et al., 2015; Teno et al., 2014a).

Limitations

This study has several limitations worth noting. First of all, this study was limited to freestanding hospices in the US, other institution-based hospices (e.g., hospital-based hospices, nursing home-based hospices) were not considered. Compared to freestanding hospices, most institution-based hospices already had resources to provide inpatient services. To measure market competition, this study only used the market share of freestanding hospices in computing the HHI and the number of hospitals with hospice programs. Other competitors like nursing homes, home health agencies, and palliative care programs were not considered. Given the fact that freestanding hospices made up the majority of hospices and that the growth in hospice market was closely related to the growth of freestanding hospices (NHPCO, 2015), the focus of this study was to examine factors associated with freestanding hospices' inpatient services offering. So the findings of this study were only applicable to freestanding hospices. Second, this study only coded hospices that directly offered inpatient services as the dependent variable. Many hospices (about 80 percent) had contracts with health care facilities to offer inpatient services to patients. A future study could examine factors associated with hospice outsourcing behavior and related financial and quality outcomes. Last, but not the least, this study has a limitation related to omitted variable bias. Specifically, this study did not consider the

impact of patient factors in offering inpatient services. Wachterman et al. (2011b) found that patient diagnosis was associated with nursing staff and social worker visits. In this case, patient factors may influence the presence of inpatient services. However, given the limitation of secondary data resources we were using, patient factors were not available in this study. A future study could include patient-level data to make sure patient factors were also considered.

Implications

Despite these limitations, the findings of this study have implications for policy makers, researchers, hospice practitioners, and patients. This study adds to the growing body of hospice literature by using resource dependence theory (RDT) to examine market factors on hospice inpatient services. Similar to other studies that adopted RDT as conceptual framework (Apenteng, Nayar, et al., 2014; Lindley et al., 2013), this study found partial support of RDT. Market munificence plays an important role in predicting the presence of hospice inpatient services. For hospice administrators who were considering offering inpatient services, market demand is an important factor they need to take into account. On the other hand, this study also provided evidence for policy makers to identify hospices that were less likely to offer inpatient services. Policy makers should pay more attention to hospices that were not chain-affiliated, relatively new in the market, for-profit, and with longer average LOS to make sure patients receive necessary hospice services. For patients and families who have complex health care needs at end-of-life stages and worry that some hospices may not offer inpatient services, they can

select hospices that are part of a chain, not-for-profit, and within a market for a relatively long time.

CONCLUSION

The purpose of this study was to understand the market and organizational factors that influence hospices' provision of inpatient services. This study utilized a five year longitudinal sample of hospices (2009 to 2013) and adopted RDT as a theoretical framework to examine the environmental influence on hospice inpatient services offering. About fifteen percent of hospices directly offer inpatient services. Market munificence measured by urban location and percentage of 65+ older adults were related to the provision of hospice inpatient services. Hospices located in the Midwest and South regions were more likely to provide inpatient services. A hospices' decision to offer inpatient services depended on demand in the market. Organizational factors such as hospice chain-affiliation, age, and ownership were also associated with hospices' probability in offering inpatient services. In this study, average LOS was negatively associated with inpatient services offering. However, both a short LOS and a very long LOS represent problems in hospices. More patient-level data is in need to identify the appropriate amount of hospice services (number of services patients received and LOS) that are beneficial to an individual patient.

Figure 1. Conceptual framework

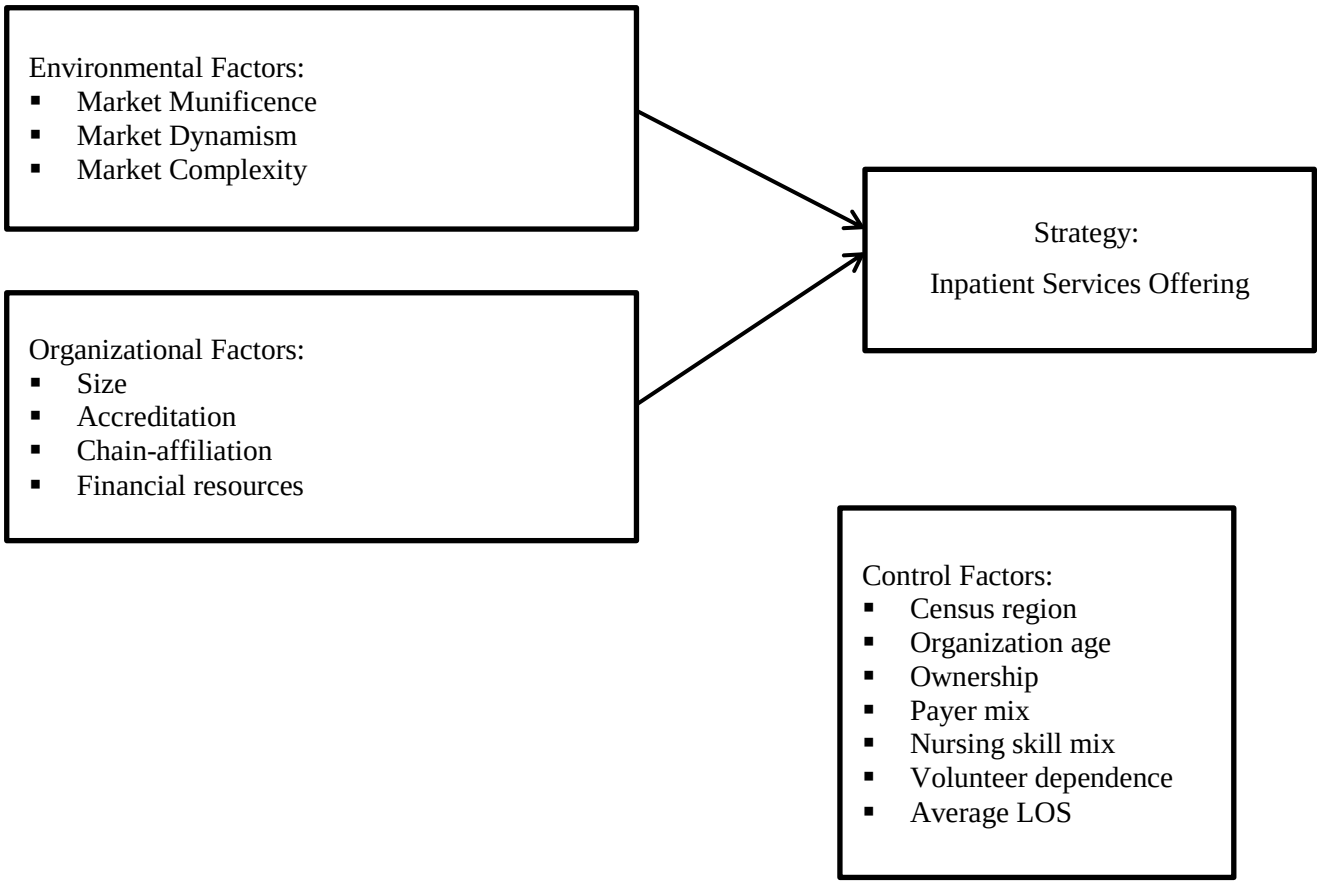

Figure 2. Time Trend of Hospices Inpatient Services Provision

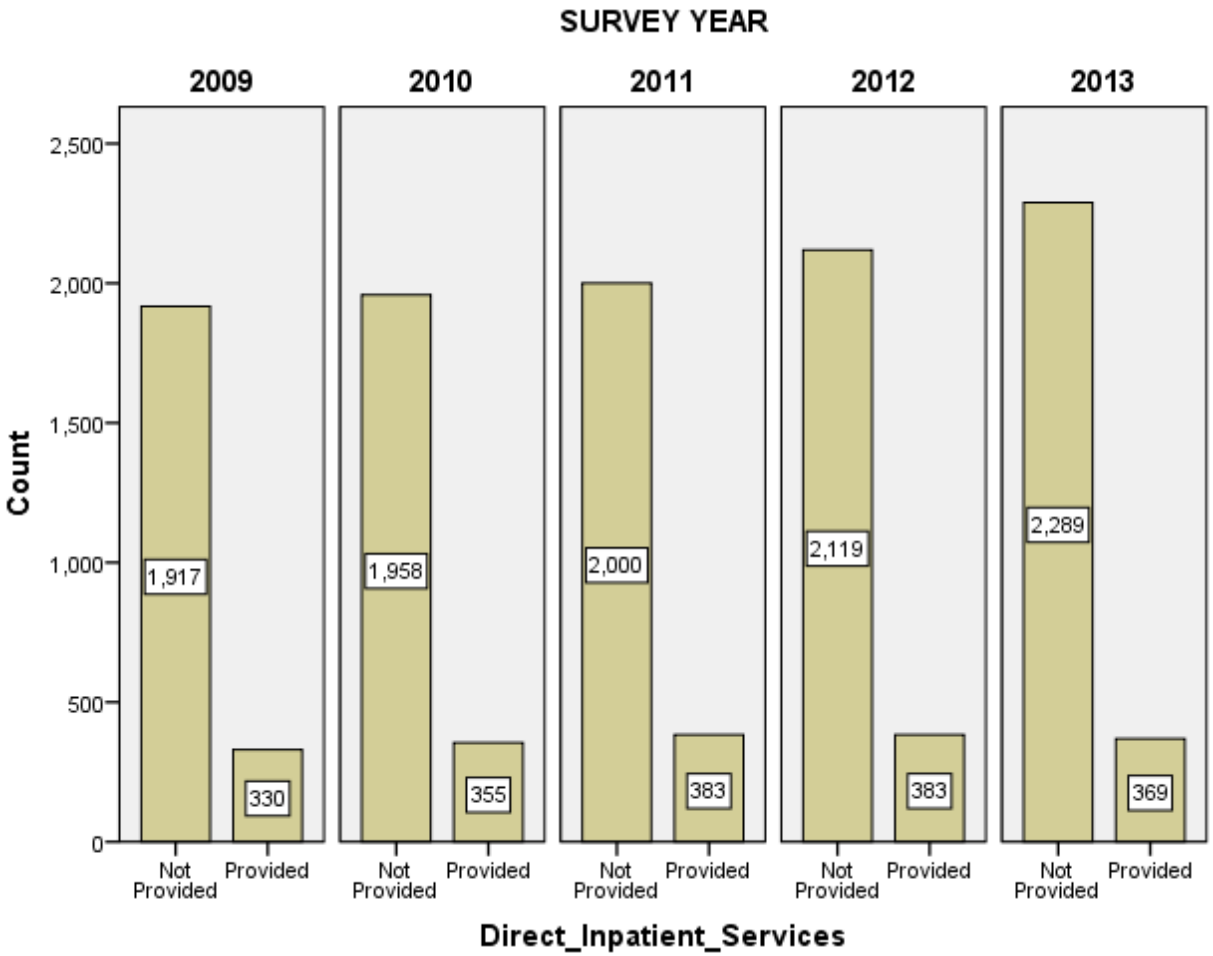

Table 1. Variables, measurements, and their data sources (2009-2013)

