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Hospital Financial Performance: A Look at Governance and HIT Strategies

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HOSPITAL FINANCIAL PERFORMANCE: A LOOK AT GOVERNANCE AND HIT STRATEGIES

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ABSTRACT

Taken together, the purpose of the three papers included in this dissertation is to provide empirical evidence on the relationship between strategies employed by hospital managers and hospital financial performance. The findings of these studies are important to managers as they search for ways to sustain and improve hospital financial performance in light of environmental changes that have taken place over the last three decades. The results of this dissertation suggest that to improve financial performance hospital leaders (e.g. management, board of directors) should choose strategies that are more amenable to their control. Specifically, having BOD members that are independent from management is positively related to financial performance. Additionally, adopting an electronic health record (EHR) can improve financial performance for hospitals, but only through receiving incentive payments for meaningfully using them. Taken together, the findings of these studies will be beneficial to hospital leaders as they are making decisions about which strategies to pursue.

Keywords: financial performance, governance, electronic health record, EHR, BOD

DEDICATION

I dedicate this dissertation to my husband, Blake Collum, for his patience and constant source of love, concern, over the course of my research, and also for the countless sacrifices he made during my the final months of writing.

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CHAPTER 1

INTRODUCTION

Introduction

This purpose of this chapter is to provide an overview of the three papers included in this dissertation. The common theme of these papers is hospital financial performance, and each of them addresses a gap in the hospital financial performance literature. The chapter begins with a background section which presents a discussion on the importance of hospital financial performance and how external factors have shaped financial performance over the last two decades. Given the trends over that time period, several strategies have emerged that may help hospitals generate and sustain positive financial returns. Two of these strategies will be discussed in detail in the two sections following the background. These two strategies will be the primary focus of the empirical analyses in my dissertation. Finally, the chapter will conclude with an overview of each of the three papers that will be included in this dissertation.

Background

Sustainable financial returns are vital to a hospital's success. Because of this, hospital managers focus a large amount of their attention on ways to sustain and improve financial performance (Langabeer Ii, DelliFraine, & Helton, 2010). Surveys conducted by the American College of Healthcare Executives (ACHE) consistently suggest that

financial considerations are the top concern of hospital executives (ACHE, 2011). Throughout the last three decades, major initiatives in the healthcare industry have focused on ways to reduce overall healthcare costs, increase healthcare quality, or both (Committee on Quality of Health Care in America, 2001; Davis, June 2010; Gawande, June 2009; Langabeer Ii et al., 2010; Morrisey, 2008). In the 1980s and 1990s, these initiatives included the switch from a retrospective to a prospective payment system (PPS), the growth of Health Maintenance Organizations (HMOs), and the passage of the Balanced Budget Act of 1997 (Morrisey, 2008). More recently, the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 (Blumenthal, 2009, 2010a) and the Patient Protection and Affordable Care Act (PPACA) of 2010 (Harrington, 2010) were passed by congress and signed into law.

Despite these initiatives being potentially beneficial to third-party payers and healthcare consumers, some scholars have argued that they may have a negative impact on a hospital's financial performance (Langabeer Ii et al., 2010). Reducing healthcare costs and improving quality has previously been linked to less reimbursement/revenues from third-party payers and more spending which translates into decreased financial returns. Since most hospitals already operate on small margins, decreased financial returns could be detrimental. Unless managers and the board of directors are able to find new and innovative ways to organize and manage their hospitals, they may not be able to achieve sustainable financial returns necessary for continued operation. The following paragraphs will outline some of the major initiatives in the healthcare industry that have focused on ways to reduce overall healthcare costs, improve healthcare quality, or both

over the last three decades. A discussion on how these initiatives are related to hospital financial performance will also be included.

The increasing costs of healthcare in the late 1970s and early 1980s prompted the Medicare program and other third-party payers to find ways to incentivize providers (i.e. hospitals and physicians) to provide more cost-efficient care (Morrisey, 2008; Weiner, Maxwell, Sapolsky, Dunn, & Hsiao, 1987). As a response, major changes were made to the way providers were reimbursed for services. Until 1983, hospitals were reimbursed using a retrospective payment system. Under this system, they were reimbursed for all reasonable costs incurred in providing services to patients. Although this allowed hospitals to acquire the most advanced technology and expand services to a larger population, it provided no incentive for frugal or efficient use of the hospital's resources.

On October 1, 1983, the Medicare program began to implement a Prospective Payment System (PPS) to replace the retrospective payment system, and other third-party payers followed their lead. Using a PPS allowed them to reimburse providers for hospital services based on predetermined rates which were generally less than reimbursements under the retrospective system (Enthoven & Noll, 1984). The PPS most commonly chosen by third-party payers and the one mandated for the Medicare program was diagnosis-related groups (DRGs) (Thompson, Averill, & Fetter, 1979). The underlying purpose of the DRG system was to provide hospitals with an incentive to control costs. If hospitals are paid for their services based on set predetermined rates, they are forced to contain their cost or lose profit. This puts pressure on management to find ways to provide services in a more cost-efficient manner in order to sustain financial performance.

Another approach used by third-party payers to reduce costs was HMOs. Although HMOs had been in existence since 1929 when a doctor in Oklahoma started a rural farmers' cooperative health plan, they did not gain in popularity until the late 1970s after President Nixon passed the HMO Act of 1973 (Markovich, 2003; Morrisey, 2008; Tufts Managed Care Institute, 1998). This law authorized funds to help with the development of HMOs, prevented states from making laws that banned HMOs, and required certain employers to offer a federally qualified HMO. HMOs continued to gain in popularity from the time the HMO Act of 1973 was passed until the early 1990s when the "HMO Backlash" occurred. At the time the backlash occurred, patients and doctors were both dissatisfied with HMOs. Patients felt HMOs cared only about saving money, and as a result, patients were not receiving quality care. For example, patients complained that they were unable to see a specialist without first being referred by their primary care physician. They also complained that physicians did not spend enough time with each patient. Physicians were also dissatisfied with HMOs. They felt the restrictions HMOs had placed on them limited the care they could provide to their patients. Also, physicians who participated in HMOs were experiencing lower incomes. HMOs addressed some of their policies that led to the backlash, and they began to expand again and reached their peak in 1999 with 89 million members.

HMOs are still used as a means to reduce costs and deliver quality at the same time (Morrisey, 2008). To be part of an HMO, hospitals must agree to accept a reduced payment for their services. Accepting reduced payments means less revenues and potentially less profit for hospitals.

Despite the federal government and other third-party payers' efforts to reduce costs in the 1970s and 1980s, healthcare costs continued to rise throughout the 1990s and 2000s (Davis, June 2010; Gawande, June 2009). In 1997, the federal government signed into law the Balanced Budget Act (Moon, Gage, & Evans, 1997; Morrisey, 2008). Although the primary focus of this law was to reduce overall federal spending, the Medicare program represented 73 percent of the total cuts presented. Because of these major cuts in funding, the Medicare program tightened payments to health care providers and health plans. Since a large portion of hospitals' revenues come from Medicare patients (Dunn, Koepke, & Pickens, 2009; Langabeer Ii et al., 2010), this change affected them significantly and meant lower potential revenues from the Medicare program and potentially lower overall financial returns.

More recently, the HITECH Act of 2009 was signed into law as part of the American Recovery and Reinvestment Act (ARRA) (Blumenthal, 2010a, 2010b; Blumenthal & Tavenner, 2010; Jha, 2010). The purpose of this law is to incentivize Medicare and Medicaid providers to adopt and "meaningfully use" Electronic Health Records (EHRs) and to promote widespread use of EHRs. In order for widespread EHR adoption to occur, providers must benefit from their investment. Currently, providers receive the least benefit from EHRs when compared to patients, insurance companies, and other stakeholders and sacrifice the most in terms of implementation costs (Miller, West, Brown, Sim, & Ganchoff, 2005; Schmitt & Wofford, 2002), loss of productivity, and ongoing maintenance costs (Miller et al., 2005).

To correct for this misalignment of incentives, financial incentives are built into the HITECH Act for providers that "meaningfully use" an EHR. These incentives were

created to offset some of the costs associated with EHR adoption (Blumenthal & Tavenner, 2010) and are made available through the Centers for Medicare and Medicaid Services (CMS). If hospitals implement an EHR and meet CMS's "meaningful use" criteria, they should be able to reap the financial benefits that some researchers have found to be associated with EHR use (Blumenthal & Tavenner, 2010; Hogan & Kissam, 2010; Jha, 2010). However, if providers do not adopt and "meaningfully use" an EHR by 2015, they will incur penalties in the form of reduced Medicare and Medicaid payments, and they will forgo incentives to assist with the costly implementation of EHRs. Since a large portion of most hospital's revenues are made up of Medicaid and Medicare reimbursements (Bachrach, Braslow, & Karl, 2012; Dunn et al., 2009; U.S. Department of Health & Human Services, 2013), hospital managers must find a way to adopt and "meaningfully use" an EHR so that they avoid decreased reimbursements and potentially lower financial returns.

In 2010, another effort was made to reduce costs, increase access, and improve the quality of healthcare. On March 23, 2010, President Barack Obama signed the PPACA, a comprehensive healthcare reform, into law (U.S. Department of Health & Human Services, 2013). Some of the major provisions of this law include an individual mandate which requires U.S. citizens to have health insurance coverage, employer requirements such as requiring employers with 50 or more employees to offer coverage, an expansion of Medicaid and the Children's Health Insurance Program (CHIP), the creation of health insurance exchanges where individuals and small business can purchased qualified insurance plans, and cost-containment initiatives such as reducing Medicaid and Medicare reimbursements to providers. Most of the cost-containment

initiatives presented in this law are related to quality. For example, hospitals will experience reduced Medicare payments for preventable readmissions and certain hospital-acquired infections. Although these initiatives will improve quality and reduce costs for the Medicare program, hospitals will experience a decline in their financial returns unless they are able to improve the quality of care they offer.

As third-party payers continue to implement regulations and policies that threaten to financially constrain hospitals, hospital managers must implement strategies in their organizations to competitively position themselves in their environments and help them to achieve optimal performance. Evidence from the healthcare management literature has suggested strategies such as hospital ownership (Gapenski, Bruce Vogel, & Langland-Orban, 1993; M. J. McCue, 1997; Shen, 2003; Shukla, Pestian, & Clement, 1997), governance (Goes & Zhan, 1995; Kane, Clark, & Rivenson, 2009; C. Molinari, Hendryx, & Goodstein, 1997), integration (Bazzoli, Chan, Shortell, & D'Aunno, 2000; Ginn & Lee, 2006; M. J. McCue, Clement, & Luke, 1999; B. B. Wang, Wan, Clement, & Begun, 2001), management strategy (Douglas & Ryman, 2003; Langabeer 2nd, 1998), and quality (J. A. Alexander, Weiner, & Griffith, 2006; Harkey & Vraciu, 1992b; E. C. Nelson et al., 1992) to help hospitals achieve these goals. Identification of the relationships between these strategies and financial performance suggests that financial performance is important to hospitals and is at least partially determined by the strategies in which hospitals pursue. Two particular strategies have been advocated as a means to improve financial performance; implementation of EHRs (Menachemi, Burkhardt, Shewchuk, Burke, & Brooks, 2006) and hospital governance board structuring (C. Molinari et al., 1997).

Implementation and Use of EHRs

The cost of healthcare in the US continues to rise while the quality of care for patients is not improving (Bowles & Simpson, December 2010; Committee on Quality of Health Care in America, 2001; Gawande, June 2009). Because of this phenomenon, providers have been experiencing increased pressure from third-party payers over the last three decades to reduce costs. Adjusting to these pressures is an overwhelming task for most hospitals, but the adjustment is necessary for them to stay competitive and financially viable.

One strategy hospitals have used to adjust to the pressures of reducing costs is the implementation and use of HIT (Bates et al., 1999; Bhattacherjee, Hikmet, Menachemi, Kayhan, & Brooks, 2006; Tierney, Miller, Overhage, & McDonald, 1993). In fact, hospitals began using HIT in the 1960s and 1970s when they used 16-mm films from International Business Machines (IBM) and Lockheed Corporation as a means to reduce paperwork and improve care (Barrett, 1975). Since then, the healthcare industry has become more complex and the need for technology has grown. In the 1990s, the Institute of Medicine (IOM) and the US Department of Health and Human Services predicted the rapid adoption and substantial benefits of computerized patient records (Dick & Steen, 1991). By 2005, some analysts projected more than $81 billion in savings plus substantial health benefits from the nationwide adoption of computerized health records (Hillestad et al., 2005). Most recently, the US Congress passed the HITECH Act of 2009 which represents the largest investment in HIT in the US history (Blumenthal, 2010b; Blumenthal & Tavenner, 2010). This Act provides funding to incentivize healthcare

providers to adopt and meaningfully use electronic health records and to promote widespread adoption of EHRs.

The need for HIT, specifically EHRs, is evident, and previous research suggests it is a valid strategy to reduce costs and improve revenues for providers (i.e. physicians and hospitals) (Ewing & Cusick, 2004; S. J. Wang et al., 2003). Specifically, the physician practice literature has linked EHRs to increased revenues and averted costs from multiple sources (Chaudhry et al., 2006; Menachemi & Collum, 2011). Examples of increased revenues include improved charge capture/decrease in billing errors, improved cash flow, and enhanced revenues (S. J. Wang et al., 2003). Averted costs are the result of efficiencies created by having patient information electronically available. Some of these include decreased utilization of medical tests because results of recent tests are electronically available (Chen et al., 2003; Tierney et al., 1993), reduced staff resources devoted to patient management (S. J. Wang et al., 2003), reduced costs relating to supplies needed to maintain paper files (Ewing & Cusick, 2004), decreased transcription costs (Agrawal, 2002), and decreased costs relating to chart pulls (S. J. Wang et al., 2003).