Variable	Operational Definition and Measurement	Data Source
Dependent Variable:		
Inpatient Services Offering	Binary variable indicating the directly provision of hospice inpatient services: Yes (1) or No (0)	POS
Environmental Variables:		
Munificence		
Per capita income	The average income of the county residents	AHRF
Proportion of adults 65+	The percentage of elderly residents in the county who are older than 65 years	AHRF
Urban	Urban (1) or rural (0) location	AHRF
Dynamism		
Unemployment rate	Unemployment rate in the county	AHRF
Complexity		
Market competition (1-HHI)	Herfindahl index (HHI): each hospice's market share	AHRF
Hospital with hospices	Number of hospitals in the county that have hospice program	AHRF
Organizational Variables:		
Size	Annual patient census	HCR
Accreditation	Accredited by JCAHO, ACHA, CHAP (1) or not (0)	POS
Chain-affiliation	Part of hospice chain (1) or not (0)	HCR
Financial performance	Hospices' profitability: total operating margin	HCR
Control Variables:		
Hospice age	Number of years that hospices have been operated	HCR
Ownership	For-profit (1) or not-for-profit (0)	POS
Medicare payer mix	The percentage of Medicare patients	HCR
Nursing skill mix	Total paid RN FTE/Total paid RN+LPN FTE	POS
Volunteer dependence	Volunteer to staff ratio	POS
Census region	Hospice census region: Northeast, Midwest, South, and West	AHRF
LOS	Average length of stay	HCR

Note: AHRF=Area Health Resource File; HCR= Hospice Cost Report; POS=Provider of Services file

Table 2. Descriptive statistics for study variables (pooled data; N=12,103)

Variables	Mean	Standard Deviation	Min	Max	N
Dependent variable					
Inpatient Services (%)	15.04				12,103
Independent variable					
Per capita income ($)	39823.48	9359.60	19846.00	121632.00	11,851
Proportion of adults 65+ (%)	13.37	3.39	4.76	34.54	11,900
Unemployment rate	8.52	2.47	2.6	29.9	11,900
1-HHI	0.89	0.11	0	0.99	12,103
# of hospital with hospice	1.62	3.10	0	18	11,900
Size (patient census)	538.76	4035.90	1	232285	11,872
Total margin	-42.86	2253.91	-137425	386.05	11,738
Age (years in operation)	13.59	7.76	1	45	12,103
Medicare payer mix	91.53	8.52	0.14	100	12,094
Nursing skill mix	84.39	17.58	5.26	100	12,078
Volunteer dependence	0.42	1.03	0	25.04	12,098
LOS (days)	78.89	114.35	1	9277	12,055
Urban (%)	78.82				12,101
Accreditation (%)	28.68				12,095
Chain-affiliation (%)	54.15				12,103
For-profit (%)	74.13				12,099
Not-for-profit (%)	24.19				12,099
Northeast (%)	9.81				11,900
Midwest (%)	19.55				11,900
South (%)	50.55				11,900
West (%)	20.09				11,900

Table 3. Bivariate analyses for hospice with inpatient services and without inpatient services (pooled data; N=12,103)

Variables	Hospices with inpatient services	N	Hospices without inpatient services	N	p-value
Per capita income ($)	39570.84	1,799	39868.70	10,052	0.214
Proportion of adults 65+ (%)	13.87	1,803	13.28	10,097	0.000
Unemployment rate	8.73	1,803	8.48	10,097	0.000
1-HHI	0.88	1,820	0.89	10,283	0.000
# of hospital with hospice	1.45	1,803	1.64	10,097	0.015
Size (patient census)	846.47	1,794	483.98	10,078	0.015
Total margin	0.08	1,786	-50.57	9,952	0.382
Age (years in operation)	18.08	1,820	12.80	10,283	0.000
Medicare payer mix	90.05	1,820	91.79	10,274	0.000
Nursing skill mix	84.57	1,815	84.36	10,263	0.638
Volunteer dependence	0.53	1,815	0.40	10,283	0.000
LOS (days)	68.46	1,812	80.74	10,243	0.000
Urban (%)	2.86	1,472	66.66	8,066	0.016
Rural (%)	12.16	346	18.32	2,217	
Accredited (%)	4.10	496	24.60	2,975	0.144
Not accredited (%)	10.95	1,324	60.36	7,300	
Chain-affiliated (%)	8.52	1,031	45.63	5,523	0.022
Not chain-affiliated (%)	6.52	789	39.33	4,760	
For-profit (%)	7.90	956	66.23	8,013	
Not-for-profit (%)	6.86	830	17.33	2,097	0.000
Government (%)	0.28	34	1.40	169	
Northeast (%)	1.09	132	8.55	1,035	
Midwest (%)	3.97	480	15.26	1,847	0.000
South (%)	7.49	907	42.40	5,108	
West (%)	2.35	284	17.41	2,107	

Table 4. Hospice inpatient services offering mixed-effects regression model

Variables	Odds ratio (OR)	Robust standard error (SE)	95% confidence interval (CI)	
			Lower	Upper
Environmental factors				
Per capita income (Ln)	0.74	1.42	0.05	1.60
Proportion of adults 65+ (%)	1.24**	0.10	1.03	1.50
Urban	17.76***	0.79	3.77	83.56
Unemployment rate	1.15	0.16	0.85	1.56
1-HHI	0.10	1.98	0.00	4.95
# of hospital with hospice	1.04	0.08	0.90	1.21
Organizational variables				
Size (Ln)	1.97	3.06	0.00	932.51
Accreditation	1.30	0.46	0.53	3.21
Chain-affiliation	3.29***	0.35	1.65	6.56
Total margin	1.00	0.16	0.76	1.32
Control variables				
Age	1.18***	0.04	1.09	1.28
LOS (Ln)	0.37***	0.32	0.20	0.69
Not-for-profit	(Ref)			
For-profit	0.09***	0.62	0.03	0.29
Government	0.54	0.94	0.09	3.43
Medicare payer mix	0.98	0.68	0.26	3.74
Nursing skill mix	1.00	0.52	0.36	2.77
Volunteer dependence	0.98	1.27	0.08	11.49
Northeast	(Ref)			
Midwest	19.09***	0.83	3.80	95.96
South	28.22***	0.82	5.69	140.02
West	3.05	1.04	0.39	23.60

Note: * $p<0.10$ ** $p<0.05$ *** $p<0.01$

Table 5. Hypotheses testing results

	Hypotheses	Results
Environmental	Hypothesis 1: Hospices in markets with relatively munificent environmental conditions are more likely to offer inpatient services.	Partially supported
	Hypothesis 2. Hospices in markets with relatively dynamic environmental conditions are less likely to offer inpatient services.	Not supported
	Hypothesis 3. Hospices in markets with relatively complex environmental conditions are less likely to offer inpatient services.	Not supported
Organizational	Hypothesis 4. Larger hospices are more likely to offer inpatient services.	Not supported
	Hypothesis 5. Accredited hospices are more likely to offer inpatient services.	Not supported
	Hypothesis 6. Chain-affiliated hospices are more likely to offer inpatient services.	Supported
	Hypothesis 7. Hospices with better financial performance are more likely to offer inpatient services.	Not supported

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CHAPTER 4

HOSPICE INPATIENT SERVICES PROVISION, UTILIZATION, AND FINANCIAL PERFORMANCE

by

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CHAPTER 4

HOSPICE INPATIENT SERVICES PROVISION, UTILIZATION, AND FINANCIAL PERFORMANCE

Abstract

Purpose: The objective of this study is to explain differences in the financial performance of hospices with regard to hospice inpatient services provision when considering the average length of stay (LOS) in the relationship.

Methodology/Approach: A longitudinal secondary data set (2009 to 2013) was merged from three sources: Hospice Cost Reports from the Centers for Medicare and Medicaid Services (CMS), the Provider of Services (POS) files, and the Area Health Resources Files (AHRF). The dependent variable in this study was hospice financial performance measured by TM and ROA. The independent variable was hospice inpatient services offering. Mixed effects regression models were used in the multivariate regression analyses. The mediation effect of hospice average LOS in the relationship between hospice inpatient services provision and two financial performance measures was also tested.

Findings: The presence of hospice inpatient services was negatively related to average LOS (β =-0.050; $p<0.01$), total margin (TM) (β =-0.028; $p<0.01$), and return on assets (ROA) (β =-0.059; $p<0.01$). However, average LOS was positively associated with TM (β =0.077; $p<0.01$) and ROA (β =0.177; $p<0.01$). The relationship between hospice inpatient services offering and financial performance was partially mediated by hospice average LOS.

Conclusion: Hospice inpatient services provision and average LOS were associated with financial performance. Offering the inpatient services to patients decreased average LOS and lowered the hospices' overall profitability. Hospices need to seek strategies to maintain their financial sustainability but not to compromise their quality of care.

Keywords: hospice, inpatient services, length of stay (LOS), financial performance

INTRODUCTION

Hospice performance is an overlooked area in the health care field due to the nature of hospice care (Donaldson & Field, 1998) and the infrequent hospice quality inspection (Whoriskey, 2014b). As part of the Affordable Care Act (ACA), the Centers for Medicare and Medicaid Services (CMS) adopted the Hospice Quality Reporting Program (HQRP) which required all Medicare-certified hospices to provide quality of care data to CMS. A failure to report data or having lower quality of care will result in hospices receiving a two percentage point reduction in their Annual Payment Update (APU) (CMS, 2015b). A hospice's ability to provide the full array of hospice services is considered an indicator of hospice quality of care (Carlson et al., 2004; CMS, 2015a). Specifically, an inpatient services offering is important for patients who have complex health care conditions and need the transition from home to inpatient settings (Whoriskey & Keating, 2014c). Hospices received higher daily reimbursement rates from Medicare in providing general inpatient care ($720.11) than routine home care ($161.89) (CMS, 2015b). However, offering inpatient care to patients may add financial and logistical barriers to small and mid-size hospices (Whoriskey & Keating, 2014). Given the stringent policy requirement on quality and the increasing needs of patients, hospices are concerned about the financial sustainability in offering inpatients services.

Hospices often experience low profit margins (O'Neill et al., 2008). Researchers have empirically examined the relationship between hospice structure and financial performance. They found that for-profit (FP) hospices earned higher profits than not-for-profit (NFP) hospices by lowering operational costs (Noe & Forgione, 2014; O'Neill et al., 2008) and publicly traded FP hospices made higher profits than both private FP and NFP

hospices (McCue & Thompson, 2005). In comparison to existing hospices, newly established hospices (operated after year 2000) served fewer patients but increased revenue and overall profitability through longer length of stays (LOS) (McCue & Thompson, 2006). Hospice strategic group membership, based on measures of innovation and efficiency in operation, was not associated with financial performance (Kirby, 2012), likewise no differences were observed between urban and rural hospices in terms of financial performance (O'Neill et al., 2009). All of the studies examining hospice financial performance adopted cross-sectional designs and utilized relatively older data (from year 2000 to 2007) that could not capture the recent trajectory of hospice financial performance over time. In addition, several studies employed California data (Kirby, 2012; O'Neill et al., 2008, 2009), which limited the generalizability of those studies.

An increase in financial performance is beneficial in helping hospices improve quality and attain CMS requirements. Therefore, understanding the relationship between hospice structure and financial performance is essential for an industry facing changes in social norms, funding opportunities, and other environmental factors (Kirby et al., 2007). Guided by Donabedian's structure-process-outcome (SPO) framework and structure-conduct-performance (SCP) framework (Bain, 1959; Avedis Donabedian, 1966a), this study will examine the presence of hospice inpatient services on utilization, and its influence on hospice financial performance using national freestanding hospice data from 2009 to 2013.

CONCEPTUAL FRAMEWORK

Hospices can achieve better financial performance by lowering cost and increasing revenue from operations. Transaction cost theory states that firms decide to provide services in-house because it can reduce the "transaction cost" of going to the market to find and utilize a provider (Coase, 1937; Williamson, 1998). Transaction costs are market costs related to the coordination between agents (information gathering, contract negotiations, etc.). This theory explains why some hospices choose to provide inpatient services directly. Providing inpatient services also brings extra revenue to hospices. Compared to routine home hospice care, Medicare offers higher reimbursement rates for hospice inpatient care (CMS, 2015a, 2015b), enables the presence of some hospice inpatient facilities.

Structure-Conduct-Performance (SCP) is the foundation of industrial organization theory and was adopted as an analytic tool for examining business functioning in a competitive market environment (Porter, 1980). SCP describes how industry structure can influence a firm's conduct which, in turn, could impact the performance of both industry and firm. Structure contains a set of market and industry indicators that are stable over time which could affect a firm's behavior. Conduct describes how firms behave and performance covers both industry and market performance. The Donabedian Model is a conceptual framework which provides health care researchers with an outline to evaluate quality of care. It contains three main parts: structure, process, and outcome. Structure reflects physical or organizational characteristics of health care entities. Process refers to the care that patients have received. Outcome represents the results or consequences of provided health care. Donabedian's SPO model suggests that structure

and process may be the cause of outcome (Avedis Donabedian, 1966b, 1980; A. Donabedian, 1988). The SPO model has been used to explain variation in quality of care in patient outcome; it also has been used to explain quality of care from the organizational perspective. Several studies have been conducted using SPO model to explain the variation of quality of care in hospitals and nursing homes (Gile, 2011; Needleman et al., 2007; Weech-Maldonado et al., 2003; Wu & Hsieh, 2011). The proposed conceptual framework using both SPO and SCP framework will examine the relationship of inpatient services provision, average LOS, and financial performance, after controlling for environmental and organizational factors (Figure 1).

The Influence of Hospice Inpatient Services on Average LOS

Hospices with inpatient facilities are capable of providing more services to patients. A failure to offer essential services to patients was associated with more dis-enrolled cancer patients (Carlson et al., 2009) and a higher live discharge rate (Teno et al., 2015; Teno et al., 2014a). Inpatient services are crucial to patients and family members when routine home hospice care is no longer able to handle patients' complex care needs. Therefore, patients have longer LOS in hospices that offer inpatient services and move back to home hospices after their conditions are stabilized without discharging alive to other health care settings. Two studies, one from a comprehensive cancer center (Elsayem et al., 2004) and one from a multi-center randomized control trial (Gade et al., 2008), suggested that inpatient palliative care services were associated with longer LOS in the hospice compared to usual hospital care. Differing from hospice care that focused

on end-of-life care and offered at a patient's home, inpatient palliative care services are provided by an interdisciplinary team in the hospital. Therefore, inpatient palliative care services served as a transition for end-of-life patients from hospital to hospice to ensure patients' access to hospice care and LOS in hospice. A number of organizational characteristics were reported to be related to hospice LOS: FP hospices had longer average LOS than NFP hospices (Gandhi, 2012; Richard C Lindrooth & Burton A Weisbrod, 2007; Wachterman et al., 2011b) and newly established hospices had longer LOS when compared to older ones (McCue & Thompson, 2006). Given that hospices with inpatient facilities could better serve patients' needs and reduce the probability of patients' disenrollment from hospice to resume regular health care services, we hypothesize:

Hypothesis 1: Hospices that offer inpatient services would have longer average LOS compared to hospices that do not offer inpatient services.

The Relationship between Hospice Average LOS and Financial Performance

Under the existing hospice reimbursement mechanism established in 1982, named the Medicare Hospice Benefit (MHB), hospice services are paid by Medicare with a fixed per diem rate (Mahoney, 1998). Longer hospice LOS is related to higher total reimbursement from Medicare. The cost of providing hospice care follows a U-shaped curve pattern with higher costs occurring during the first and last few days of hospice care, while costs are relatively lower and stable in between (Buntin, Nicosia, Reardon, Lorenz, & Lynn, 2009; Huskamp et al., 2001; MedPAC, 2015). Therefore, longer hospice

average LOS is associated with higher profitability by generating higher revenue and lowering average daily cost. Based on California hospice data, O'Neill et al. (2008) found longer hospice LOS to be associated with higher profits. Because longer hospice LOS may improve revenue and reduce average daily cost simultaneously, we make the following hypothesis:

Hypothesis 2. Hospices with longer average LOS would experience better financial performance.

The Impact of Hospice Inpatient Services on Financial Performance

Hospices that offer inpatient services directly to patients may have longer average LOS, and then achieve better financial performance. As mentioned earlier, hospice profitability is achieved by lowering cost and increasing revenue. Providing inpatient services brings revenue to hospices because Medicare offers higher reimbursement rates for hospice inpatient care than regular home hospice care (MedPAC, 2015). Based on transaction cost theory, operating a hospice inpatient facility reduces transaction costs as it saves hospices effort in seeking the appropriate provider to offer inpatient services as well as making sure the quality of inpatient services is also achieved (Coase, 1937; Williamson, 1998). Thus, we speculate that hospices with inpatient facilities will have better financial performance since transaction costs are lowered and extra revenue is generated. Moreover, we assume that hospice LOS also plays a mediation role in this relationship. Increased financial performance is due to increased average LOS in hospices with the provision of inpatient services.

Hypothesis 3a. Hospices that offer inpatient services would have better financial performance compared to hospices that do not offer inpatient services.

Hypothesis 3b. The relationship between hospice inpatient services provision and financial performance is mediated by average LOS.

METHODS

Data and Study Sample

This study utilized a longitudinal, retrospective design to examine relationships among hospice inpatient services provision, average LOS, and financial performance. The study sample was drawn from all freestanding hospices in the U.S. from 2009 to 2013. The data was obtained from three sources: Hospice Cost Reports from the Centers for Medicare and Medicaid Services (CMS), the Provider of Services (POS) files, and the Area Health Resources Files (AHRF).

The Medicare Hospice Cost Report provides financial information for all freestanding hospices. The dependent variable, hospice financial performance, was extracted from the Medicare Hospice Cost Report. The Medicare POS file provides hospice organizational characteristics, the information of hospice inpatient services provision, and average LOS. The AHRF provides information about county-level market characteristics that were used as control variables. The sampling frame consists of U.S. freestanding hospices that were operational from the years 2009 through 2013. The total number of freestanding hospices reporting their cost information to CMS were 12,332:

2,278 in 2009, 2,347 in 2010, 2,434 in 2011, 2,563 in 2012, and 2,710 in 2013, respectively. The unit of analysis was the individual freestanding hospice, and the market characteristics were defined at the county level.