Although most research on EHRs presents evidence on the benefits that accrue to physicians or physician practices, a few articles address benefits experienced by hospitals. For example, a study on HIT in 41 Texas hospitals found that hospitals with more-advanced HIT had fewer complications, lower mortality, and lower costs than hospitals with less-advanced HIT (Amarasingham, Plantinga, Diener-West, Gaskin, & Powe, 2009). Another study which was conducted on Florida hospitals found a positive association between HIT utilization and overall hospital financial performance

(Menachemi et al., 2006). Additionally, a study conducted at one academic medical center that utilized components of an EHR found a 12.7% reduction in total costs per admission (Tierney et al., 1993). A different study at one academic medical center also found an association between the use of an EHR and a reduction in costs (Bates et al., 1999). Specifically, the Bates et al. study found a decrease in redundant tests saved the organization $35,000 per year. Although the evidence is limited for hospitals, it is believed that if able to implement an EHR and meet Medicare's "meaningful use" criteria, they will be able to reap the same financial benefits as seen in physician practices.

Structure of the Governing Board of Directors

Since the early 1980s, changes in the healthcare industry such as the implementation of a prospective payment system and the growth of HMOs have threatened to financially constrain hospitals. As a response, hospitals have undergone significant organizational changes such as vertical and horizontal integration of services, multihospital arrangements, and unrelated business ventures to help them sustain positive financial returns in an economically constrained environment (C. Molinari, Morlock, Alexander, & Lyles, 1993). Because the general organization of the hospital has changed, the structure of the governing board of directors (BOD) has also changed. Until the 1970s, BODs were comprised of members of the community, and their responsibility was to obtain needed resources for hospital operations (Pfeffer, 1972). However, in the 1970s, two court rulings made hospital BODs legally accountable for the fiscal management and quality of services delivered. After these rulings, the role of hospital

BODs began to expand and shift their focus to both operational and strategic decision making for the hospital.

In order to fulfill their responsibility for fiscal management, members of hospital BODs need to be accurately informed about hospital operations. One strategy hospitals have used since the late 1970s to meet their information needs is management involvement on the BOD (J. A. Alexander, Morlock, & Gifford, 1988). Specifically, there was an increase in CEOs serving on hospital BODs in the early to mid-1980s immediately after the courts ruled that BODs are responsible for fiscal management of hospitals (J. Alexander & Morlock, 1985; J. A. Alexander et al., 1988; J. A. Alexander, Weiner, & Bogue, 2001; Morlock, Alexander, & Hunter, 1985). Since then, CEOs and other management team members are more likely to be involved on the BOD and/or hold a voting position on the BOD than they were in the past (J. A. Alexander et al., 2001).

Although hospitals have used management participation on the BOD as a strategy to improve fiscal management of the hospital, the question still remains as to whether it is an effective one. Although there are no studies that examine the relationship between overall management involvement on the BOD and hospital financial performance, two previous studies have identified a link between CEO participation on the BOD and hospital financial performance (C. Molinari et al., 1997; C. Molinari et al., 1993). Specifically, one team of researchers examined the relationship between CEO-board relations and hospital financial performance in a cross-sectional study using 1985 data (C. Molinari et al., 1993). They operationalized CEO participation on the BOD as a CEO who has voting rights, and they found a positive and significant relationship between CEO participation on the BOD and hospital financial performance. In a similar

study, the same research team examined data from two times periods, 1985 and 1989, and found that CEO participation on the BOD is significantly related to improved hospital performance (C. Molinari et al., 1997). Because these two studies were conducted by the same research team on hospitals in only one state and using data that is more than three decades old, more rigorous studies are needed to determine if management involvement on the BOD will be related to financial performance in the same way.

Contents of This Dissertation

This dissertation consists of three distinct research papers each of which addresses gaps in the hospital financial performance literature. The first paper, described in more detail below, involves a quantitative systematic review and meta-analysis of the financial performance literature of the past two decades. After identifying articles that focus on hospital financial performance, key information was systematically extracted from each published study. The analysis of this information identified factors that are related to the financial performance of hospitals. Additionally, combining and contrasting the results of all the studies being reviewed identified patterns among study results, disagreements among those results, or other relationships that are only apparent through the meta-analysis of this body of literature. An additional important contribution of this first paper is the identification of research gaps in the hospital financial performance literature.

The second and third papers of this dissertation involve econometric empirical analysis of the relationships between hospital financial performance and specific strategies that hospitals may use to sustain or improve financial performance. These strategies include the use of an EHR and the structuring of a hospital's BOD.

The second paper focuses on EHR use as a strategy to improve hospital financial performance. Although studies have been conducted on EHRs and financial performance in the outpatient setting, there are only a few studies that examine the relationship between EHRs and financial performance in inpatient settings. Most of those studies examine the relationship between reduced costs or improved revenues and the use of EHRs (Amarasingham et al., 2009; Bates et al., 1999; Tierney et al., 1993; B. B. Wang, Wan, Burke, Bazzoli, & Lin, 2005) as opposed to overall financial performance of a hospital (captures both revenues and expenses) and the use of EHRs (Menachemi et al., 2006; Thouin, Hoffman, & Ford, 2008). Also, most of those studies used cross-sectional study designs which do not address selection bias thus limiting any causal inferences that may be drawn (Menachemi et al., 2006; Thouin et al., 2008; B. B. Wang et al., 2005). The current study provides stronger evidence by addressing selection bias through the use of a panel study design with hospital fixed effects. Additionally, because of limited data, studies conducted in the inpatient setting often focus on hospitals in one state (Amarasingham et al., 2009; Menachemi et al., 2006) or on one academic medical center (Bates et al., 1999; Tierney et al., 1993) which limits the generalizability of the study to other hospitals. The current study utilizes a nationally representative set of hospitals, so the results of the study can be generalized more broadly.

The third paper focuses on management involvement on the hospital BOD as a strategy to improve financial performance. Although there is no evidence on the relationship between overall management involvement on the BOD and hospital financial performance, previous studies have found that the CEO's (a single member of the top management team) involvement on the hospital BOD is significantly associated with

financial performance (C. Molinari et al., 1997; C. Molinari et al., 1993). However, only two studies have been conducted on that relationship and both of them focused on hospitals in only one state which limits their generalizability to other states. Moreover, both studies used data that is currently more than three decades old. Since hospitals are complex organizations that are constantly changing, this relationship should be examined using more current data. Thus, the third paper of this dissertation includes an analysis of the relationship between overall management involvement on the BOD and hospital financial performance. In our analyses, we used a nationally representative set of not-for-profit hospitals and current data. Also, given that only cross-sectional data on management involvement on hospital BODs is available, propensity scores were utilized in an effort to address some of the selection bias which is possible in a simple cross-sectional design.

Taken together, these three papers focus on hospital financial performance and strategies hospitals may use to sustain and improve their financial performance. As mentioned previously, it is important for hospitals to adopt new strategies to help them sustain positive financial returns in the complex and dynamic environment in which they operate. The following is a more in depth synopsis of each paper.

Paper 1: Factors That Influence Hospital Financial Performance: A Systematic Review and Meta-Analysis

Methods

The first paper in this dissertation is a quantitative systematic review and meta-analysis of factors associated with the financial performance of hospitals for the years 1992-2012. Using a defined inclusion criterion, we identified articles that are empirical,

peer-reviewed, written in the English language, and based on US hospitals. Using a code sheet developed for this project, we extracted information such as measurements of financial performance, findings of the study, independent variables of interest, and the study design (e.g., cross-sectional, longitudinal) from each article. By amassing such data, we were able to empirically model how these study characteristics are associated with hospital financial performance and identify gaps in the literature. We also combined and contrasted the results of all the studies being reviewed in order to identify patterns in the hospital financial performance literature that are only apparent through the analysis of multiple studies.

Contribution to Literature

Only one review article on the hospital financial performance literature has been published over the last two decades, and it was published in 2011 by Holt et al. and included articles from 1984 to 2010 (Holt, Clark, DelliFraine, & Brannon, 2011). Holt et al. used a qualitative and non-comprehensive approach to review the financial performance literature and organize the studies into five categories including ownership, governance, management strategy, integration, and quality. The current systematic review and meta-analysis builds on those authors' work by extracting information from each article included in the current review and classifying them into the categories identified by Holt et al. Doing so helped us empirically determine if there is a relationship between each category and hospital financial performance.

The current systematic review and meta-analysis addresses several limitations of the Holt et al. review (Holt et al., 2011). First, Holt et al. used a qualitative approach in

which they only provided summaries of the studies that were reviewed. In contrast, the current systematic review and meta-analysis used a quantitative approach that more comprehensively summarizes how individual study characteristics of included articles are related to hospital financial performance. Next, the previous authors used a limited search strategy to identify articles to review. Specifically, they used only three financial performance search terms: hospital financial performance, cash flow, and profitability; and as a result, many articles on hospital financial performance were left out of their analysis. Although they did not state how many articles they reviewed, they summarized only 46 articles in their tables for the 26 year time period they were reviewing. The article search for the current review included nine different financial performance search terms including the names of the most common financial ratios to ensure that all financial performance articles were included. The current study's search utilized a more comprehensive search strategy and identified 89 relevant articles. Therefore, the current review better identifies gaps in the financial performance literature.

Paper 2: Does EHR Use Improve Hospital Financial Performance? Evidence from Panel Data

Methods

In the second paper, we conducted a panel study with hospital fixed effects on the relationship between EHR use and hospital financial performance. We used the American Hospital Association's (AHA) Annual Survey Information Technology (IT) Supplement data for the fiscal years 2006 through 2009 and the Medicare Cost Reports for the fiscal years 2007 through 2011 to perform our analysis. Consistent with the approach use by Jha (2009) and colleagues, EHR use was measured using thirty-two

clinical functions (e.g. electronic documentation of medication lists, electronic laboratory reports, computerized entry for medications, etc.) of an EHR from the AHA IT supplement survey, and it was operationalized as a categorical variable with three levels: comprehensive EHR, basic EHR, and no EHR (Jha, 2010; Jha et al., 2009). The dependent variable is hospital financial performance and was measured with common financial performance measures that are expected to be sensitive to EHR adoption.

Contribution to Literature

Although the majority of studies examining the relationship between EHR use and financial performance have been conducted in the outpatient setting, a few studies have been conducted on this relationship in the inpatient setting. Of those few, only a couple examine the relationship between EHR use and overall hospital financial performance (Menachemi et al., 2006; Thouin et al., 2008). Other studies conducted in the inpatient setting examined the relationship between reduced costs or improved revenues and the use of EHRs (Amarasingham et al., 2009; Bates et al., 1999; Tierney et al., 1993; B. B. Wang et al., 2005) as opposed to the overall financial performance of a hospital and the use of EHRs. Most of the studies conducted in the inpatient setting, including the ones that examined overall hospital financial performance, used a cross-sectional study design which does not address selection bias thus limiting any causal inferences that may be drawn (Menachemi et al., 2006; Thouin et al., 2008; B. B. Wang et al., 2005). The current study provides stronger evidence by addressing selection bias through the use of a panel study design with hospital fixed effects. In most cases, the studies conducted in the inpatient setting were also limited to one hospital and many

times the hospital that was examined was an academic institution (Bates et al., 1999; Tierney et al., 1993). Additionally, the studies that were conducted on multiple institutions were usually limited to one state (Amarasingham et al., 2009; Menachemi et al., 2006). Both of these factors limit the generalizability of these studies to other hospitals. The current study utilized a nationally representative set of hospitals so that the results will be more generalizable to US hospitals.

Currently there is a lack of evidence on the relationship between the EHR use and overall hospital financial performance. Despite this lack of evidence, hospitals are still implementing and using EHRs. This is mainly due to the passage of the HITECH Act of 2009 (Blumenthal, 2010a, 2010b; Blumenthal & Tavenner, 2010). Since the HITECH Act provides funding for incentives over the next few years and then penalizes hospitals in the future if they do not "meaningfully use" an EHR, the number of hospitals implementing and using EHRs continues to increase even though there is no clear association between the "meaningful use" of EHRs and overall financial performance. The results of the current study provide clarity on that relationship and will be beneficial to hospital administrators and policy makers as our country moves forward under the HITECH Act of 2009.

Paper 3: Management Involvement on the Board of Directors and Hospital Financial Performance

Methods

The third paper in my dissertation utilizes propensity scores to examine the relationship between management involvement on the hospital BOD and hospital financial performance. The key independent variables, which measure managements'

involvement on the BOD, were derived from multiple survey items from the 2011 Hospital and Health System Governance Survey which focuses on not-for-profit hospitals. The dependent variable, financial performance, was measured with multiple financial ratios relevant to not-for-profit hospitals and extracted from Medicare cost reports for 2011.

Contribution to Literature

Although there is no evidence on the relationship between management involvement on the BOD and hospital financial performance, previous studies have found that the CEO's (a single member of the top management team) involvement on the hospital BOD is significantly associated with financial performance (C. Molinari et al., 1997; C. Molinari et al., 1993). However, only two studies have been conducted on that relationship and both of them focused on hospitals in only one state which limits their generalizability. Moreover, both studies used data that is more than 30 years old. Since hospitals are complex organizations that are constantly changing, this relationship should be examined using more current data. Thus, the third paper of this dissertation includes an analysis of the relationship between overall management involvement on the BOD and hospital financial performance. In our analyses, we used a nationally representative set of not-for-profit hospitals and current data. Also, given that only cross-sectional data on management involvement on hospital BODs is available, propensity scores were utilized in an effort to address some of the selection bias which is possible in a simple cross-sectional design.