Dependent variable: Financial Performance

Financial performance captures both revenue and costs during operation and is often measured using profitability ratios (Gapenski, 2005; Schneider et al., 2007). Because of the complexity and diversity of using profitability ratios to represent financial performance, normally more than one profitability ratio is used (Kuntz, Pulm, & Wittland, 2015; Langland-Orban, Gapenski, & Vogel, 1996; Waddock & Graves, 1997). For studies examining hospice financial performance, revenue and expenses (Kirby, 2012; McCue & Thompson, 2005, 2006), profits (revenue minus costs) (O'Neill et al., 2008, 2009), and total profit margin ratios were used (McCue & Thompson, 2005, 2006). Based on the financial performance literature and the availability of variables in our data set, we employed total margin (TM) and return on assets (ROA) to measure hospice financial performance. The TM (net income/total revenue) measures a hospice's ability to control expenses and ROA (net income/total assets) demonstrates how productive a hospice uses its assets. Hospices with missing (N=608) and extreme values (N=1,630) on TM and ROA were excluded from further analyses. The threshold for calculating the extreme values of financial performance was $lower\ level = Q_1 - 3 \times IQR$ and $upper\ level = Q_3 + 3 \times IQR$ (IQR: Interquartile range=Q_3-Q_1).

Independent variables: Hospice Inpatient Services Provision & Average LOS

Hospice inpatient services provision was measured using the "inpatient services offering" variable from the Medicare POS file. The "inpatient services offering" variable contains four levels of provision: 0=not provided, 1=provided by staff, 2=provided under arrangement, 3=combination. We recoded inpatient services offering into a dichotomous variable where "1" for hospices with inpatient facilities by combining categories 1 to 3 and "0" for hospices without inpatient facilities. 138 hospices with a missing value on inpatient services offering were excluded from the analyses.

Hospice LOS is measured by the average days that patients stayed in one hospice. Several studies used hospice average LOS as measurement for services utilization and process of quality (Gandhi, 2012; Richard C Lindrooth & Burton A Weisbrod, 2007; Lorenz et al., 2002). Twenty-three hospices with missing values on average LOS were not included in this study. Figure 1 shows the process of sample selection. In addition, because most hospices had relatively shorter LOS and the hospice average LOS was positively skewed (median is less than mean), a natural log transformation was performed.

Control Variables

Variables were identified from the hospice performance literature as factors that may influence hospice financial performance (Apenteng, Linder, et al., 2014; Apenteng, Nayar, et al., 2014; Kirby, 2012; Kirby et al., 2007). Accordingly, control variables contain both environmental and organizational factors. Environmental factors include location, region, per capita income, unemployment rate, percentage of population older

than age of 65, and market competition (Herfindahl-Hirschman Index and number of hospitals with hospices). The Herfindahl-Hirschman Index (HHI) represents the market share of each hospice in the same county calculated by hospice patient days.

$$HHI = Sum\left(\frac{Hospice\ patient\ days}{County\ total\ hospice\ patient\ days}\right)^2$$

HHI ranges from 0 to 1 where 0 indicates a perfect competitive market and 1 indicates a monopoly in the market. To prepare for further analyses, hospice market competition is reverse scaled (1-HHI) to make it easier to interpret. The higher value of (1-HHI) represents a more competitive hospice market. Organizational factors include hospice size, affiliation, accreditation, ownership, hospice age (number of years the hospice has operated in the market), Medicare payer mix, nursing skill mix, and volunteer dependence are also used for control. A summary of dependent, independent, and control variables with their measurements and data sources is presented in Table 1.

Data Analyses

The dependent variable, independent variables, and control variables were checked for normality, outliers and extreme values, and to make sure the assumptions for subsequent analyses were met. In addition, bivariate analyses were performed to test for multicollinearity among study variables. Then, using Statistical Analysis System software (Version 9.4; SAS Institute, Cary, North Carolina), we performed linear mixed-effects models to analyze the influence of hospice inpatient services provision on average LOS and financial performance. Because we have longitudinal data with repeated measures of

hospices from year 2009 to 2013, linear mixed-effects model is the appropriate method to examine the relationship between hospice inpatient services provision and financial performance when considering both within and between hospices. In addition, we tested the mediation effect of average LOS between hospice inpatient services provision and financial performance (Baron & Kenny, 1986). To test the mediation effect, three regression models were examined: 1) the impact of the independent variable (inpatient service) on the mediator (average LOS); 2) the impact of the independent variable (inpatient service) on the dependent variable (financial performance); 3) regressing the dependent variable (financial performance) on both the independent variable (inpatient service) and the mediator (average LOS):

$$(1) LOS_{it} = \beta_0 + \beta_1 Inpatient_{it} + \lambda Z_{it} + b_i + \varepsilon_{it}; \quad \text{(Hypothesis 1)}$$

$$(2) FP_{it} = \beta_0 + \beta_1 Inpatient_{it} + \lambda Z_{it} + b_i + \varepsilon_{it}; \quad \text{(Hypothesis 3a)}$$

$$(3) FP_{it} = \beta_0 + \beta_1 Inpatient_{it} + \beta_2 LOS_{it} + \lambda Z_{it} + b_i + \varepsilon_{it}. \quad \text{(Hypothesis 2\&3b)}$$

In equation 1, the dependent variable is average LOS, where $i = hospice$ and $t = time$; $\beta_1$is the coefficient for the independent variable (inpatient services provision). Similar to equation 1, equation 2 has financial performance as the dependent variable, where the independent variable is also inpatient services provision. For equation 3, financial performance is the dependent variable, where $\beta_1$is the coefficient of inpatient services provision and β_2 is the coefficient of average LOS. λZ_{it} represents all control variables in this study, b_i is the random intercept, and ε_{it} is the error term. We use mixed-effects models to account for both variations within-hospices and between hospices and report statistical significance at the $p < .01$, $p < .05$, and $p < .10$ levels, respectively. Model

selection is applied based on AIC (Akaike information criterion) and BIC (Bayesian information criterion) (smaller AIC and BIC values indicate better model fitting).

RESULTS

There were 9,933 hospices in our sample during the years 2009 to 2013 (see Table 2). 1,581 (15.9%) hospices offered inpatient services and 8,352 (84.1%) hospices did not have inpatient facilities. The average LOS was 67.67 days for hospices that offer inpatient services and 81.01 days for hospices that do not offer inpatient services. In addition, the total margin (TM) and return on assets (ROA) were respectively 0.05 and 0.12 for hospices offering inpatient services and 0.07 and 0.20 for hospices not offering inpatient services. For hospices offering inpatient services, the average number of patients per year was 1076.28 (400.63 for hospices without inpatient services) and, on average, were in their markets for 18.97 years (13.31 years for hospices without inpatient facilities). About half of the hospices with inpatient facilities were NFP (48.8%) and were chain-affiliated agencies (55.4%). The mean level of market competition in our sample was 0.89, indicating a competitive hospice market. On average, counties where sample hospices located comprised of 13.4% over age 65, had an unemployment rate of 8.5%, and had an average per capita income of $39,925.81. Most hospices are in urban areas (79.7%) and about half are in the south (49.5%).

We also showed the trend of hospice financial performance, average LOS, and hospice inpatient services offering between 2009 and 2013 (see Table 3 & Figure 2). In our sample, the number of freestanding hospices continued to grow (1,873 in 2009 to

2,175 in 2013). The pattern of hospice financial performance showed fluctuations in TM and ROA from 2009 to 2013. The percentage of hospices that had inpatient facilities increased from 14.6% in 2009 to 17.2% in 2011, and then decreased back to 14.6% in 2013. Similarly, the average LOS for hospices increased from 75.51 days in 2009 to 84.48 days in 2011, and back to 75.74 days in 2013. Figure 2 shows the trend of hospice financial performance and average LOS by inpatient services provision.

Table 4 presents the results of the linear mixed-effects model. In Hypothesis 1 and 3a, we posited that hospices with inpatient facilities would have longer LOS and better financial performance. However, our results show that the presence of hospice inpatient facilities was negatively associated with average LOS (β =-0.050; $p<0.01$), total margin (β =-0.028; $p<0.01$), and return on assets (β =-0.059; $p<0.01$). We found support for Hypothesis 2 that hospices with longer average LOS were associated with higher total margin (β =0.077; $p<0.01$) and return on assets (β =0.177; $p<0.01$). In Hypothesis 3b, we hypothesized that the influence of hospice inpatient services provision on financial performance would be mediated by average LOS. Based on the coefficient decrease for hospice inpatient services offering from Model 2 (TM: β =-0.028; ROA: β =-0.059) to Model 3 (TM: β =-0.024; ROA: β =-0.050), we found partial support for the mediation effect of hospice average LOS in the relationship between inpatient services provision and financial performance.

In addition, we found that some environmental and organizational variables were associated with hospices' average LOS and financial performance. The average per capita income for counties that hospices located were negatively associated with average LOS (β =-0.079; $p<0.05$), TM (β =-0.056; $p<0.01$), and ROA (β =-0.093; $p<0.05$). Hospices

located in more competitive markets (1-HHI) had longer average LOS (β =0.254; $p<0.01$). Compared to rural hospices, urban hospices had longer average LOSs (β =0.046; $p<0.05$), but experienced lower TM (β =-0.014; $p<0.10$) and ROA (β =-0.052; $p<0.05$). Hospice size as measured by number of patients, was negatively associated with average LOS (β =-0.081; $p<0.01$), but positively associated with TM (β =0.039; $p<0.01$) and ROA (β =0.084; $p<0.01$). Hospice age (number of years operated) was negatively associated with TM (β =-0.002; $p<0.01$) and ROA (β =-0.006; $p<0.01$). Medicare payer mix (the percentage of Medicare patients) was positively associated with average LOS (β =0.004; $p<0.01$), TM (β =0.002; $p<0.01$), and ROA (β =0.003; $p<0.01$). For-profit hospices had significantly longer average LOS (β =0.187; $p<0.01$) and higher ROA (β =0.113; $p<0.01$) than not-for-profit hospices. Stand-alone hospices had better financial performance (TM: β =0.010; $p<0.05$; ROA: β =0.047; $p<0.01$) than chain-affiliated hospices.

DISCUSSION

This study examined the relationship between hospice inpatient services provision, average LOS, and financial performance. From year 2009 to 2013, the number of hospices and average LOS in hospices is continued to increase. Hospices are getting better in controlling costs. Compared to 2009, hospices had higher total margin from 2010 to 2012 while stayed the same in 2013. However, hospices had lower ROA in 2013 when comparing to 2009. To better show the time trend of hospice financial performance, more years of hospice are in need.