Conclusion

Together these three papers contribute new findings to the field of healthcare financial management. Specifically, they provide information about gaps in the hospital financial performance literature and summarize what factors are most commonly related to hospital financial performance. Also, they provide evidence about how EHR use is related to hospital financial performance and how management involvement on the BOD is related to hospital financial performance.

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CHAPTER 2

FACTORS THAT INFLUENCE HOSPITAL FINANCIAL PERFORMANCE: A SYSTEMATIC REVIEW AND META-ANALYSIS

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CHAPTER 2

FACTORS THAT INFLUENCE HOSPITAL FINANCIAL PERFORMANCE: A SYSTEMATIC REVIEW AND META-ANALYSIS

Abstract

Objectives: To systematically review the hospital financial performance literature and conduct a meta-analysis to determine how various hospital strategies are related to financial performance in the literature.

Methods: We used a 3-step search process to identify all empirical articles that focused on hospital financial performance as the dependent variable. Then using a coding sheet, we extracted information from the included articles to use in our analyses. From the pooled data, we performed descriptive analyses and cross tabulations to identify gaps in the literature. Additionally, a logistic regression model was used to determine which strategies and other independent variables were more likely to be positively related to hospital financial performance.

Results: Most of the 89 included articles focused on management strategies (37.1%), ownership (18%), and integration (18%), and only a small proportion focused on governance (6.7%) and quality improvement strategies (5.6%). In pooled multivariate analyses, studies that focused on governance were 33.7% percentage points more likely to find a positive association with hospital financial performance while studies that focused on organizational (-31.8 percentage points) and market characteristics (-25.8

percentage points) were less likely to find a positive association. Studies that focused on academic medical centers were 45.9 percentage points more likely to find a positive relationship with financial performance, and articles that were authored by an academic (-37.0 percentage points) or published in a health related journal (-29.8 percentage points) were less likely to find a positive relationship.

Conclusions: Studies using independent variables that typically involve decision making by hospital leaders (e.g. governance, management strategies) were more likely to find a positive association with hospital financial performance than those that examined factors that are not under such leadership control (e.g. organizational characteristics and market characteristics). This emphasizes the important role that decision making by hospital leaders plays in hospital financial performance. Additionally, more rigorous studies on the relationship between governance or quality improvement strategies and hospital financial performance would be beneficial to policymakers and hospitals leaders especially in light of healthcare reform, other recent policy initiatives, and the intense focus on quality of care and cost containment in hospitals.

Introduction

Sustainable financial returns are vital to a hospital's success. Thus, hospital managers and boards of directors (BODs) focus a large amount of their attention on ways to sustain and improve financial performance (Langabeer Ii et al., 2010). Surveys of hospital managers consistently suggest that financial considerations are the top concern of hospital executives (ACHE, 2011). Additionally, hospitals' chief executive officers

(CEOs) and BODs report that financial performance is the dimension of performance that is reviewed most often by the hospital's BOD (Margolin, 2006).

Throughout the last two decades, major initiatives such as implementation of health information technology (HIT) (Blumenthal, 2009, 2010a) and "pay for performance" have focused on ways to reduce overall healthcare costs, increase healthcare quality, or both (Committee on Quality of Health Care in America, 2001; Davis, June 2010; Gawande, June 2009; Langabeer Ii et al., 2010). Despite these initiatives being potentially beneficial to third-party payers and healthcare consumers, some scholars have argued that they may have a negative impact on a hospital's financial performance (Langabeer Ii et al., 2010). Reducing healthcare costs and improving quality results in less reimbursement from third-party payers and increased spending which could lead to decreased financial returns for hospitals. Since 50% of hospitals operate on margins less than 2.3% and approximately 20% of hospitals have negative operating margins (American Hospital Association, 2012; HealthLeaders Media, 2012), any further decreased financial returns could be detrimental. Unless hospital leaders (e.g. managers and boards of directors) are able to find new and innovative ways to organize and manage their hospitals, they may not be able to achieve sustainable financial returns necessary for continued operation. As third-party payers continue to implement regulations and policies that threaten to financially constrain hospitals, hospitals must implement strategies to competitively position themselves in their environments and help them to achieve optimal performance.

Over the last two decades only one review article has examined the hospital financial performance literature. In that review, Holt et al. (2011) qualitatively

summarized articles and grouped them into five categories based upon each articles key independent variable. Those categories, which correspond to potential strategies that hospitals can pursue to improve financial performance, include: (1) hospital ownership, (2) governance, (3) integration, (4) management strategy, and (5) quality. To identify articles, Holt et al., (2011) utilized a limited number of search terms which resulted in identifying 46 articles in total. Yet unanswered by their literature review is how individual study's methodologies influence the findings that are reported, to what extent different studies have conflicting findings for a given type of strategy (or other independent variable) and its relationship to financial performance, and whether expanding the search strategy would yield additional articles that may change the overall conclusions reached.

The purpose of the current study is to systematically review the hospital financial performance literature and to conduct a meta-analysis to determine, quantitatively, how various hospital strategies are related to financial performance in the literature. Given the policy initiatives discussed above, we focus upon the last two decades and are interested in studies where financial performance is the dependent variable. Additionally, we utilize a comprehensive search strategy to identify potential articles of interest, and we adopt a widely used definition of financial performance as any profitability measure (measure that captures both revenues and expenses) (Irwin, Hoffman, & Lamont, 1998; Langland-Orban, Gapenski, & Vogel, 1996; Pink et al., 2005). As part of our meta-analysis, we comparatively examine independent variables extracted from the articles (e.g. governance, organizational characteristics, etc.) to determine which ones are more likely to be positively associated with hospital financial performance. We also examine other

study characteristics such as whether the study focused on a specialty hospital, whether it was extramurally funded, and author affiliation to determine whether or not such characteristics are related to positive findings reported in published studies. In addition, our approach identifies gaps in the literature by identifying hospital strategies and financial performance measures that have not yet been examined.

Methods

We used a 3-step search process (outlined in Figure 1) to perform our review of the hospital financial performance literature. In step 1, we identified relevant articles in the PubMed, ABI/Inform, and Business Source Premier databases. We conducted an abstract search for the following key terms, drawn from the definition described above, to identify articles that focused on hospital financial performance: "financial performance," "financial ratios," "operating margin," "total margin," "return on assets," "return on equity," "financial vulnerability," "financial distress," and "return on investment." These search terms included specific measures of performance that meet our definition of financial performance as well as terms broad enough to capture any article related to financial performance. Articles from all databases were included if they were published between January 1992 and July 2012 in a peer-reviewed journal, written in the English language, and focused on U.S. based hospitals.

Next, in step 2, we performed a review of each article title and abstract and eliminated articles that were not related to hospital financial performance, articles that used financial performance as the independent variable, and non-empirical articles such as commentaries, and letters to editors.

In the 3rd step, we used a "snowballing" technique to identify additional articles missed in the first two steps. Through this technique, we identified additional articles for possible inclusion by reviewing the citation lists of already included articles and repeating this process for every additional article that was subsequently included. We also reviewed the citation list of the only review article on hospital financial performance (Holt et al., 2011) and the citation lists of any subsequent articles that were found as a result.

Next, we systematically extracted information from all included articles by using a standard coding sheet developed specifically for this study (see Appendix A). Since authors sometimes use multiple dependent or independent variables in a given published article, we coded each individual relationship between independent and dependent variables within each article separately. From each study, we extracted information on study design (cross-sectional, longitudinal, or other), sample size, sample type (nationally representative, single state, multiple states, or other), author affiliation (business school, health/medicine school, or other), journal, and funding type if any. Because our focus is on different types of hospitals, we collected information on the type (general or specialized), location (rural, urban, or sample was not limited by a certain geographic location) and ownership (for-profit, non-profit, other, or sample was not limited by ownership) of hospitals included in each study. Since financial performance is often operationalized using several different measures, we collected information about specific measures used such as total margin, operating margin, return on assets, return on equity, cash flow margin, and return on investments. Additionally, we identified the key independent variables of interest in each study and determined whether findings indicated

there was a positive, negative, or some other type of relationship (e.g. nonlinear) with hospital financial performance. To build on the previous literature, we also classified each study, based on the given study's main independent variable, into one of eleven mutually exclusive independent variable categories including ownership, governance, management strategy, integration, quality, human resources, organizational characteristics, market characteristics, regulation/accreditation/policy, financial factors, and marketing (see Appendix B for a definition of each category). These categories were adapted from and add to the five categories (ownership, governance, management strategy, integration, and quality) used by Holt et al. (2011).

Descriptive statistical analyses were used to examine the distributions of each variable. We tabulated frequencies for variables of interest and cross-tabulated the variables measuring financial performance (e.g., operating margin, total margin) and the independent variables examined (e.g., governance, ownership, management strategy, etc.). Next, we examined the relationship between various study characteristics and whether the conclusions of the study suggested that there is a positive relationship between the independent variable of interest and the outcome variable used to measure hospital financial performance. Then, we developed a three-stage stepwise logistic regression model where the dependent variable was finding a positive relationship and the independent variables were those extracted from the included studies including study design, sample size, sample type, strategy examined, author affiliation, funding, hospital type, hospital ownership, hospital location, and measures used to operationalize financial performance. This technique allowed us to examine the relative stability of the association between predictor variables and hospital financial performance while

controlling for increasingly more covariates in the model. In Model 1, we included the main independent variables (e.g. management strategies, governance, quality) we extracted from the studies we reviewed. Then, in Model 2 we added study characteristics (e.g. study design, sample type, hospital ownership) and in Model 3, we added measures of financial performance that were examined in the studies we reviewed. Since odds ratios alone can be difficult and confusing to interpret, we calculated risk differences (i.e. marginal effects), which are widely used in the economics literature, to estimate the absolute change observed in financial performance given a change in a covariate (Tajeu, Sen, Allison, & Menachemi, 2011). Since some articles contribute several studies to our sample, we clustered studies, using the robust cluster command in STATA, to deal with the nested nature of the data.

Results

Article Search

In step 1 of our 3-step search process (outlined in Figure 1), our keyword search identified 603 articles that were related to hospital financial performance. In step 2, our title and abstract review found 74 of those 603 articles met our inclusion criteria. In step 3, we used two methods to ensure our search process was comprehensive. First, we reviewed the reference lists of the only review article on hospital financial performance (Holt et al., 2011) and found five articles that were relevant to our review but were not included in our original search. Subsequently, we reviewed the reference lists of those five articles and found no articles to be included. Second, we used a “snowballing”

technique through which we reviewed the citation lists of included articles until we reached a point of saturation. Through this process, we included 9 additional articles in our analysis. Then, we reviewed the citation lists of those 9 articles and found one additional article. We then reviewed the reference list of that article and found no additional articles to be included. Including the 15 articles that were subsequently identified, a total of 89 articles met our inclusion criteria. Because many included articles presented multiple analyses (e.g., multiple independent or dependent variables examined), we analyzed 495 analyses stemming from the 89 articles (see Appendix C).

Descriptive Analyses

The majority of articles in our review were published in health-related journals (84.3%) by academic authors (88.8%) who were affiliated with health schools (59.6%) (see Table 1). Additionally, most of the articles were derived from studies that were unfunded (68.5%). Furthermore, almost half of the articles used a national sample (47.2%), and nearly all of the articles focused on acute care hospitals (89.9%). We also found that a large proportion of articles focused on management strategies (37.1%) and used operating margin (49.4%) to measure financial performance.

To identify gaps in the hospital financial performance literature, we cross tabulated the independent variables examined and the financial performance measures used in each study (see Table 2). First, we found that cash flow margin (2.4%) was the least used measure of financial performance. Specifically, no studies have been conducted using cash flow margin as the financial performance measure when analyzing governance, organizational characteristics, or market characteristics. Next, although total

margin was used as the financial performance measure when analyzing 8 out of the 11 independent variable categories, it was not used in any analyses on governance. Finally, operating margin was used as the financial performance measure when analyzing all of the independent variable categories except human resource strategies.

Bi-variate Analyses

When compared to all other studies, those examining ownership (58.8% vs. 36.9%, $p < 0.016$), governance (63.6% vs. 37.2%, $p < 0.023$), or management strategies (48.6% vs. 34.4%, $p < 0.004$) were more likely to find a positive relationship with hospital financial performance (see Table 3). On the other hand, those examining organizational characteristics (22.4% vs. 44.9%, $p<0.001$) and market characteristics (21.2% vs. 39.6%, $p < 0.041$) were less likely to find a positive result. Additionally, studies using total margin (53.8% vs. 36.0%, $p < 0.009$) as the financial performance measure were more likely to find a positive result, and those using return on assets (30.7% vs. 41.3%, $p < 0.030$) were less likely to find a positive result when compared to all other studies.

Furthermore in bivariate analyses, studies published in health-related journals (36.3% vs. 57.1%, $p < 0.005$), authored by an academic (37.3% vs. 57.7%, $p < 0.060$), or had an author who was affiliated with a health school (31.6% vs. 60.5% and 45.9%, $p < 0.001$) were less likely to find a positive relationship with hospital financial performance (see Table 3). Lastly, studies that used national samples (43.3% vs. 36.4%, 34.8%, and 17.6%, $p < 0.078$) or focused on academic medical centers (80.0% vs. 38.0%, $p < 0.074$) were more likely to find a positive result.