In contrast to Hypothesis 1, results showed that inpatient services provision was negatively associated with average LOS. These findings are inconsistent with previous studies indicating that offering inpatient palliative care services is associated with longer length of stay in the hospice compared to traditional hospital care (Elsayem et al., 2004; Gade et al., 2008). The purpose of hospice inpatient services is to provide short-term care that helps stabilize patients' critical conditions. Similar to an acute hospital stay, inpatient hospice care is a short-term intervention, thus, it should not have a significant impact on extending the hospice average LOS. Moreover, even though some hospices offer inpatient services, it does not necessarily mean that they will transfer patients to their inpatient settings (Whoriskey & Keating, 2014c). Patients who were sicker (e.g., cancer patients) may be more likely to enroll in hospices with inpatient care. Thus, they have shorter survival time than patients (e.g., dementia patients) who enroll in hospice without inpatient services. Several studies observed hospice's cherry-picking behavior where for-profit hospices were more likely to have longer patient stays (Noe & Forgione, 2014; Sengupta et al., 2013) and to admit more patients with potential longer LOS (Gandhi, 2012; Richard C Lindrooth & Burton A Weisbrod, 2007; Wachterman et al., 2011b). A two-way cherry-picking phenomenon may be happening when patients enrolled in hospice: patients with complex health conditions may prefer to go to those hospices with inpatient facilities, and hospices that offer inpatient services were less likely to put limitations on patient admissions. Studies have found that hospice organizational characteristics (e.g., size, chain-affiliation) were associated with hospice admission practices and patients' choices (M. D. A. Carlson, C. L. Barry, E. J. Cherlin, R. McCorkle, & E. H. Bradley, 2012; Lorenz, Asch, et al., 2004).

Hypothesis 2, regarding the relationship of hospice LOS to financial performance was supported. Consistent with the hospice performance literature, we found that hospices' average LOS was positively associated with financial performance. Using the California hospice data, O'Neill et al. (2008) found that longer LOS was strongly associated with hospices' overall profitability (revenue minus costs). We found the same results that longer average LOS was associated with higher total margin and return on assets using the national freestanding hospice data. As we mentioned earlier, the cost of providing hospice care follows a "U shape": higher cost at the beginning and end of hospice care, but lower cost in-between when patients were stabilized (Huskamp et al., 2001; MedPAC, 2015). Therefore, a longer hospice LOS represents a lower average cost for patients. In addition, the passage of the 1982 Medicare Hospice Benefit established the per diem payment mechanism for hospice care. Hospices received higher total reimbursement from Medicare when patients stayed longer in hospices. Therefore, a longer hospice average LOS was associated with lower average daily cost but higher revenue which led to better hospice financial performance.

Our results did not support Hypothesis 3a that the presence of hospice inpatient facilities was associated with better financial performance. However, we did find a mediation effect of hospice average LOS in the relationship between hospice inpatient services provision and financial performance. This means that the negative relationship between hospice inpatient services provision and financial performance was partially due to the negative relationship between hospice inpatient services provision and average LOS. The poorer financial performance of hospices with inpatient facilities when compared to hospices without inpatient facilities, was partially due to the shorter average

LOS. Even though hospices received higher reimbursement for providing inpatient care, the cost to offer inpatient care was also higher than home-based care. Thus, the extra revenue for providing short-term inpatient care could not cover the cost spent on inpatient services.

We found the average per capita income of counties where hospices are located to be negatively associated with length of stay and financial performance. Apenteng, Nayar, et al. (2014) found that hospices located in wealthier markets were more likely to adopt a nursing facility focus strategy. The possible explanation was that people from wealthier counties would like to consider other hospice embedded options (e.g., nursing home with hospices, hospitals with hospice program) than freestanding hospices. As more hospitals with hospice programs were observed in a market, the average LOS for freestanding hospices also decreased. In addition, we found that market competition was associated with longer LOS and competition from hospitals with hospice programs was positively associated with higher ROA for freestanding hospices. When facing competition from other hospices, hospices may choose certain strategies (e.g., volunteer use) to make sure patients stay longer in the hospice and generate more revenue from the longer stay (Apenteng, Linder, et al., 2014; Apenteng, Nayar, et al., 2014; Huskamp et al., 2001; MedPAC, 2015). Compared to rural hospices, urban hospices had longer LOS but poor financial performance, which is inconsistent with previous findings where no significant difference of financial performance was observed between urban and rural hospices in California (O'Neill et al., 2009). The possible explanation is the sample difference between single state data and national sample that urban freestanding hospices have more operational costs than rural hospices.

Consistent with previous studies about hospice ownership (Gandhi, 2012; Richard C Lindrooth & Burton A Weisbrod, 2007; Wachterman et al., 2011b), we found additional support that FP hospices have longer average LOS and, thus a higher return on assets than NFP hospices. Hospice size (number of patients) was negatively related to average LOS, but positively related to financial performance. Previous studies showed that larger hospices were more likely to offer diverse services to patients (Barry et al., 2012; Jarosek et al., 2009; Lindley et al., 2013; Lorenz, Ettner, et al., 2004). Even as larger hospices offer more services to patients, it is possible that they also have sicker patients (e.g., cancer), since a diverse services offering strategy attracts patients with complex health care needs. In addition, larger hospices had higher profits by serving more patients. Hospice age (number of years operating in a market) and chain-affiliation were negatively associated with total margin and return on assets. Because older hospices (Jarosek et al., 2009; McCue & Thompson, 2006) and chain-affiliated hospices (Cagle et al., 2012; Carlson et al., 2011) had higher operational costs by offering more services to patients and are less likely to put limitation on patients' admission (A. Carlson, C. Barry, E. Cherlin, R. McCorkle, & E. Bradley, 2012; Lorenz, Asch, et al., 2004). Medicare (91.8%) was the major payer for hospice care; the percentage of Medicare patients enrolled in hospices was positively related to hospice financial performance. Volunteer dependence (volunteer to staff ratio) could save hospices' spending on human resources; therefore, it was positively associated with total margin.

Limitations

This study has several limitations that are worth mentioning. First, this study was limited to all freestanding hospices. The results are not generalizable to institution-based hospices (e.g., hospital-based, home health-based hospices). However, the majority of hospices (59.1 percent in 2014) were independent, freestanding hospices (NHPCO, 2015). Our results were applicable to these hospices. Second, due to the limitation of using secondary data, this study did not take patient factors into account (e.g., patient case mix). Wachterman et al. (2011b) found that patient diagnosis was associated with nursing staff and social worker visits. So these patient factors may have an impact on patients' choice of hospice, average LOS, and financial performance. A future study may consider patient-level data in the analyses to better control patient level variations and explore factors related to patient outcome (e.g., LOS, live discharge). In addition, the secondary data used for this study were subject to inaccuracies because they were obtained from administrative databases which relied on self-reported information.

CONCLUSION

In summary, this study found that the presence of hospice inpatient services was negatively associated with average LOS, total margin, and return on assets. There was a positive relationship between hospice LOS and financial performance. Hospice average LOS partially mediated the relationship between inpatient services provision and financial performance. The provision of inpatient services could better satisfy hospice patients' complex health care needs and improve the quality of care (Whoriskey &

Keating, 2014c). About 8,352 hospices (84.1%) in our sample chose not to directly offer inpatient services. However, among the hospices that did not offer inpatient services, 7,817 hospices (83.2%) chose to contract with other health care providers (e.g., hospitals, nursing homes) to offer inpatient services. Future studies could explore what other strategies (e.g., outsourcing) hospices may adopt to reduce cost while ensuring the provision of necessary services to patients and the impact of those strategies. Hospices recognized that patients' longer LOS was related to more revenue, so for-profit hospices enrolled more patients with longer LOS (Gandhi, 2012; Richard C Lindrooth & Burton A Weisbrod, 2007). However, LOS in hospices was not an optimal measurement of quality of care, because a short stay may represent an under-utilization of care and a long hospice stay may indicate a misuse of hospice or a diagnosis error. In recent studies, hospice live discharge rate has been used to measure hospice quality of care (Teno et al., 2014a) and hospices' performance (Teno et al., 2015). Future studies could also explore the link between hospice quality of care and financial performance.

Table 1. A summary of study variables

Variable	Definition	Data Sources
Financial Performance	Hospices' profitability measurement	
Total Margin (TM)	Net income/total revenue	HCR
Return on Assets (ROA)	Net income/total assets	
LOS	The average length of stay	HCR
Inpatient Facilities	Binary variable indicating the provision of hospice inpatient services: Yes (1) or No (0)	POS
Environmental Factors		
Per capita income	The average income of the county residents	AHRF
Proportion of adults 65+	The percentage of elderly residents in the county who are over 65 years old	AHRF
Urban	Urban (1) or rural (0) location	AHRF
Unemployment rate	Unemployment rate in the county	AHRF
Market competition	Herfindahl index: each hospice's market share	AHRF
Hospital with hospices	Number of hospitals in the county that have hospice program	AHRF
Census region	Hospice census region: Northeast, Midwest, South, and West	AHRF
Organizational Factors		
Size	Number of patients per year	HCR
Accreditation	Accredited by JC, ACHA, CHAP (1) or not (0)	POS
Chain-affiliation	Part of hospice chain (1) or not (0)	HCR
Organization age	Number of years that hospices have been operated	HCR
Ownership	For-profit (1) or not-for-profit (0)	POS
Medicare payer mix	The percentage of Medicare patients	HCR
Nursing skill mix	Total paid RN FTE/Total paid RN+LPN FTE	POS
Volunteer dependence	Volunteer to staff ratio	POS

Note: AHRF=Area Health Resource File; HCR= Hospice Cost Report; POS=Provider of Services file

Table 2. Descriptive statistics of pooled data from year 2009 to 2013

Variable	Hospices with Inpatient Facilities (N=8,352)		Hospices without Inpatient Facilities (N=1,581)		All Hospices (N=9,933)	
	Mean/N	SD/%	Mean/N	SD/%	Mean/N	SD/%
Financial Performance						
Total Margin (TM)	0.05	0.15	0.07	0.17	0.07	0.17
Return on Assets (ROA)	0.12	0.37	0.20	0.46	0.19	0.45
Average Length of Stay (LOS), day	67.67	117.67	81.01	124.71	78.89	123.70
Environmental Factors						
Per capita income ($)	39637.56	9221.72	39981.12	9396.32	39925.81	9368.82
Proportion of adults 65+ (%)	14.03	3.95	13.28	3.23	13.40	3.36
Unemployment rate (%)	8.75	2.46	8.50	2.45	8.54	2.46
Market competition	0.88	0.10	0.89	0.10	0.89	0.10
Hospital with hospices	1.45	2.98	1.65	3.13	1.62	3.11
Urban	1289	81.6	6627	79.3	7916	79.7
Rural	290	18.4	1725	20.8	2015	20.3
Northeast	120	7.7	882	10.8	1002	10.3
Midwest	429	27.4	1505	18.5	1934	19.9
South	767	49.0	4049	49.5	4816	49.5
West	250	16.0	1736	21.2	1986	20.4
Organizational Factors						
Size (number of patients)	1076.28	1452.87	400.63	600.98	508.17	837.01
Hospice age	18.97	8.80	13.31	7.33	14.21	7.86
Medicare payer mix (%)	90.25	6.81	92.04	7.52	91.76	7.44
Nursing skill mix (%)	84.48	14.53	84.12	17.76	84.18	17.29
Volunteer dependence	0.55	0.93	0.39	0.94	0.42	0.94
Accredited	417	26.4	2376	28.5	2793	28.1
Not Accredited	1164	73.6	5968	71.5	7132	71.9
Chain-affiliated	876	55.4	4535	54.3	5411	54.5
Stand-alone	705	44.6	3817	45.7	4522	45.5
Non-profit	772	48.8	1882	22.5	2654	26.7
For-profit	790	50.0	6401	76.7	7191	72.4
Government	19	1.2	66	0.8	85	0.9

Table 3. Summary of Financial Performance, Average Length of Stay, and Inpatient Facilities in each year (N=9,933)

Variables	2009		2010		2011		2012		2013		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Financial Performance												
TM	0.06	0.17	0.08	0.16	0.07	0.17	0.08	0.17	0.06	0.17	0.07	0.17
ROA	0.18	0.45	0.19	0.45	0.19	0.45	0.21	0.44	0.18	0.45	0.19	0.45
ALOS	75.51	31.12	77.39	38.96	84.48	169.95	81.39	207.82	75.74	37.34	78.89	123.70
Inpatient Facilities	N	%	N	%	N	%	N	%	N	%	N	%
Yes	279	14.9	315	16.6	336	17.2	333	16.4	318	14.6	1581	15.9
No	1594	85.1	1585	83.4	1614	82.8	1702	83.6	1857	85.4	8352	84.1
Total (N)	1873		1900		1950		2035		2175		9933	

Table 4. Hospice mixed effects analysis between inpatient facilities, average length of stay (LOS), and financial performance

Variables	Model 1 (LOS)		Model 2 (TM)		Model 2 (ROA)		Model 3 (TM)		Model 3 (ROA)	
	β	se	β	se	β	se	β	se	β	se
Independent Variable										
Inpatient Services	-0.050***	0.014	-0.028***	0.006	-0.059***	0.016	-0.024***	0.006	-0.050***	0.016
Mediator										
Ln_LOS							0.077***	0.004	0.177***	0.012
Control Variables										
Ln_Per capita income	-0.079**	0.037	-0.062***	0.015	-0.109***	0.040	-0.056***	0.015	-0.093**	0.039
Proportion of adults 65+ (%)	0.002	0.002	0.000	0.001	0.001	0.002	0.000	0.001	0.000	0.002
Unemployment rate	0.000	0.003	-0.002	0.001	-0.005	0.003	-0.001	0.001	-0.005	0.003
Market competition	0.254***	0.060	-0.001	0.025	0.012	0.067	-0.021	0.025	-0.035	0.067
Hospital with hospices	-0.005**	0.002	0.000	0.001	0.006**	0.003	0.001	0.001	0.006**	0.003
Rural	Ref		Ref		Ref		Ref		Ref	
Urban	0.046**	0.020	-0.011	0.008	-0.044**	0.021	-0.014*	0.008	-0.052**	0.021
Northeast	Ref		Ref		Ref		Ref		Ref	
Midwest	0.078***	0.026	0.004	0.010	-0.020	0.027	-0.002	0.010	-0.034	0.027
South	0.135***	0.025	-0.004	0.010	-0.024	0.026	-0.015	0.010	-0.047*	0.026
West	0.045*	0.027	0.023**	0.011	0.020	0.028	0.020*	0.011	0.012	0.028
Ln_Size (number of patients)	-0.081***	0.005	0.033***	0.002	0.070***	0.006	0.039***	0.002	0.084***	0.006
Organization age	-0.001	0.001	-0.002***	0.000	-0.006***	0.001	-0.002***	0.000	-0.006***	0.001
Medicare payer mix (%)	0.004***	0.001	0.002***	0.000	0.004***	0.001	0.002***	0.000	0.003***	0.001
Nursing skill mix (%)	-0.001**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Volunteer dependence	-0.001	0.006	0.004*	0.003	-0.004	0.007	0.004*	0.002	-0.003	0.007
Not accredited	Ref		Ref		Ref		Ref		Ref	
Accredited	-0.021*	0.012	-0.005	0.005	0.031**	0.014	-0.003	0.005	0.035***	0.014
Stand-alone	Ref		Ref		Ref		Ref		Ref	
Chain-affiliated	-0.004	0.011	-0.011**	0.005	-0.049***	0.012	-0.010**	0.004	-0.047***	0.012

Non-profit	Ref		Ref		Ref		Ref		Ref	
For-profit	0.187***	0.017	0.025***	0.007	0.148***	0.019	0.010	0.007	0.113***	0.019
Government	0.177***	0.054	0.015	0.023	0.111*	0.061	0.003	0.022	0.084	0.061
Year 2009	Ref		Ref		Ref		Ref		Ref	
Year 2010	0.023**	0.010	0.022***	0.004	-0.003	0.012	0.021***	0.004	-0.007	0.012
Year 2011	0.032***	0.010	0.012***	0.004	-0.005	0.012	0.009**	0.004	-0.011	0.012
Year 2012	0.036***	0.011	0.020***	0.005	0.003	0.013	0.017***	0.005	-0.003	0.013
Year 2013	0.031***	0.012	0.002	0.005	-0.038***	0.014	-0.001	0.005	-0.043***	0.014