Multivariate Analyses

Our multivariate analyses included three models in which we used a logistic regression to analyze how study characteristics are related to finding a positive relationship with hospital financial performance. In Model 1, our most parsimonious model, we included the 11 independent variable categories that were examined in the hospital financial performance literature (see Table 4). We found that organizational characteristics (OR = 0.22; 95% CI: 0.07, 0.71; risk difference, -30.8%) and market characteristics (OR = 0.21; 95% CI: 0.07, 0.66; risk difference, -27.8%) were 30.8 and 27.8 percentage points, respectively, less likely to find a positive relationship with hospital financial performance when compared to studies that focused on other categories. The results for those two categories (i.e. organizational characteristics and market characteristics) remained consistent for all three models.

When we added study characteristics such as type of journal, sample size, and study design in Model 2, studies that focused on human resources strategies (OR = 0.14; 95% CI: 0.02, 1.24; risk difference, -29.7) were 29.7 percentage points less likely to find a positive relationship with hospital financial performance and studies examining governance (OR = 4.09; 95% CI: 0.99, 16.92; risk difference, +33.7) were 33.7 percentage points more likely to find a positive relationship. Additionally, studies that were published in a health related journal (OR = 0.29; 95% CI: 0.10, 0.89; risk difference, -29.8), authored by an academic (OR = 0.21; 95% CI: 0.05, 0.90; risk difference, -37.0), or funded (OR = 0.37; 95% CI: 0.12, 1.16; risk difference, -20.9) were less likely to find a positive relationship with hospital financial performance.

Furthermore, studies that focused on academic medical centers (OR = 8.11; 95% CI: 0.85, 77.42; risk difference, +45.9) were more likely to find a positive relationship.

When we added financial performance measures in Model 3, our results were consistent with Model 2 except the human resources strategy was no longer significant. None of the financial performance measures added to the model differed from their counterparts with respect to finding a positive relationship with hospital financial performance.

Discussion

The main finding of our literature review and meta-analysis is that studies focusing on independent variables that typically involve decision making by hospital leaders (e.g. governance, management strategies) were more likely to find a positive association with hospital financial performance than those that examined factors that are not under such leadership control (e.g. organizational characteristics and market characteristics). This finding emphasizes the important role that leadership decision making plays in hospital financial performance. For example, two studies on management involvement on the board of directors found that Chief Executive Officer involvement on the board of directors is associated with improved hospital financial performance (C. Molinari et al., 1997; C. Molinari et al., 1993). Additionally, Langabeer (1998) found that pricing strategy was the single most significant competitive strategy for improving performance for teaching hospitals operating in turbulent and dynamic markets (Langabeer 2nd, 1998). Importantly, we found that, in most cases, factors that are under leadership direction (e.g., governance and management strategies), as opposed

to factors not easily amenable to leadership intervention (e.g., organizational characteristics, market dynamics), were linked to finding a positive relationship with financial performance among published studies even after controlling for a wide range of factors including sample size, study type, and facility type.

The finding that decision making by hospital leaders may be more likely related to hospital financial performance adds to the ongoing debate about whether management decision making matters in organizations (Andersen & Jonsson, 2006; Harris & Ruefli, 2000; Pertusa-Ortega, Molina-Azorin, & Claver-Cortes, 2010). On the one hand, organizational theories including population ecology argue that organizations, given their structures and strategies, are either well-adapted or not to their market conditions (Hannan & Freeman, 1977). This implies that managerial decision making plays only a minor role in organizational performance over the long haul. On the other hand, strategic management theory argue that in order to survive and do well, organizations must align themselves with their environments through various manager-directed strategies (Hoskisson, Hitt, Wan, & Yiu, 1999). Given the collective findings of the published articles we meta-analyzed, there is some evidence to support the strategic management theoretical view point.

Overall, we found that the most common financial performance measures used in the hospital literature were operating margin, return on assets, and total margin. Nevertheless, we found that regardless of financial performance measure used, no measure was more systematically related to finding a positive result. We speculate that this may be due to one of two reasons. First, it is possible that authors consciously decide to employ outcome measures they believe to be the most amenable to the topic being

studied. Second, given that all of the profitability measures are essentially measuring different aspects of the same construct, it is possible that the choice of outcome measure in such studies does not impact the conclusions drawn.

Our review of the hospital financial performance literature identified several gaps that present opportunities for future research. For example, only six articles have been published on the relationship between hospital financial performance and governance (Culica & Prezio, 2009; C. Molinari, Alexander, Morlock, & Lyles, 1995; C. Molinari et al., 1997; Carol Molinari, Morlock, Alexander, & Lyles, 1992; C. Molinari et al., 1993; Young, Beekun, & Ginn, 1992) and many of these studies are several decades old and used mostly cross-sectional data that did not address potential selection bias or unobserved differences in groups. Additionally, researchers have used only two of the examined measures (e.g. operating margin and return on assets) of financial performance when examining its relationship with governance. Since the boards of directors assist hospitals in all areas of decision making (i.e. operating and non-operating), it is especially interesting that no studies examined the relationship between total margin and governance. Hospitals' BODs have a fiduciary responsibility to assure their hospitals are adjusting to the complex demands of regulation and market forces (J. A. Alexander et al., 2001). Given the expected changes associated with healthcare reform and other recent policy initiatives, decision makers would benefit from more recent and more rigorous studies in this area.

Another gap in the literature that we identified involves the impact of quality improvement strategies on hospital financial performance. Our study identified five such studies (Harkey & Vraciu, 1992a; M. McCue, Mark, & Harless, 2003; Eugene C. Nelson

et al., 1992; Smythe, Koerber, Fitzgerald, & Mattson, 2008; Velez-Gonzalez, Pradhan, & Weech-Maldonado, 2011), two of which are based on patient's perception of care rather than an objective measure of quality (Harkey & Vraciu, 1992a; Eugene C. Nelson et al., 1992). Additionally, three (Harkey & Vraciu, 1992a; Eugene C. Nelson et al., 1992; Smythe et al., 2008) of the five studies were based on cross-sectional data and only one study utilized a national sample (Velez-Gonzalez et al., 2011). With the intense contemporary focus on quality of care in hospitals, more research in this area, that can overcome the limitations of existing studies, would benefit policymakers and hospital leaders.

It is important to note that certain study characteristics were significantly associated with published articles reporting a positive relationship between whatever factor examined and hospital financial performance. For example, studies focusing upon academic medical centers were more likely to find a positive association with financial performance. Given the unique complex structures and characteristics of academic medical centers, results from studies on this organization-type may not be generalizable to other types of hospitals.

Next, we found that studies that were first-authored by an individual based at a university were less likely to find a positive relationship with financial performance than authors employed in other settings (e.g., industry, professional association). A previous literature review, that examined the relationship between community parks and their impact on physical activity, found that university-based authors were less likely to find a beneficial relationship (O. Ferdinand, Sen, Rahurkar, Engler, & Menachemi, 2012). Those authors suggested that a university-based author may be a proxy for a more

rigorous study. Lastly, we found that among the articles we reviewed, those published in health related peer-reviewed journals (as opposed to generic business peer-reviewed journals) were less likely to report a positive relationship with financial performance. It is not clear why this trend exists and future research is needed to better understand this relationship.

While the current study provides useful information about the hospital financial performance literature, there are limitations worth mentioning. First, we recognize some articles that should have been included in our search may have been missed given our approach. To minimize this risk, we conducted a thorough search using comprehensive search terms and snowballing procedures to make sure we included all articles from the hospital financial performance literature that met our inclusion criteria. Additionally, when extracting information from the articles we focused on the abstract and only extracted information from other sections of the article when the abstract was not clear or did not present the information we sought. We recognize some information may have been missed through that approach. Also, human judgment was used during the coding process which could have led to some errors in coding the information we extracted from the articles. We tried to minimize the impact of this process by having two authors discuss and reach a consensus anytime ambiguity was encountered.

Conclusion

As hospitals continue to face financially constraining changes in their environments, such as recent healthcare reform and quality improvement initiatives, it is important for hospital leaders to choose strategies that will improve hospital financial

performance. Research suggests, that in order for hospitals to be financially viable, hospital leaders should choose strategies that align their organization with its environment (Harris & Ruefli, 2000; Hoskisson et al., 1999). Evidence from the current study suggests that decision making by hospital leaders does make a difference in hospital financial performance. Additionally, more rigorous studies especially in the areas of governance and quality improvement strategies will be beneficial to hospital leaders as they continue to understand how strategies affect hospital financial performance.

Figure 1. Steps to identify articles for the systematic review of the hospital financial performance literature

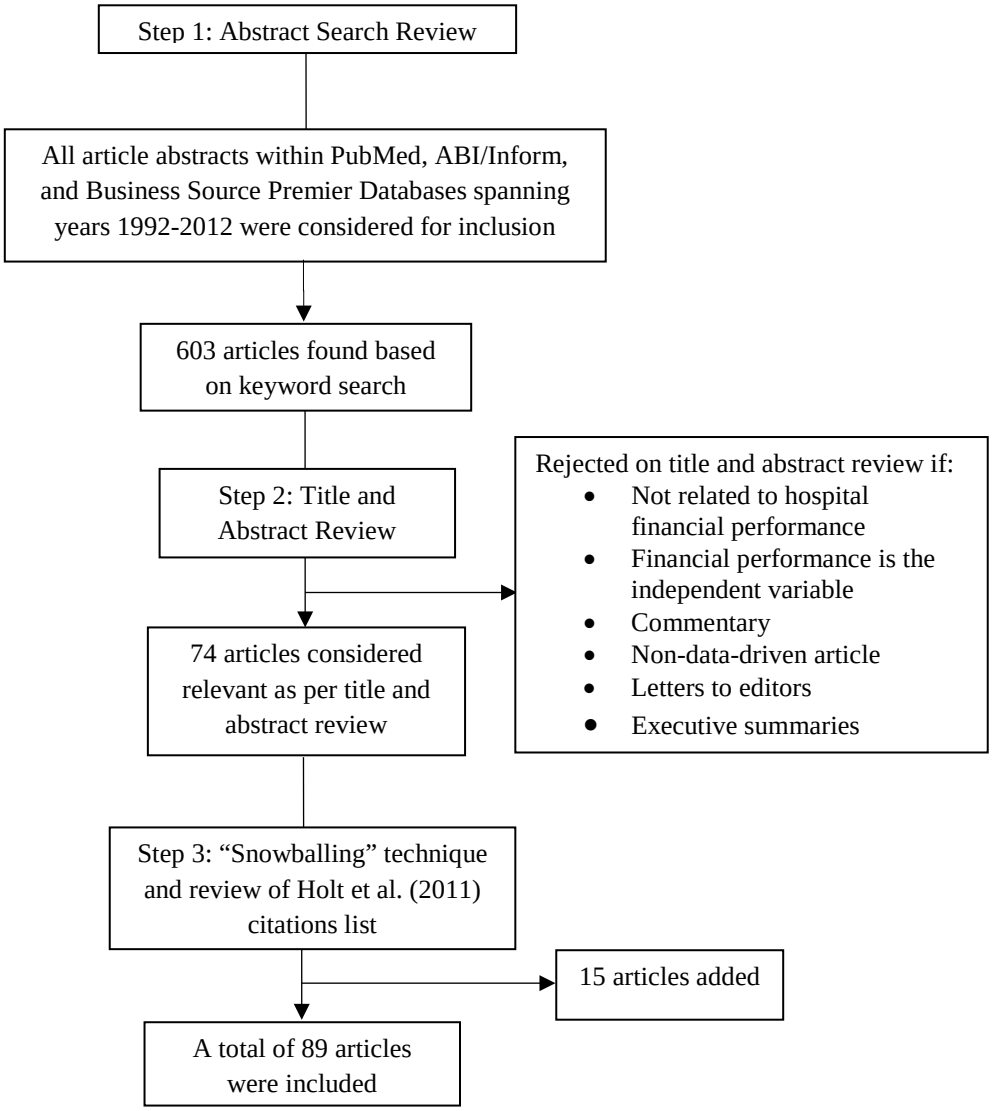

Table 1

Descriptive statistics of reviewed articles (*n*=89)

Variables	Total *n*	%
Year Published:		
1992-1996	29	32.6
1997-2001	17	19.1
2002-2006	23	25.8
2007-2012	20	22.5
Published in a health-related journal	75	84.3
First author is an academic	79	88.8
Longitudinal study design	45	50.6
First author affiliation:		
Health/Medicine schools	53	59.6
Business school	20	22.5
Other	16	18.0
Funded study	28	31.5
Sample Size:		
Mean	691.95	
Median	169	
Standard Deviation	1096.89	
Range (Min-Max)	1-5200	
Sample type:		
National sample	42	47.2
Single state	32	36.0
Multiple states	8	9.0
Other	7	7.9
Article focused on acute care hospitals	80	89.9
Article focused on academic medical centers	3	3.4
Sample drawn from:		
Not-for-profit hospitals	12	13.5
For-profit hospitals	2	2.2
Other	3	3.4
Not limited to a specific subgroup of hospitals	72	80.9
Location of hospitals in sample:		
Rural	10	11.2
Urban	10	11.2
Not limited to either	69	77.5
[1,2]Independent Variables examined:		
Management strategies	33	37.1
Ownership	16	18.0
Integration	16	18.0
Organizational characteristics	15	16.9
Financial factors	12	13.5
Market characteristics	10	11.2
Regulation / accreditation / policy	8	9.0
Governance	6	6.7
Quality	5	5.6
Human resources	3	3.4
Marketing	3	3.4
[2]Financial performance measure used:		
Operating margin	44	49.4
Total margin	28	31.5
Return on assets	22	24.7
Cash flow margin	6	6.7
Return on equity	2	2.2
Return on investment	2	2.2
Other	24	27.0

Note: Numbers may not add up to 100% due to rounding.
[1]Categories adapted from Holt et al. (2011); [2]Categories not mutually exclusive

Table 2

Number of studies with given financial performance measures and independent variables examined (n= 89 articles including 495 analyses)

		Financial Performance Measure, Total *n* (%)						
Independent Variable Examined	**Total *n* (%)**	**Total Margin**	**Operating Margin**	**Return on Assets**	**Return on Equity**	**Cash Flow Margin**	**Return on Investment**	**Other**
Ownership	34 (6.9)	11	9	9	1	1	0	3
Governance	22 (4.4)	0	14	4	0	0	0	4
Management strategies	140 (28.3)	18	56	22	1	3	17	23
Integration	43 (8.7)	13	12	7	1	1	0	9
Quality	9 (1.8)	1	3	4	0	0	0	1
Human Resources	8 (1.6)	0	0	4	0	4	0	0
Organizational characteristics	143 (28.9)	15	38	55	10	0	0	25
Market characteristics	33 (6.7)	3	13	11	0	0	0	6
Regulation/accreditation/policy	12 (2.4)	2	5	1	0	1	0	3
Financial factors	35 (7.1)	2	11	10	1	2	2	7
Marketing	16 (3.2)	0	2	10	0	0	0	4
Total *n* (%)	**495 (100)**	**65 (13.1)**	**163 (32.9)**	**137 (27.7)**	**14 (2.8)**	**12 (2.4)**	**19 (3.8)**	**85 (17.2)**

Note: Numbers may not add up to 100% due to rounding.

Table 3

Likelihood of finding a positive relationship in a study (*n*=495)

Independent Variable Examined:[1,2]	%	p-value
Ownership	58.8 vs. 36.9	0.016
Governance	63.6 vs. 37.2	0.023
Management strategies	48.6 vs. 34.4	0.004
Integration	39.5 vs. 38.3	0.871
Quality	44.4 vs. 38.3	0.738
Human resources	37.5 vs. 38.4	1.000
Organizational characteristics	22.4 vs. 44.9	<0.001
Market characteristics	21.2 vs. 39.6	0.041
Regulation, accreditation, or policy	33.3 vs. 38.5	1.000
Financial factors	34.3 vs. 38.7	0.719
Marketing	56.2 vs. 37.8	0.190
Financial Performance Measure Used:[1,2]		
Total margin	53.8 vs. 36.0	0.009
Operating margin	36.8 vs. 39.2	0.625
Return on assets	30.7 vs. 41.3	0.030
Return on equity	28.6 vs. 38.7	0.581
Cash flow margin	41.7 vs. 38.3	0.775
Return on investment	52.6 vs. 37.8	0.231
Other financial performance measure	40.0 vs. 38.0	0.807
Study Characteristics:		
Journal type:		
Health-related	36.3	0.005
Business (non-health)	57.1	
First author is an academic:		
Yes	37.3	0.060
No	57.7	
First author affiliation:		
Health/medicine school	31.6	<0.001
Business school	60.5	
Non-academic institution	45.9	
Study design:		
Longitudinal	39.8	0.636
Cross-Sectional	37.5	
Study is funded:		
Yes	35.9	0.587
No	39.2	
Hospital type study focused on:		
Acute care	37.7	0.125
Specialty	58.8	
Study focused on academic medical centers:		
Yes	80.0	0.074
No	38.0	
Sample type:		
National	43.3	0.078
Multiple states	17.6	
Single state	34.8	
One hospital	36.4	
Location of hospitals in sample:		
Rural	49.1	0.170
Urban	31.7	
Not limited to a subgroup	37.6	
Ownership of hospitals in sample:		
For-profit	31.3	0.299
Not-for-profit	43.5	
Other	23.3	
Not limited to a subgroup	39.4	

[1]Reference category for p-value is all other studies

[2]Articles that focused on the independent variable examined that found a positive relationship with hospital financial performance versus articles focusing on all other independent variables that found a positive relationship with hospital financial performan

Table 4

Predictors of positive relationships in studies examining hospital financial performance (n= 89 articles including 495 analyses)

	Model 1		Model 2		Model 3	
	Odds Ratio (95% CI)	Risk Difference	Odds Ratio (95% CI)	Risk Difference	Odds Ratio (95% CI)	Risk Difference
Independent Variable Examined						
Ownership (e.g. investor owned, non-profit)	1.11 (0.39-3.17)	+2.5	0.84 (0.22-3.26)	-3.9	0.65 (0.16-2.58)	-9.4
Governance (i.e. board composition or board processes)	1.36 (0.47-3.90)	+7.4	4.09* (0.99-16.92)	+33.7	3.36* (0.85-13.24)	+29.4
Management strategies (e.g. cost leadership, pricing strategies)	0.73 (0.33-1.66)	-7.1	0.70 (0.21-2.28)	-8.1	0.57 (0.15-2.18)	-12.6
Integration (e.g. horizontal or vertical)	0.51 (0.17-1.56)	-14.4	0.65 (0.11-3.84)	-9.5	0.48 (0.07-3.35)	-15.3
Quality improvement (i.e. patient outcomes)	0.62 (0.14-2.84)	-10.3	0.53 (0.03-9.97)	-13.1	0.67 (0.05-8.19)	-8.8
Human resources (e.g. compensation, turnover)	0.47 (0.15-1.44)	-15.7	0.14* (0.02-1.24)	-29.7	0.17 (0.02-1.57)	-28.1
Organizational characteristics (e.g. bed size, payer-mix)	0.22** (0.07-0.71)	-30.8	0.21** (0.05-0.83)	-31.8	0.17** (0.04-0.79)	-35.1
Market characteristics (e.g. competition)	0.21*** (0.07-0.66)	-27.8	0.24** (0.08-0.73)	-25.8	0.19*** (0.06-0.66)	-27.9
Regulation/accreditation/policy (e.g. nurse staffing laws)	0.39 (0.07-2.18)	-18.7	0.17 (0.02-1.86)	-28.3	0.14 (0.01-1.89)	-29.7
Financial factors (e.g. debt utilization)	0.41 (0.08-2.07)	-18.4	0.45 (0.10-2.15)	-16.3	0.38 (0.08-1.88)	-19.1
Study Characteristics						
Year article was published			1.09 (0.75-1.59)	+2.0	1.07 (0.73-1.58)	+1.6
Health related journal			0.29** (0.10-0.89)	-29.8	0.32** (0.11-0.93)	-27.8
First author academic			0.21** (0.05-0.90)	-37.0	0.25** (0.06-0.96)	-33.3
Longitudinal study design			1.67 (0.59-4.72)	+12.0	1.60 (0.53-4.84)	+11.1
Study is funded			0.37* (0.12-1.16)	-20.9	0.32* (0.10-1.05)	-23.7
National sample			1.62 (0.61-4.32)	+11.2	1.63 (0.59-4.47)	+11.3
Acute care hospital			0.42 (0.08-2.18)	-21.3	0.50 (0.09-2.80)	-17.2
Academic medical center			8.11** (0.85-77.42)	+45.9	7.91* (0.84-74.72)	+45.7
Rural hospital			1.77 (0.49-6.37)	+13.9	1.87 (0.49-7.18)	+15.2
Sample size			1.00 (1.00-1.00)	0	1.00 (1.00-1.00)	0
Ownership			1.19 (0.75-1.89)	+4.1	1.25 (0.81-1.93)	+5.2
Financial Performance Measure Used						
Total margin					1.54 (0.54-4.38)	+10.4
Operating margin					1.08 (0.35-3.30)	+1.8
Return on assets					0.60 (0.18-2.04)	-11.4
Return on equity					0.58 (0.21-1.59)	-11.6
Return on investment					0.65 (0.12-3.64)	+9.4
Other					1.09 (0.33-3.55)	+1.9

Note: The risk difference was calculated using the *mfx* command in Stata version 10. A marginal effect represents the difference in the probability of an outcome occurring between a given category and the reference group.
***p<.01; **p<.05; *p<.10

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Appendix A: Standard coding sheet developed for this study

Year Published:	First Author (Last Name):	Name of Journal:

First author academic?
Yes (1) No (0)

Study Design
- Cross-Sectional (1)
- Longitudinal (2)
- Other_____ (3)

Sample Size:
_____or Unknown

First Author Affiliation:
- Business School (1)
- Health/Medicine Schools(2)
- Other (3)

Is the study funded?
Yes (0) No (1)

Sample type:
- Nationally representative (1)
- Single state (2)
- Multiple states (3)
- Other:_____(4)

Hospital Type:
- General, Acute Care (1)
- Specialized (2)
  Specify: _____

Hospital Ownership
- For-Profit (1)
- Not-For-Profit (2)
- Other (3)
- Not limited to a specific subgroup (4)

Strategy Examined:	Key Independent Variable:	Key Dependent Variable:	Location:
• Ownership (1) • Governance(2) • Management strategy (3) • Integration (4) • Quality (5) • Other: _____(6)	(0) Financial Performance (1) Other: Specify_____	(0) Financial Performance (1) Other: Specify_____	(1) Rural (2) Urban (3) Not limited to either

Financial Performance Measure and Results:

Financial Performance (FP) Measure	Relationship of key variable to FP			
	Positive	***Negative***	***No Effect***	***Other***
Total Margin				
Operating Margin				
Return on Assets				
Return on Equity				
Return on Investment				
Other:				

(Select all measures that apply)

Appendix B: Definitions of strategy categories found in studies examined

Strategy Category	Definition
Ownership	Studies that focus on whether a hospital is for-profit (i.e. investor owned), non-profit, or government owned.
Governance	Studies that focus on board composition or board processes (i.e. what they do and how they do it).
Management	Studies that focus on cost leadership strategies, product mix strategies, pricing strategies, or market strategies.
Integration	Studies that focus on horizontal integration (i.e. contractual relationships between hospitals, providers, and health plans) or vertical integration (i.e. hospitals merging or aligning to form systems or networks).
Quality	Studies that focus on quality of care delivered in hospitals.
Human resources	Studies that focus on hospital employees (e.g. employee compensation, consideration of employee's during and after layoffs, employee turnover, etc.).
Organizational characteristics	Studies that focus on hospital characteristics such as bed size, payer mix, case mix, length of stay, and occupancy rate.
Market characteristics	Studies that focus on market characteristics such as competition, patient income, area wage rate, and physician density of the hospitals being examined.
Regulation, accreditation, or policy	Studies that focus on regulations, accreditation guidelines, or other policies that affect hospitals
Financial	Studies that focus on financial characteristics of a hospital such as debt utilization, nonoperating revenues, age of plant, and cash flows.
Marketing	Studies that focus on a hospital's marketing practices such as usage of marketing intelligence and innovative marketing factors.

Appendix C: Articles Included in the Study

1. Bazzoli, G. J., & Chan, B. (2000). The Financial Performance of Hospitals Belonging to Health Networks and Systems. *Inquiry (00469580), 37*(3), 234.

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CHAPTER 3
DOES EHR USE IMPROVE HOSPITAL FINANCIAL PERFORMANCE? EVIDENCE FROM PANEL DATA

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CHAPTER 3

DOES EHR USE IMPROVE HOSPITAL FINANCIAL PERFORMANCE? EVIDENCE FROM PANEL DATA

Abstract

Objectives: To examine the impact of electronic health record (EHR) adoption and on financial performance in hospitals.

Methods: We construct a longitudinal panel using data from (1) the 2007-2010 American Hospital Association (AHA) Annual Survey, (2) the 2007-2010 AHA Annual Survey Information Technology (IT) Supplement, and (3) the 2007-2011 Medicare Cost Reports. Potential financial benefits attributable to EHR adoption may take some time to accrue. Thus, we run regressions with lags of 1 and 2 years that include hospital and year fixed effects to examine the relationship between the level of EHR adoption and three hospital financial performance measures: total margin, operating margin, and return on assets. In addition, our models control for time-varying factors that can impact financial performance, such as competition.

Results: There were 5,120 unique hospitals in our sample representing 13,615 hospital-year observations. A total of 48 (1.5%), 93 (2.4%), 114 (3.3%), and 248 (8.1%) hospitals had a comprehensive hospital-wide EHR system in 2006, 2007, 2008, and 2009 respectively. A change in the level of EHR adoption was not associated with changes in operating margin or return on assets within hospitals. However, total margin was

significantly improved, after 2 years, in hospitals that moved from no EHR to having a comprehensive EHR in all areas of their hospital (β= 0.030, p <0.034). On the other hand, hospitals that increased their level of EHR adoption, but did not achieve hospital-wide comprehensive adoption, did not experience changes in any financial performance measures examined.

Conclusions: The improvements in total margin, as opposed to operating margin, which we observe are likely due to hospital incentive payments under the HITECH Act that are reflected in non-patient revenues and therefore show up in total margin calculations. Thus, after 2 years of EHR adoption, hospital financial performance is observed to improve based only upon "meaningful use" incentive payments. More research will be needed to determine whether EHR adoption impacts financial performance on a longer time horizon.

Introduction

Hospitals' investments in health information technology (HIT) have become routine and are expected to increase as hospitals take advantage of monetary incentives offered as part of the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 (Blumenthal, 2010a). Those incentivizes are in place to reduce a hospital's financial burden of adopting, implementing, and maintaining an electronic health record (EHR) system and to encourage hospitals to meaningfully use the system according to preset objectives (Blumenthal & Tavenner, 2010). Given the stringent meaningful use criteria and increasing complexity of HIT systems, hospitals must

continue to consider the financial return on their investment before adopting and implementing an EHR system.