Note: ***p<0.01; **p<0.05; *p<0.10

LOS=Length of Stay; TM=Total Margin; ROA=Return on Assets

Figure 1. Conceptual Framework

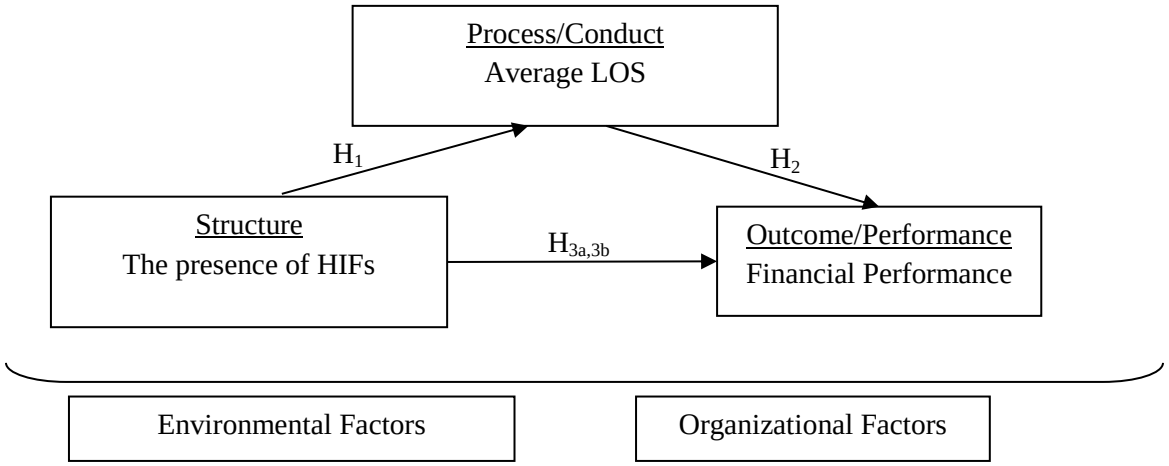


Figure 2. Sample selection process

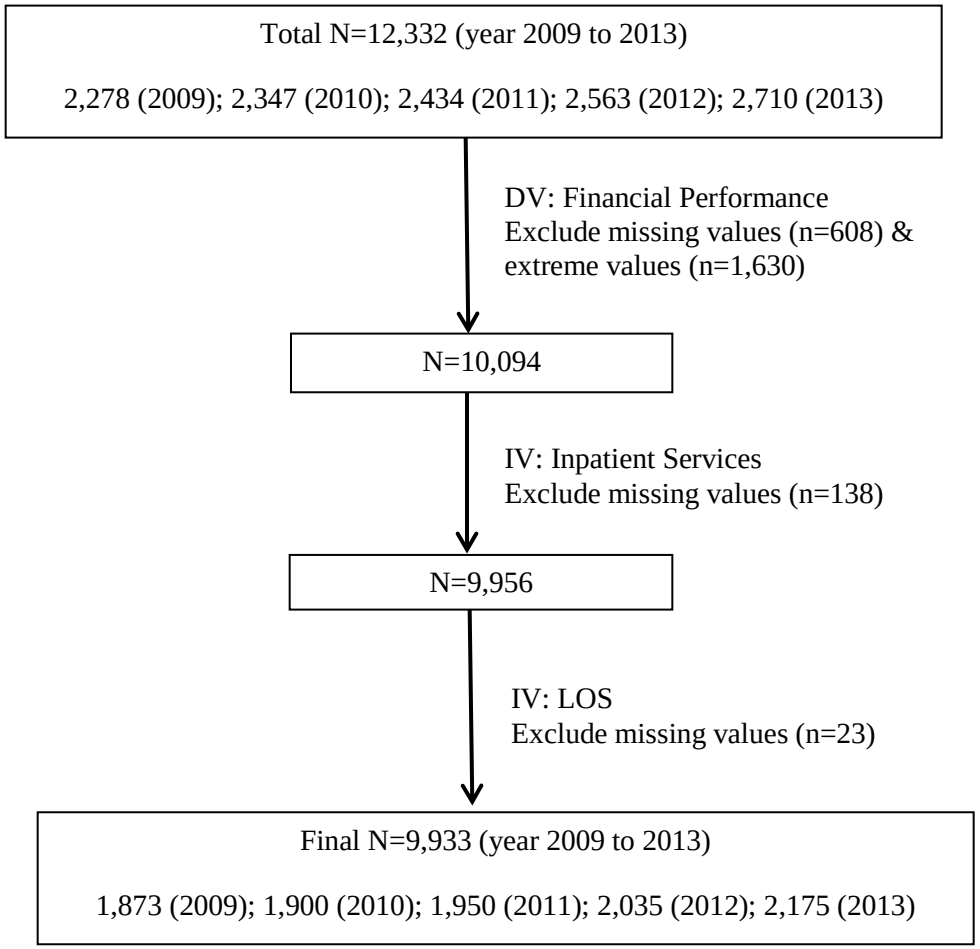
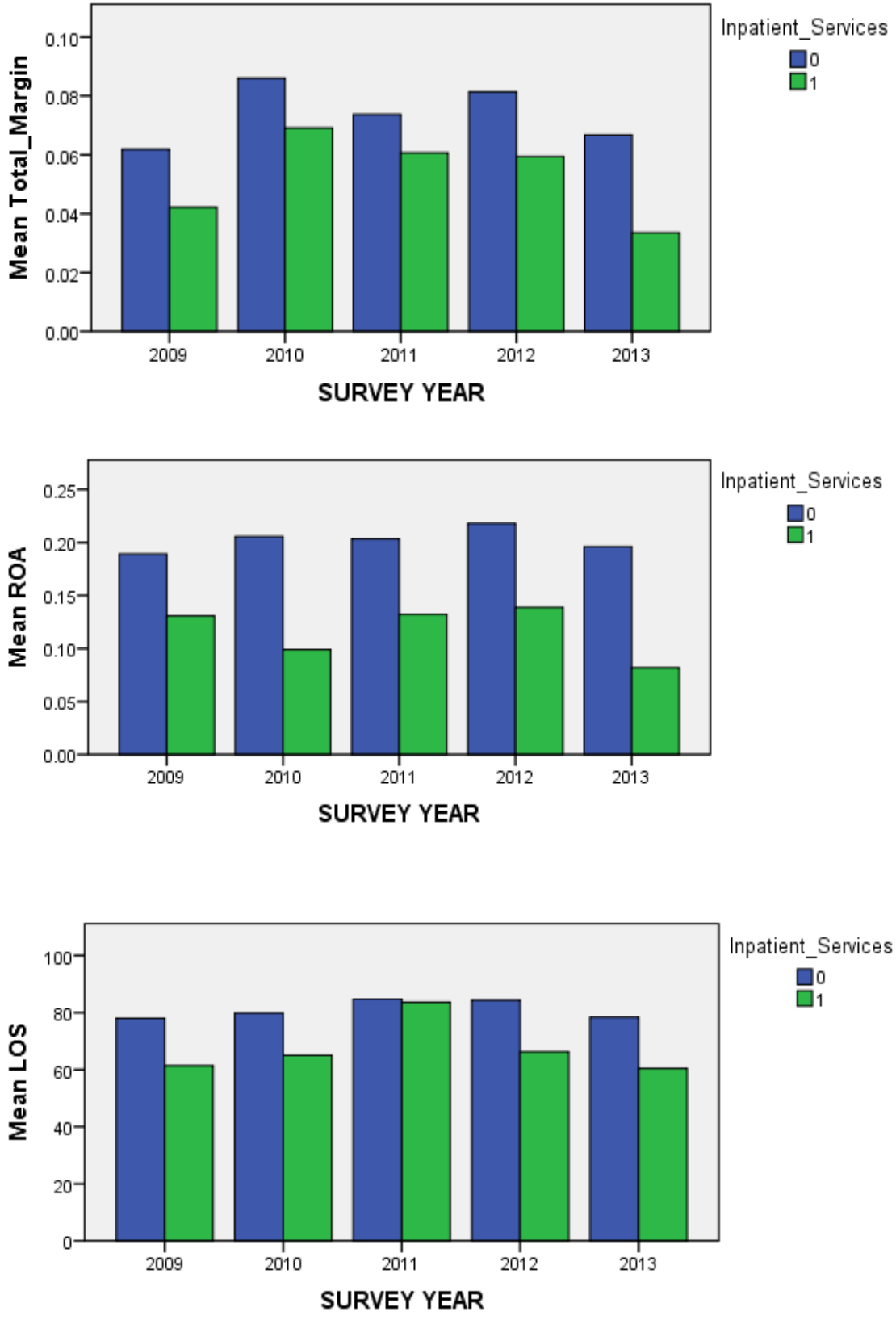


Figure 3. Time Trend of Financial Performance and Average LOS by Inpatient Services



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CHAPTER 5

CONCLUSIONS

Introduction

The purpose of this dissertation is to explore hospice performance in detail and to provide empirical support of the relationship among hospice market structure, inpatient services provision, and financial performance. As part of the Affordable Care Act (ACA), the Center for Medicare and Medicaid Services (CMS) introduced a hospice quality reporting program (HQRP) which requires hospices to provide quality reports to the public (CMS, 2014b, 2015a). Financial penalty (2% reduction in Medicare payment) applies to hospices that fail to report quality or comply with the quality reporting requirements for the previous calendar year (CMS, 2014c). In addition, Congress approved a tighter scrutiny of hospices recently: from one inspection in every 6 years to one in every 3 years (Whoriskey, 2014a). Under pressures from social norms and policy, market environment, and funding opportunities, the performance of hospices became more important. The purpose of the systematic review in this dissertation is to summarize hospice performance and to identify the literature gaps in conducting hospice performance research. Hospices adopted several quality improvement (QI) strategies to survive, to gain competitive advantage, and to differentiate themselves from other competitors (CMS, 2015a; IOM, 2014). Providing inpatient services is one of the strategies to improve quality of hospice care and to better serve end-of-life patients' complex health care needs. Based on the findings of the systematic review, the second and third paper examine the antecedents and consequences of hospice inpatient services provision. The findings of each paper are outlined in the following paragraphs:

Paper 1 (Chapter 2): Systematic Review of the Hospice Performance Literature

The purpose of paper 1 is to summarize hospice performance based on two research frameworks (Bain, 1959; Avedis Donabedian, 1966a) and to identify the literature gaps in conducting hospice performance research. The systematic review of hospice performance literature found that hospice organizational factors, market environment, and patient characteristics were related to hospice strategic conduct and performance. Specifically, hospice innovative practices (measured by special services use and percentage of private pay patients) and volunteer usages were associated with better organizational quality performance and patient/family satisfaction. The summarization of factors that may influence hospice performance provides insight to different stakeholders. When conducting hospice quality related studies, researchers need to take these factors into account because they have influence on hospice strategic conduct and performance. For policy makers, special attention is needed on hospices that are low quality performers in order to understand what they did to compromise quality and how it will impact patients and their caregivers. The results of this review give patients and their caregivers evidence about factors to consider when choosing a hospice with better performance.

The systematic review identified gaps in the hospice performance literature that present opportunities for future research. First, there is lack of theory support and research framework use in hospice performance literature; only five out of 36 (13.89%) studies were based on management theory or research framework. Secondly, the majority of the literature considered the impact of hospice organizational characteristics, while only a few studies included patient and market factors. More studies are in need to

include the impact of market and patient factors in hospice performance studies. Last but not the least, more hospice studies focused on structure-performance, conduct-performance, and structure-conduct-performance are in need. Among the 44 research foci identified in the hospice performance literature, the majority of hospice performance research (29 studies) examined the relationship between structure and conduct, while 12 studies were focused on structure and performance and 3 studies were focused on conduct and performance. No studies have examined the three aspects (structure-conduct-performance) together.

Paper 2 (Chapter 3): Factors Associated with the Provision of Inpatient Care in Hospices

As we mentioned earlier in the findings of hospice performance literature review, more studies are in need to examine market factors in hospice performance studies. Paper 2 contributes to the hospice performance literature by considering the impact of both the market and organizational factors on hospice strategic conduct (the provision of hospice inpatient services). In addition, due to the lack of theory support in hospice performance literature, this study is based on resource dependence theory (RDT).

The main findings of this study suggest that market munificence measured by urban location and percentage of 65+ older adults were related to the provision of hospice inpatient services. Hospices located in the Midwest and South regions were more likely to provide inpatient services. A hospices' decision to offer inpatient services depended on the demand in the market. Organizational factors such as hospice chain-affiliation, age,

and ownership were also associated with hospices' probability in offering inpatient services. Due to the data limitation, this study only considered market and organizational factors. As more data becomes available, future research could include patient-level data to make sure patient factors (e.g., patient diagnosis) were also considered.

Paper 3 (Chapter 4): Hospice Inpatient Services Provision, Utilization, and Financial Performance

Gaps have found in paper 1 that no studies have examined the three aspects (structure-conduct-performance) together. This study examines the relationship between hospice inpatient services provision (structure), length of stay (conduct), and financial performance (performance).