Identifying a positive return on investment from a hospital EHR system has been challenging (Schmitt & Wofford, 2002). While many non-financial benefits (e.g., error reduction, improved quality) may be easier to quantify, most hospitals do not fully understand the financial impact of adopting and implementing an EHR. Two studies, one on hospitals (Menachemi, Burkhardt, Shewchuk, Burke, & Brooks, 2006) and one on integrated healthcare delivery systems (Thouin, Hoffman, & Ford, 2008), have empirically examined the relationship between financial returns and HIT use and reported that increased levels of HIT was related to improved financial returns. Additional studies suggest that hospital EHR use is related to other financial metrics such as reduced costs or improved revenues which may translate into improved financial returns (Amarasingham, Plantinga, Diener-West, Gaskin, & Powe, 2009; Bates et al., 1999; Tierney, Miller, Overhage, & McDonald, 1993). All of the studies examining overall hospital financial returns, as well as those examining reduced costs or improved revenues, used cross-sectional study designs not suitable for causal inference. Additionally, several studies were limited to one institution, many times an academic one, (Bates et al., 1999; Tierney et al., 1993) or one state (Amarasingham et al., 2009; Menachemi et al., 2006) which limits the generalizability of those studies.

Although one of the main initiatives of the HITECH Act of 2009 is to reduce healthcare costs (Blumenthal, 2010a, 2010b; Blumenthal & Tavenner, 2010), it is still unclear if adopting and implementing an EHR provides financial returns for hospitals. Nevertheless, hospitals continue to take advantage of incentives offered through the Act

by adopting and implementing EHRs (Jha, 2010). By employing a longitudinal design and examining within hospital changes in financial performance, the current study will provide rigorous evidence on how progression toward the meaningful use of EHRs is associated with financial returns. We expect that the results of the current study will be useful to anyone interested in how increased levels of EHR use impact a hospital's financial returns.

Background

EHRs could affect hospital financial returns through two mechanisms: (1) reduced costs and/or (2) improved revenues. Reduced costs are the result of having patient information electronically available through the different components of an EHR. One team of researchers found that computerized order entry, a key component of an EHR, reduced the number of antiepileptic drug tests by approximately 20% by reminding physicians when a potential redundant test was being ordered (Chen et al., 2003). Similarly, Bates et al. (1999) examined computerized orders and found a 24% absolute reduction in redundant tests yielding an estimated cost savings of $35,000 per year for a particular hospital (Bates et al., 1999). Another group of researchers found that computerizing inpatient orders resulted in a 12.7% reduction in total costs per admission for a particular hospital (Tierney et al., 1993). Most of those costs savings were the result of significant decreases in hospital bed, medication, and diagnostic test costs. Finally, Amarashingham et al. (2009) found that higher levels of automation for multiple components of an EHR (test results, order entry, and decision support) were associated with lower hospital admissions costs for four different conditions (Amarasingham et al.,

2009). Additional cost savings that have been discussed in commentaries but not empirically examined are reduced costs relating to reduced staff resources, reduced supplies needed to maintain paper files, decreased transcription costs, and decreased costs relating to chart pulls (Mildon & Cohen, 2001; Schmitt & Wofford, 2002).

The use of EHRs may also improve hospital revenues. Such improvements are usually the result of improved charge capture and decreased billing errors. Although neither of those mechanisms has been empirically examined in the inpatient literature, they have been documented in commentaries (Erstad, 2003; Mildon & Cohen, 2001; Schmitt & Wofford, 2002). Additionally, both improved charge capture and decreased billing errors have been empirically examined in the outpatient literature (Wang et al., 2003) and were found to be related to improved revenues.

Because EHR use may improve revenues and reduce costs simultaneously, a hospital that uses an EHR should experience improved profitability (financial performance that captures both revenues and costs). In a cross-sectional study of integrated delivery systems, Thouin et al. (2008) found that each one tenth of a percentage increase in HIT expenditures is associated with an approximate increase of profit of $950,000 for an average sized system (Thouin et al., 2008). Similar positive findings was reported in the study of Florida hospitals (Menachemi et al., 2006).

Financial Performance Measures

Given the above literature, we expect financial measures that capture both revenues and costs to be the most responsive to EHR use. We also expect measures that take into consideration a hospital's investment in assets to be responsive to EHR use

since hospitals invest large sums of money in assets needed for EHR adoption and implementation. Thus, we will use three profitability measures, total margin, operating margin, and return on assets, to measure the financial performance of hospitals. All three of these measures capture both revenues and costs and the latter of the three captures assets.

EHR Use and Hypotheses

Typically, hospital level of EHR adoption may progress on an incremental process ranging from having no components of an EHR to having components of an EHR in some areas of the hospital to having a comprehensive EHR in all areas of the hospital. We expect as hospitals increase their level of EHR adoption, their financial performance will also increase. Given that hospitals will experience improved revenues and reduced costs as they move to an increased level of EHR adoption, we hypothesize as follows:

Hypothesis 1: Hospitals that increase their level of EHR adoption, regardless of which level they achieve, will experience improvements in their financial performance.

Additionally, we expect that hospitals that specifically increase their level of EHR adoption from having no components of an EHR to (a) either having some components of an EHR in some areas of the hospital or (b) to having a comprehensive EHR in all areas of the hospital to experience improved revenues and reduced costs. Thus, we hypothesize as follows:

Hypothesis 2a: Hospitals that increase their level of EHR adoption from having no components of an EHR to having some components of an EHR in some areas of the hospital will experience improvements in their financial performance.

Hypothesis 2b: Hospitals that increase their level of EHR adoption from having no components of an EHR to having a comprehensive EHR in all areas of the hospital will experience the greatest improvements in their financial performance.

Methods

Using a longitudinal panel study design with hospital and year fixed effects, we examined the relationship between the level of EHR adoption and hospital financial performance. We analyzed secondary data from three different sources on U.S. based acute-care hospitals: (1) the 2007-2010 American Hospital Association (AHA) Annual Survey, (2) the 2007-2010 AHA Annual Survey Information Technology (IT) Supplement, and (3) the 2007-2011 Medicare Cost Reports. We matched hospitals in the three datasets based on their Medicare provider number. Those that did not have a match across all datasets were excluded.

The AHA Annual Survey IT Supplement is administered annually in conjunction with the AHA Annual Survey. The IT supplement survey provides information on hospitals' adoption of EHR components including electronic clinical documentation, results viewing, decision support, and bar coding. It also specifies the degree to which these functions are implemented within the hospital, as well as future plans for

implementation. Researchers have used data from the IT supplement survey to investigate EHR adoption (Blavin, Buntin, & Friedman, 2010; Diana, Kazley, Ford, & Menachemi, 2012; Jha, 2010; Kutney-Lee & Kelly, 2011).

Data from the Medicare Cost Reports, which are filed annually with the Centers for Medicare and Medicaid Services (CMS) by all U.S. hospitals that accept Medicare as a form of payment, was used to measure financial performance of hospitals. Lastly, data from the AHA Annual Survey was used to measure hospital characteristics and control variables included in the study. Our university's Institutional Review Board deemed this study exempt from human subjects.

Level of EHR Adoption

Consistent with the approach used by Jha and colleagues (2010), we used the thirty-two clinical functions (e.g. electronic documentation of medication lists, electronic laboratory reports, computerized entry for medications, etc.) of an EHR in the AHA IT supplement survey to operationalize EHR adoption as a variable with three levels: comprehensive EHR, basic EHR, and no EHR (Jha, 2010; Jha et al., 2009). A comprehensive EHR is one that has a specific set of twenty-four clinical functions deployed in all hospital units. This level of EHR adoption gets a hospital closest to meeting the meaningful use criteria set forth in the HITECH Act of 2009. A basic EHR is one that has a specific set of ten clinical functions deployed in at least one hospital unit. A hospital with anything less than a basic EHR is considered to have no EHR. For hypothesis 1, this variable was operationalized as an ordinal variable with the three levels specified above (1=No EHR, 2=Basic EHR, 3=Comprehensive EHR). In hypothesis 2a,

the level of EHR adoption was measured as a dichotomous variable where "0" represented hospitals with no EHR and "1" represented hospitals that had a basic EHR. Lastly, in hypothesis 2b, the level of EHR adoption was a dichotomous variable where "0" represented hospitals with no EHR and "1" represented hospitals that had a comprehensive EHR.

Financial Performance:

The financial performance of acute care hospitals is most often measured using profitability ratios (Pink et al., 2005). Thus, we adopt a widely used definition of financial performance as any profitability measure that captures both revenues and expenses of a hospital (Casey, Burlew, & Moscovice, 2007; Irwin, Hoffman, & Lamont, 1998; Langland-Orban, Gapenski, & Vogel, 1996). Due to the complexity and inconsistency of accounting based measures of financial performance, researchers generally use more than one profitability measure in a single study (Dalton, Daily, Ellstrand, & Johnson, 1998; Dalton, Daily, Johnson, & Ellstrand, 1999). Accordingly, we used three measures that are expected to be the most responsive to EHR use: total margin, operating margin, and return on assets (see Appendix A for definitions of each measure).

Control Variables

Identification of control variables was based on items that may affect the level of EHR adoption or hospital financial performance. Since we are using a panel study design, which considers within hospital changes in financial performance following

changes to EHR adoption status (relative to a control group), it is unnecessary to control for hospital characteristics that are time-invariant such as size, system affiliation, tax status, and location. Instead, we control for competition which may change over time, and year of adoption. The Herfindahl-Hirschman Index (HHI), which measures the concentration of an industry in a particular market, was used to operationalize competition. It was calculated using the AHA Annual Survey data, and was measured continuously. Dummy variables for each year were included in each model to account for secular trends that may impact financial performance.

Data Analysis

Descriptive statistics for the independent variables, control variables, and dependent variables were analyzed to determine the variability of each, to test the assumptions of the regression model, and to test for outliers in the data. In addition, we performed bivariate analyses to test for multi-collinearity issues among the variables. Then, using STATA software, we performed multivariate analyses to measure the within hospital changes in financial performance given the changes in the level of EHR adoption. Our model specification is as follows:

$$y_{it}=\beta_1\chi_{it1}+\beta_2\chi_{it2}+\mathrm{z}_{it}\lambda+\alpha_i+\mu_{it}$$

Where:

y_{it} is the dependent variable (financial performance) where i = hospital and t = time

β_1 is the coefficient for one category (comprehensive EHR) of the main independent variable (EHR use) x_{it1}

x_{it1} represents one category (comprehensive EHR) of the main independent variable of interest
(EHR use)

β_2 is the coefficient for one category (basic EHR) of the main independent variable (EHR use) x_{it2}

x_{it2} represents one category (basic EHR) of the main independent variable of interest (EHR use)

$Z_{it}\lambda$ represents all control variables (competition, payer mix, etc.)

α_i *(i=1…..n)* is the unknown intercepts for a vector of hospitals

u_{it} is the error term

Examining the within hospital changes in financial performance addresses some of the issues related to selection bias that is presented by the observational nature of these data. Because it is unknown as to when hospitals start to experience improvements in financial performance, we analyzed our data using a one and two year lag. In all analyses, we clustered error terms within hospitals to account for the repeated observations, and we flagged statistical significance at the $p<0.10$, $p<0.05$, and $p<0.01$ levels respectively.

Results

There were 5,120 unique hospitals in our sample representing 13,615 hospital-year observations. The majority of the hospitals included in our analysis were not-for-profit (83.6%) and/or accredited (68.7%) (see Table 1). The sample included mostly non-teaching hospitals (93.0%) and hospitals that were members of a system (53%). On average, hospitals in our sample had 170.4 staffed beds and the mean HHI was 0.70. Additionally, 48% of hospitals' inpatient days were related to serving Medicare patients and 19% were related to serving Medicaid patients.

We cross-tabulated the level of EHR adoption and fiscal year to make sure there was variation in our data. First, 48 (1.5%) hospitals had a comprehensive EHR in 2006 (see Table 2). This number increased to 93 (2.4%) hospitals in 2007, 114 (3.3%) in 2008, and 248 (8.1%) in 2009. Similarly, the number of hospitals with a basic EHR increased from 240 (7.4%) in 2006 to 333 (8.8%) in 2007, 406 (11.9%) in 2008, and 553 (18.1%) in 2009.

In hypothesis 1, we hypothesized that hospitals that increased their level of EHR adoption (regardless of which level they achieved) would experience improvements in their financial performance. Our findings do not support this hypothesis when using any of the three financial performance measures, total margin ($\beta = 0.001$, $p < 0.864$), operating margin ($\beta = -0.005$, $p < 0.130$), or return on assets ($\beta = -0.002$, $p < 0.755$), with a one year lag in the level of EHR adoption (see Table 3). However, when the level of EHR adoption was lagged by two years, we found support for our hypothesis when using total margin ($\beta = 0.011$, $p < 0.041$) as the outcome variable. We did not find support with a two year lag when using operating margin ($\beta = 0.004$, $p < 0.426$) or return on assets ($\beta = 0.009$, $p < 0.248$) as the outcome measure.

In hypothesis 2a, we hypothesized that hospitals that increased their level of EHR adoption from having no components of an EHR to having components of an EHR in some areas of the hospital (i.e. basic EHR) will experience improvements in their financial performance. We did not find support for this hypothesis with a one or two lag in the data when using any of the three measures of financial performance, total margin ($\beta = -0.001$, $p < 0.786$), operating margin ($\beta = -0.007$, $p < 0.127$), or return on assets ($\beta = -0.002$, $p < 0.790$) (see Table 4). In hypothesis 2b, we hypothesized that hospitals that

increase their level of EHR adoption from having no components of an EHR to having a comprehensive EHR in all areas of the hospital will experience improvements in their financial performance. This hypothesis was supported in the model that used total margin as the financial performance measure and lagged the level of EHR adoption by two years ($\beta = 0.030$, $p < 0.034$). It was not supported when we used the other two measures of financial performance, operating margin ($\beta = 0.013$, $p < 0.305$) and return on assets ($\beta = 0.025$, $p < 0.233$), with a one or two year lag in the level of EHR adoption. We also ran an additional analysis in addition to our hypotheses to determine if a hospital increasing its level of EHR adoption from basic to comprehensive experienced improvements to financial performance when compared to hospitals that had no changes to their level of EHR adoption. We did not find significant results in this analysis using any of the three financial performance variables with a one or two year lag.

Discussion

Relative to hospitals that had no change to their level of EHR adoption, those that increased their level of EHR adoption did not experience improvements in financial performance when we measured it using both patient revenues and operating costs (i.e. operating margin). These findings are inconsistent with previous studies which have found that EHR adoption is related to reduced operating costs (e.g. diagnostic testing, medications, and admissions) (Amarasingham et al., 2009; Bates et al., 1999; Chen et al., 2003; Tierney et al., 1993) and previous commentaries in which authors argue that the adoption of an EHR improves patient revenues through improved charge capture (Mildon & Cohen, 2001; Schmitt & Wofford, 2002). If a hospital experiences reduced operating

costs, improved patient revenues or both, it should also experience improved operating margin. However, the findings of this study suggest that the adoption of an EHR is not related to within hospital operating margin which takes both financial metrics (e.g. patient revenues and operating expenses) into consideration. Additionally, we found that hospitals were not able to improve their return on assets in one or two years following changes in their level of EHR adoption when compared to other hospitals that had changes in their level of adoption. This is likely due to the fact that hospitals invest large sums of money in assets that are needed to adopt and implement an EHR.

We found that hospitals experienced improvements in their total margin in the second year following changes in the level of EHR adoption when compared to other hospitals that had no changes in their level of adoption. Specifically, we found that hospitals that changed their level of EHR adoption from no EHR to a basic EHR found no improvements to total margin, but those that changed their level of EHR adoption from no EHR to a comprehensive EHR had significant improvements to their total margin. Therefore, having only a few functionalities in some areas of the hospital does not improve a hospital's total margin, but having several functionalities in all units of a hospital, which gets a hospital closer to meeting the meaningful use criteria set forth under the HITECH Act, does improve a hospital's total margin.

Similar to operating margin, total margin captures both patient revenues and operating expenses. However, it also takes into consideration other revenues and expenses such as grant income, charitable contributions, and losses on assets which are included in the "other income" section of the Medicare Cost Report Statement of Revenues and Expenses (Centers for Medicare & Medicaid Services, 2013). Thus, the

contradicting results between total margin and operating margin would likely be due to other revenues and expenses. Because we found an improvement in total margin two years after adoption but not one year after, our findings suggest that the "meaningful use" incentives that hospitals began to receive in May 2011 may be causing the difference in results. Because "meaningful use" incentives are usually accounted for as grant income or other operating revenues, they are included in the "other income" section of the Statement of Revenues and Expenses (Healthcare Financial Management Association, 2011) and thus, may be causing hospitals to see improvements in total margin but not operating margin.

Additionally, because the largest percentage of changes from one level of EHR adoption to the next took place in 2009, most of our analysis examined total margin in 2011 which was the first year meaningful use incentives were paid. In fact, over $2.5 billion dollars in meaningful use incentives were paid to professionals and hospitals as of December 2011 (iHealthBeat, 2012). Therefore, it is likely the improvements in total margin two years after adoption are due to "meaningful use" incentives received by hospitals.

Despite the valuable contributions of our analysis, our study has several limitations worth mentioning. First, we used data from the Medicare Cost Reports to calculate the profitability measures we used to operationalize hospital financial performance. Since this data only includes information for hospitals that provide care to Medicare beneficiaries, the generalizability of this data may be impaired (Kane & Magnus, 2001). However, this problem is mitigated by the fact that almost all acute care facilities serving adults accept Medicare. Additionally, our sample is limited to hospitals

that responded to the AHA annual IT supplement survey in at least two of the four years we used in our analysis which may have introduced response bias. Further, given the sample of respondents, our results may not be generalizable to all hospitals in the U.S. However, our sample did include non-profit and for-profit hospitals of different sizes with different payer mixes and teaching statuses.

Conclusion

As hospitals continue to invest in HIT, specifically EHRs, it is important for managers to understand its impact on hospital financial performance. The findings of this study suggest that changes in the level of EHR adoption are not related to improved hospital financial performance from patient revenues or reduced operating costs. However, it does suggest that "meaningful use" incentives offered under the HITECH Act may improve hospital financial performance in the years hospitals receive them. Because these incentives are only temporary, it is still unclear if hospitals will experience long-term financial benefits from meaningfully using an EHR. Given that we did not find an improvement in operating margin nor return on assets two years after changes in the level of EHR adoption, it is likely that hospitals will not experience benefits from adopting an EHR until several years later; if at all. As more data becomes available, future research should examine the financial impacts of comprehensive EHR adoption with longer lag periods to account for the possibility that two years is insufficient time for the benefits to accrue.

Table 1

Descriptive statistics of hospital-year observations in our sample (n=13,615)

Hospital Characteristics	***n* (%)**
Ownership	
For-profit	2,232 (16.4)
Non-profit	11,345 (83.6)
Teaching status	
Teaching	947 (7.0)
Non-teaching	12,630 (93.0)
Accreditation status	
Accredited	9,327 (68.7)
Not accredited	4,250 (31.3)
System member	
Yes	7,190 (53.0)
No	6,387 (47.0)
Size	
Mean	170.4
Median	101
Range	1-2,261
Medicare percent[1]	
Mean	0.48
Medicaid percent[1]	
Mean	0.19
Herfindahl-Hirschman Index (HHI)[2]	
Mean	0.70

[1] Measured as the proportion of inpatient days that are related to Medicare/Medicaid patients.

[2] Measures the concentration of an industry in a particular market.

Table 2

Summary of EHR use in each year (n=13,517)

Level of EHR Use	2006 *n* (%)	2007 *n* (%)	2008 *n* (%)	2009 *n* (%)	Total *n* (%)
Comprehensive EHR	48 (1.5)	93 (2.4)	114 (3.3)	248 (8.1)	503 (3.7)
Basic EHR	240 (7.4)	333 (8.8)	406 (11.9)	553 (18.1)	1,532 (11.3)
No EHR	2,955 (91.1)	3,380(88.8)	2,895 (84.8)	2,252 (73.8)	11.482 (84.9)
Total	3,243 (100)	3,806 (100)	3,415 (100)	3,053 (100.0)	13,517 (100)

Table 3

Hospital fixed effects analysis between incremental levels of EHR adoption and hospital financial performance (Hypothesis 1)

	Total Margin		Operating Margin		Return on Assets	
	1 Year Lag	2 Year Lag	1 Year Lag	2 Year Lag	1 Year Lag	2 Year Lag
Independent Variable:	**β**	**β**	**β**	**β**	**β**	**β**
Level of EHR adoption	0.001	.011**	–0.005	0.004	–0.002	0.009
Control Variable:						
Market concentration (HHI)	0.003	–0.001	–0.005	–0.014	–0.012	–0.021
Observations	7,278	4,415	7,383	4,510	7,419	4,530

***p<.01; **p<.05; *p<.10

Note: Each model includes covariates for market concentration and year dummies.

Table 4
Hospital fixed effects analysis between levels of EHR adoption and hospital financial performance (Hypotheses 2a and 2b)

	Total Margin		Operating Margin		Return on Assets	
	1 Year Lag	2 Year Lag	1 Year Lag	2 Year Lag	1 Year Lag	2 Year Lag
Independent Variables:	**β**	**β**	**β**	**β**	**β**	**β**
No EHR	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Basic EHR	–0.001	0.007	–0.007	0.001	–0.002	0.006
Comprehensive EHR	0.004	0.030**	–0.007	0.013	–0.003	0.025
Control Variable:						
Market concentration (HHI)	0.002	0	–0.005	–0.013	–0.012	–0.020
Observations	7,278	4,415	7,383	4,510	7,419	4,530

***p<.01; **p<.05; *p<.10
Note: Each model includes covariates for year dummies.

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Appendix A: Calculations for financial performance variables

Variable	**Calculation**
Total Margin	$\frac{Net\ Income}{Total\ Revenue}$
Operating Margin	$\frac{Net\ Operating\ Income}{Operating\ Revenue}$
Return on Assets	$\frac{Net\ Income}{Total\ Assets}$

CHAPTER 4
MANAGEMENT INVOVLEMENT ON THE BOARD OF DIRECTORS AND HOSPITAL FINANCIAL PERFORMANCE

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CHAPTER 4

MANAGEMENT INVOLVEMENT ON THE BOARD OF DIRECTORS AND HOSPITAL FINANCIAL PERFORMANCE

Executive Summary

Agency Theory is used to investigate the relationship between top management team involvement on not-for-profit hospitals' boards of directors (BOD) and hospital financial performance. Governance data collected in 2011 by The Governance Institute was merged with hospital financial performance data from the 2011 Medicare Cost Reports. Then, an ordinary least squares regression model, using propensity score adjustments, was used to evaluate the relationship between management involvement on the BOD and three financial performance profitability ratios: total margin, operating margin, and return on assets.

The sample included 637 not-for-profit hospitals most of which were not government owned (74.1%). As hypothesized, we found that having a larger number of managers with voting rights on the BOD was associated with lower total margin ($\beta = -0.011$, $p < 0.065$). Similarly, we found that having a greater percentage of voting BOD members who were managers was associated with lower total margin ($\beta = -0.296$, $p < 0.002$) and return on assets ($\beta = -0.337$, $p < 0.072$). We did not find support for the notion that Chief Executive Officer (CEO) involvement on the BOD is associated with poorer hospital financial performance ($\beta = -0.008$, $p < 0.437$). Consistent with Agency

Theory, our findings suggest that management involvement on the BOD is associated with poorer hospital financial performance. This finding suggests that management involvement on the BOD may impair the BOD's ability to effectively monitor the actions of management which may lead managers to make decisions that are more consistent with their own interests rather than the interests of organization.

Introduction

Hospitals' boards of directors (BODs) have a fiduciary responsibility to assist hospitals in adjusting to the complex demands of regulation and market forces that the healthcare industry often faces (J. A. Alexander, Weiner, & Bogue, 2001). Their role has become more critical over the last three decades as several initiatives (e.g. prospective payment system, health information technology, etc.) to improve quality and reduce costs have been implemented in the healthcare sector (Blumenthal, 2010; Bowles & Simpson, 2010; Enthoven & Noll, 1984). Those initiatives have previously been linked to less reimbursement from third-party payers and more hospital spending which often translates into decreased financial returns (Langabeer Ii, DelliFraine, & Helton, 2010). Thus, hospitals and their BODs must implement strategies to sustain and improve hospital financial performance. One strategy hospitals have used since the 1980s is management involvement on the BOD (J. A. Alexander, Morlock, & Gifford, 1988). Specifically, there was an increase in Chief Executive Officers (CEOs) serving on hospital BODs in the early to mid-1980s following a supreme court decision that established BODs are legally responsible for the fiscal management of hospitals (J. Alexander & Morlock, 1985; Morlock, Alexander, & Hunter, 1985; Thomas, 1977). This increase was aimed at

providing BODs with more direct information to support their responsibility for fiscal management and hospital operations.

Hospitals have used management participation on the BOD as a strategy to improve fiscal management of the hospital, but it is yet unclear how this strategy relates to financial performance. Although there are no studies that examine the relationship between overall management involvement on the BOD and hospital financial performance, previous research has identified a link between CEO participation on the BOD and hospital financial performance (Molinari, Hendryx, & Goodstein, 1997; Molinari, Morlock, Alexander, & Lyles, 1993). Specifically, one team of researchers examined the relationship between CEO-board relations and hospital financial performance in a cross-sectional study using 1985 data (Molinari et al., 1993). They operationalized CEO participation on the BOD as a CEO who has voting rights, and they found a positive and significant relationship between CEO participation on the BOD and hospital financial performance.

In a similar study, the same research team examined data from two time periods, 1985 and 1989, and found that CEO participation on the BOD was significantly related to improved hospital performance (Molinari et al., 1997). However, both of these studies focused on hospitals in only one state and used data that is more than three decades old. Several initiatives including the switch from a retrospective to a prospective payment system (PPS) (Enthoven & Noll, 1984), the growth of Health Maintenance Organizations (HMOs) (Markovich, 2003) and the passage of several laws including the Balanced Budget Act of 1997 (Morrisey, 2008), the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 (Blumenthal, 2009, 2010), and the Patient

Protection and Affordable Care Act (PPACA) of 2010 (Harrington, 2010) have been implemented over the last three decades changing the environment in which hospitals operate. Therefore, research using current data and more rigorous methods is needed to sort out whether or not management involvement on the BOD is an effective strategy for hospitals to improve hospital financial performance.

The purpose of this study is to investigate the relationship between management involvement on not-for-profit hospitals' BODs and hospital financial performance using more contemporary data. We examine overall management team, CEO, and Chief Financial Officer (CFO) involvement on the BOD. Given that only cross-sectional data on management involvement on hospital BODs is available, propensity scores were utilized in an effort to address some of the selection bias which is possible in a simple cross-sectional design. The results of the current study contribute to our knowledge on the role of management involvement in hospital governance and how it relates to hospital financial performance.