The provision of inpatient services could better satisfy hospice patients' complex health care needs and improve the quality of care (Whoriskey & Keating, 2014c). This study found that the presence of hospice inpatient services was negatively associated with average LOS, total margin, and return on assets. There was a positive relationship between hospice LOS and financial performance. Hospice average LOS partially mediated the relationship between inpatient services provision and financial performance. We also found that many hospices chose to contract with other health care providers (e.g., hospitals, nursing homes) to offer inpatient services. Future studies could explore what other strategies (e.g., outsourcing) hospices may adopt to reduce costs while ensuring the provision of necessary services to patients and the impact of those strategies.

Conclusion

When facing pressures from social norms and policy change, market environment, and funding opportunities, the performance of hospices becomes more important. This dissertation examined the strategy of hospice inpatient services provision and found that market and organizational factors were associated with hospice inpatient services provision. However, offering inpatient services were not associated with better financial performance. More studies are in need to identify strategies that hospices use to improve quality and financial performance and their impact on patient/family evaluation of hospice care.

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APPENDIX

IRB Approval

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM
Institutional Review Board for Human Use

DATE: August 22, 2014

MEMORANDUM

TO: Mengying He
Principal Investigator

FROM: Cari Oliver
Assistant Director
Institutional Review Board for Human Use (IRB)

RE: Request for Determination—Human Subjects Research
IRB Protocol #N140811002 – Hospice Innovation and Performance: Organizational and Market Correlates

A member of the Office of the IRB has reviewed your Application for Not Human Subjects Research Designation for above referenced proposal.

The reviewer has determined that this proposal is **not** subject to FDA regulations and is **not** Human Subjects Research. Note that any changes to the project should be resubmitted to the Office of the IRB for determination.

470 Administration Building
701 20th Street South
205.934.3789
Fax 205.934.1301
irb@uab.edu

The University of
Alabama at Birmingham
Mailing Address:
AB 470
1720 2ND AVE S
BIRMINGHAM AL 35294-0104

Project Revision/Amendment Form

Form version: June 26, 2012

In MS Word, click in the white boxes and type your text; double-click checkboxes to check/uncheck.

- **Federal regulations require IRB approval before implementing proposed changes. See Section 14 of the IRB Guidebook for Investigators for additional information.**
- **Change means any change, in content or form, to the protocol, consent form, or any supportive materials (such as the Investigator's Brochure, questionnaires, surveys, advertisements, etc.). See Item 4 for more examples.**

1. Today's Date	9/9/2015	14934

2. Principal Investigator (PI)

Name (with degree)	Mengying He	**Blazer ID**	merryhe
Department	Health Services Administration	**Division (if applicable)**	
Office Address	547 SHPB 1720 2nd Ave S	**Office Phone**	(205) 223-4765
E-mail	merryhe@uab.edu	**Fax Number**	(205) 975-6608

Contact person who should receive copies of IRB correspondence (Optional)

Name	Stephen J. O'Connor	**E-Mail**	sjo@uab.edu
Phone	(205) 934-1735	**Fax Number**	(205) 975-6608
Office Address (if different from PI)	557 SHBP 1720 2nd Ave S		

3. UAB IRB Protocol Identification

3.a. Protocol Number	#N140811002
3.b. Protocol Title	Hospice Innovation and Performance: Organizational and Market Correlates

3.c. Current Status of Protocol—Check ONE box at left; provide numbers and dates where applicable

- ☒ **Study has not yet begun** — **No participants, data, or specimens have been entered.**
- ☐ **In progress, open to accrual** — **Number of participants, data, or specimens entered:**
- ☐ **Enrollment temporarily suspended by sponsor**
- ☐ **Closed to accrual, but procedures continue as defined in the protocol (therapy, intervention, follow-up visits, etc.)**
  - **Date closed:**
  - **Number of participants receiving interventions:**
  - **Number of participants in long-term follow-up only:**
- ☐ **Closed to accrual, and only data analysis continues**
  - **Date closed:**
  - **Total number of participants entered:**

4. Types of Change

Check all types of change that apply, and describe the changes in Item 5.c. or 5.d. as applicable. To help avoid delay in IRB review, please ensure that you provide the required materials and/or information for each type of change checked.

- ☒ **Protocol revision (change in the IRB-approved protocol)**
  In Item 5.c., if applicable, provide sponsor's protocol version number, amendment number, update number, etc.
- ☐ **Protocol amendment (addition to the IRB-approved protocol)**
  In Item 5.c., if applicable, provide funding application document from sponsor, as well as sponsor's protocol version number, amendment number, update number, etc.
- ☐ **Add or remove personnel**
  In Item 5.c., include name, title/degree, department/division, institutional affiliation, and role(s) in research, and address whether new personnel have any conflict of interest. See "Change in Principal Investigator" in the IRB Guidebook if the principal investigator is being changed.
  - ☐ **Add graduate student(s) or postdoctoral fellow(s) working toward thesis, dissertation, or publication**
    In Item 5.c., (a) identify these individuals by name; (b) provide the working title of the thesis, dissertation, or publication; and (c) indicate whether or not the student's analysis differs in any way from the purpose of the research described in the IRB-approved HSP (e.g., a secondary analysis of data obtained under this HSP).
- ☐ **Change in source of funding; change or add funding**
  In Item 5.c., describe the change or addition in detail, include the applicable OSP proposal number(s), and provide a copy of the application as funded (or as submitted to the sponsor if pending). Note that some changes in funding may require a new IRB application.
- ☐ **Add or remove performance sites**
  In Item 5.c., identify the site and location, and describe the research-related procedures performed there. If adding site(s), attach notification of permission or IRB approval to perform research there. Also include copy of subcontract, if applicable. If this protocol includes acting as the Coordinating Center for a study, attach IRB approval from any non-UAB site added.

☐ **Add or change a genetic component or storage of samples and/or data component—this could include data submissions for Genome-Wide Association Studies (GWAS)**
To assist you in revising or preparing your submission, please see the IRB Guidebook for Investigators or call the IRB office at 934-3789.

☐ **Suspend, re-open, or permanently close protocol to accrual of individuals, data, or samples (IRB approval to remain active)**
In Item 5.c., indicate the action, provide applicable dates and reasons for action; attach supporting documentation.

☐ **Report being forwarded to IRB (e.g., DSMB, sponsor or other monitor)**
In Item 5.c., include date and source of report, summarize findings, and indicate any recommendations.

☐ **Revise or amend consent, assent form(s)**
Complete Item 5.d.

☐ **Addendum (new) consent form**
Complete Item 5.d.

☐ **Add or revise recruitment materials**
Complete Item 5.d.

☐ **Other (e.g., investigator brochure)**
Indicate the type of change in the space below, and provide details in Item 5.c. or 5.d. as applicable.
Include a copy of all affected documents, with revisions highlighted as applicable.

▶

5. Description and Rationale

In Item 5.a. and 5.b, check Yes **or** No **and see instructions for** Yes **responses.**
In Item 5.c. and 5.d, describe—and explain the reason for—the change(s) noted in Item 4.

☐Yes ☐No **5.a. Are any of the participants enrolled as normal, healthy controls?**
If yes, describe in detail in Item 5.c. how this change will affect those participants.

☐Yes ☐No **5.b. Does the change affect subject participation, such as procedures, risks, costs, location of services, etc.?**
If yes, FAP-designated units complete a FAP submission and send to fap@uab.edu. Identify the FAP-designated unit in Item 5.c.
For more details on the UAB FAP, see www.uab.edu/cto.

5.c. Protocol Changes: In the space below, briefly describe—and explain the reason for—all change(s) to the protocol.

▶ There will be two changes to the IRB protocol:

1) The change of the protocol title: from "Hospice Innovation and Performance: Organizational and Market Correlates" to "Hospice Performance: Environmental and Organizational Correlates". Because the dissertation tile is "Hospice Performance: Environmental and Organizational Correlates", I want to make sure the IRB protocol title is the same as dissertation title.
2) The new protocol will involve the usage of three publicly available data sets instead of the previously two data sources. The new data will provide more sample size than the old data sources and it is a national level data while the old the date source contains only California hospices' information.
   a. Area Health Resource File (AHRF): Data is publicly available for free through HRSA website.
      Information about AHRF data: http://ahrf.hrsa.gov/overview.htm
      Data source: http://ahrf.hrsa.gov/download.htm
   b. Medicare Provider of Service (POS): Data is publicly available for free through CMS.gov.
      Information about POS file: https://www.cms.gov/Research-Statistics-Data-and-Systems/Files-for-Order/NonIdentifiableDataFiles/ProviderofServicesFile.html
      Data source: https://www.cms.gov/Research-Statistics-Data-and-Systems/Downloadable-Public-Use-Files/Provider-of-Services/index.html
   c. CMS Medicare Hospice Cost Report Data: Data is publicly available for free through CMS.gov.
      Information about Medicare Hospice Cost Report: https://www.cms.gov/Research-Statistics-Data-and-Systems/Downloadable-Public-Use-Files/Cost-Reports/?redirect=/costreports
      Data Source: https://www.cms.gov/Research-Statistics-Data-and-Systems/Downloadable-Public-Use-Files/Cost-Reports/Hospice.html

5.d. Consent and Recruitment Changes: In the space below,
(a) describe all changes to IRB-approved forms or recruitment materials and the reasons for them;
(b) describe the reasons for the addition of any materials (e.g., addendum consent, recruitment); and
(c) indicate either how and when you will reconsent enrolled participants or why reconsenting is not necessary (not applicable for recruitment materials).

Also, indicate the number of forms changed or added. For new forms, provide 1 copy. For revised documents, provide 3 copies:
- **a copy of the currently approved document (showing the IRB approval stamp, if applicable)**
- **a revised copy highlighting all proposed changes with "tracked" changes**
- **a revised copy for the IRB approval stamp.**

▶

Signature of Principal Investigator Mengying He Date 9/11/2015

FOR IRB USE ONLY

☑ Received & Noted ☐ Approved Expedited* ☐ To Convened IRB

Signature (Chair, Vice-Chair, Designee) Date 10/8/15

DOLA —

Change to Expedited Category Y / N / (NA)

*No change to IRB's previous determination of approval criteria at 45 CFR 46.111 or 21 CFR 56.111