Theoretical Framework

The origins of agency theory can be traced back in the literature to the 1960s and early 1970s in which economists explored the concept of risk sharing among individuals or groups (Arrow, 1971; Wilson, 1968). Later, agency theorists expanded the literature to include agency problems that occur when cooperating parties have different goals and division of labor (Jensen & Meckling, 1976; Ross, 1973). Agency theory views the organization as a group of contracts between the organization's owners (i.e. principal) and the agents (e.g. management) with whom the principals contract to perform work and

make decisions. This type of contractual relationship can cause problems to arise when principals transfer responsibility for decision making to agents who have differing preferences than the principal. In this situation, both the principal and the agent try to maximize their benefit with the least possible expenditure and the principal has incomplete or imperfect information about the agent's performance (information asymmetry). Consequently, agents often pursue their own interests and neglect those of the principal (Eisenhardt, 1989; Fama & Jensen, 1983). Since principals retain the risk for the outcomes of the agent's decisions, they attempt to reduce agency problems by monitoring the agent's behavior or by incentivizing the agent to act in the principal's best interest.

Stakeholders of hospitals often use the governing BOD as a monitoring mechanism to reduce problems in agency relationships (Fama & Jensen, 1983). Since the BOD's responsibility is to monitor management's actions and safeguard the interests of the stakeholders (e.g. owners, community, etc.), agency theorists argue that the BOD should be made up of individuals who are independent from the hospital's management. It is believed that when the members of the BOD are independent, they are able to monitor management's actions more effectively which will in turn lead to better financial performance.

Although no studies exist that examine the relationship between independent BODs and hospital financial performance, the results of two studies taken together indicate that when the BOD is independent from management, they are able to monitor management more effectively which leads to better performance for the hospital (Jiang, Lockee, & Fraser, 2011; Young, Stedham, & Beekun, 2000). First, in a study conducted

by Young and colleagues, the authors found that having an independent board chairperson was positively associated with the board adopting a formal CEO evaluation process (Young et al., 2000). This finding suggests that having an independent board chairperson may lead to more effective monitoring of management. Next, a study on board oversight and its relationship with quality performance in hospitals suggests that the monitoring of management and medical staff (i.e. agents) by the BOD may be an effective tool to improve quality performance (Jiang et al., 2011). In that study, the authors found that the BOD's monitoring of hospital quality performance on a regular basis was associated with improved quality performance on processes of care and risk-adjusted mortality. Since management and medical staff both have a potential influence on quality of care, the BOD was essentially monitoring their performance which may have led to better quality of care. These studies support the agency theory concept that the monitoring mechanism (i.e. the BOD) helps align management's interests with those of the stakeholders which in turn leads to better financial performance (Fama & Jensen, 1983).

Taken together, these studies indicate that having an independent BOD leads to more effective monitoring and better hospital performance. Therefore, when management is involved on the BOD, monitoring by the BOD will be less effective which will lead to a decline in hospital financial performance. Thus, we hypothesize the following:

Hypothesis 1a: A higher number of voting management members on a hospital's BOD, is associated with poorer financial performance.

Hypothesis 1b: Hospitals with a higher proportion of management members as a proportion of all voting BOD members will have poorer financial performance.

Agency theorists argue CEO involvement on the BOD reduces the effectiveness of its monitoring role. They argue that since CEOs are the most closely monitored member of management, they may be motivated by self-interest to manipulate the information they share with the BOD about their own performance or the organization's activities (Baysinger & Hoskisson, 1990). In turn, this manipulation of information may lead to decisions that conflict with the stakeholder's interests and a decline in hospital financial performance. Thus, we propose the following:

Hypothesis 2a: Hospitals with CEOs that have voting rights on their boards will have poorer financial performance than those that do not.

Since the CFO is the manager that oversees the financial operations of the organization, they have the most expertise about the financial performance of the company. Therefore, the CFO will have an information advantage about the financial operations of the organization and may selectively share data with the BOD for their own gain if they are involved in BOD decision making. When decisions are made based on this imperfect data, the financial performance of the organization can be negatively impacted. Thus, we propose the following hypothesis:

Hypothesis 2b: Hospitals with CFOs that have voting rights on their boards will have poorer financial performance than those that do not.

Methods

Description of Data

Data for this cross-sectional study on U.S. not-for-profit hospitals was obtained from three sources of secondary data: (1) the 2011 Governance Institute Biennial Survey of Hospitals and Health Systems data, (2) the 2011 Center for Medicare and Medicaid Services (CMS) Medicare Cost Reports (MCR) data, and (3) the 2009 American Hospital Association (AHA) Annual Survey data. Hospitals were first matched in the Governance and AHA datasets based upon their AHA identification number. Next, hospitals were matched with their corresponding CMS MCR data based on their Medicare provider numbers. Hospitals without information across all datasets were excluded. The 2011 Governance Institute Biennial Survey of Hospitals and Health Systems data was used to measure management involvement on the BOD. That survey is administered by The Governance Institute every two years on structures and practices of governing boards of not-for-profit hospitals (The Governance Institute, 2011). It is administered independently without financial support from the government or any other third-party private entities. In 2011, 660 not-for-profit hospitals responded to the survey. That represents 15.5% of the 4,250 not-for-profit hospitals at that time. Previous studies have used the data from that survey to investigate hospital governance (Brickley, Van Horn, & Wedig, 2004; Jiang et al., 2011). Specifically, one group of researchers used it to explore the roles and practices of BODs in quality oversight and how that quality oversight is

related to hospital quality performance (Jiang et al., 2011). Another study used the survey data to examine the relationship between management representation on not-for-profit hospitals' BODs and excessive CEO pay (Brickley et al., 2004).

Data from CMS's Medicare Cost Reports, which are filed annually with CMS by all U.S. hospitals that accept Medicare as a form of payment, was used to measure financial performance of hospitals. Data from the AHA Annual Survey, which is administered annually to all U.S. hospitals, will be used to measure control variables included in the study. Both of these datasets have been widely used in health services research. Our university's Institutional Review Board deemed this study exempt from human subjects.

Management Involvement on the Board of Directors

The involvement of management on the BOD was measured differently for each hypothesis. In all cases, a manager is defined as someone who is a non-physician board member and holds a full-time administrative position in the organization. In hypothesis 1a, it was operationalized as the number of managers who have voting rights on the BOD. In hypothesis 1b, it was measured as the number of managers who have voting rights on the BOD as a percentage of the total members who have voting rights on the BOD (See Table 1). Management involvement on the BOD as measured in hypotheses 1a and 1b are continuous variables, and a hospital with a higher number of voting managers or higher percentage of voting managers are considered to have more management involvement on the BOD.

Management involvement on the BOD in hypothesis 2a was measured as the CEO having voting rights on the BOD. It is a dichotomous variable with "1" representing a CEO who is a voting member of the board and "0" representing all other CEOs. Similarly, in hypothesis 2b, management involvement on the board of directors was measured as the CFO having voting rights on the BOD. It is also a dichotomous variable with "1" representing a CFO who is a voting member of the board and "0" representing all other CFOs.

Financial Performance

The financial performance of acute care hospitals is most often measured using profitability ratios (Pink et al., 2005). Thus, we adopt a widely used definition of financial performance as any profitability measure that captures both revenues and expenses of a hospital (Casey, Burlew, & Moscovice, 2007; Irwin, Hoffman, & Lamont, 1998; Langland-Orban, Gapenski, & Vogel, 1996). Due to the complexity and inconsistency of accounting based measures of performance, researchers generally use more than one profitability measure to assess financial performance (Dalton, Daily, Ellstrand, & Johnson, 1998; Dalton, Daily, Johnson, & Ellstrand, 1999). Accordingly, we used three measures that are expected to be responsive to management involvement on the BOD: total margin, operating margin, and return on assets (see Table 1 for the calculation of each measure).

Control Variables

Identification of control variables was based on items that may affect management involvement on the BOD or financial performance. These include competition, geographic location, size, payer mix, ownership, teaching status, accreditation status, and system affiliation. The Herfindahl-Hirschman Index, which measures the concentration of an industry in a particular market, was calculated to operationalize competition. The size of each hospital was measured as the number of beds that are set up and staffed, and payer mix was measured as the proportion of inpatient days that are Medicare and Medicaid patients. Each of the preceding control variables were operationalized as continuous variables. Additionally, geographic location (1=rural, 0=urban) was measured as rural or urban using Rural Urban Commuting Codes (RUCA) (Hart, Larson, & Lishner, 2005; Rural Health Research Center, 2013). The remaining control variables were all binary and included whether or not a hospital was government owned, a system member, an accredited hospital, and a teaching hospital. Data for each of the control variables except rural location was obtained from the 2011 American Hospital Association Annual Survey data.

Data Analysis

Descriptive statistics for the independent variables, control variables, and dependent variables were analyzed to determine the variability of each, to test the assumptions of the regression model, and to test for outliers in the data. We detected skewness in all three outcome variables (e.g. total margin, operating margin, and return on assets), and we corrected for it through the use of log transformation. Since some the

outcome variable values were negative we added a constant to all values before log transforming them. Then, using STATA software version 10, we used an ordinary least squares regression model to analyze the relationship between management involvement on the board and hospital financial performance. To address some of the potential unobserved differences in groups presented by the cross-sectional nature of these data, we controlled for propensity score strata. To calculate propensity scores, we used hospital characteristics in a logistic regression analysis to calculate the predicted probability that a hospital will have managers on its BODs. Hospital characteristics used included binary variables for whether or not a hospital was government owned, a system member, an accredited hospital, a teaching hospital, and a rural hospital. In calculating propensity scores, we also included the proportion of inpatient days that were Medicare patients, the proportion of inpatient days that are Medicaid patients, the number of staffed beds, and competition. Based on the predicted probabilities obtained, we created four categories representing the quartile along the continuum that a given hospital represented. This categorical variable, representing propensity strata was then used in our ordinary least squares regression model in the form of dummy variables. In our analysis, we flag statistical significance at the $p < 0.10$ and $p < 0.05$ levels respectively.

Results

After merging the three datasets for our analyses, we ended up with 637 not-for-profit hospitals in our sample. The maximum number of managers on a hospital's BOD was eight, and 44.4% of the hospitals in our sample had at least one manager on the BOD. The majority of the not-for-profit hospitals included in our sample were not

government owned (74.1%) or members of a system (61.1%) (see Table 2). Also, the sample included mostly non-teaching hospitals (94%) that were accredited (67.2%) and located in a rural geographic location (53.5%). On average, hospitals in our sample had 173.75 beds that were set up and staffed. Furthermore, bivariate analyses suggests that both the total number of managers with voting rights on the BOD ($\beta = -0.089$, $p < 0.052$) and the percentage of voting BOD members that are managers ($\beta = -0.145$, $p < 0.002$) are negatively correlated with total margin (see Table 3). Additionally, the CEO having voting rights on the BOD is positively correlated with operating margin ($\beta = 0.110$, $p < 0.012$).

In our multivariate analyses, we used a linear regression to examine how management involvement on the BOD is related to hospital financial performance. In all cases, adjusting for propensity scores did not affect our results; thus, we presented the fully adjusted models. In hypothesis 1a, we hypothesized that having a larger number of voting management members on the BOD is associated with poorer hospital financial performance. Our findings support this hypothesis when using total margin ($\beta = -0.011$, $p < .065$) as the hospital financial performance measure but not when using operating margin ($\beta = -0.004$, $p < 0.512$) or return on assets ($\beta = -0.017$, $p < 0.152$) (see Table 4). In hypothesis 1b, we hypothesized that having a larger percentage of voting members that are managers is associated with poorer financial performance. This hypothesis was supported when we used total margin ($\beta = -0.296$, $p < 0.002$) or return on assets ($\beta = -0.337$, $p < 0.072$) as the hospital financial performance measure; but not when we used operating margin ($\beta = -0.124$, $p < 0.159$) as the outcome measure (see Table 5).

In hypothesis 2a, we expected hospitals that had CEOs with voting rights on their boards to have poorer financial performance than those that do not. Our data analysis did not support this hypothesis using any of the financial performance measures examined (see Table 6). Additionally, in hypothesis 2b, we hypothesized the same relationship but with CFOs instead of CEOs. We found that there were no CFOs with voting rights on the BODs of any hospital we examined; thus, we were unable to examine this relationship.

The number of staffed beds, being a teaching hospital, and the level of market concentration (i.e. HHI) were consistently and positively associated with different measures of hospital financial performance across all three models. Specifically, the number of staffed beds was associated with total margin and operating margin; being a teaching hospital was associated with return on assets; and market concentration (i.e. HHI) was related to operating margin. On the other hand, government ownership and a hospital's percent of inpatient days that were from Medicare patients were negatively and consistently associated with different measures of financial performance across all three models. Specifically, government ownership was associated with operating margin, and a hospital's percent of inpatient days that were from Medicare patients was associated with total margin.

Discussion

Our main finding that management involvement on the BOD is associated with poorer hospital financial performance is consistent with agency theory. This finding may be because management involvement on the BOD may impair the BOD's ability to effectively monitor the actions of management which may lead to management making

decisions that are in their best interest rather than that of hospital stakeholders (Fama & Jensen, 1983). Consequently, this opportunistic decision making may lead to poorer financial performance for the hospital.

Specifically, we found that having managers as voting members on the BOD is associated with poorer financial performance as measured by total margin and return on assets; but not operating margin. Both total margin and return on assets are based on total hospital revenues (e.g. patient revenues, charitable contributions, investments, etc) whereas operating margin is based on patient revenues only. Thus, the findings we present pertaining to poorer financial performance may be due to hospitals having lower non-operating revenues such as charitable contributions or unrelated business revenues (i.e. business ventures that are not related to providing care to patients) when management is involved on the BOD. These lower non-operating revenues may occur because the number of outside representatives on the board is reduced by the number of management members on the BOD. Because these outside members can provide linkages to the hospitals' external environments (e.g. the community, other businesses) that may result in increased non-operating revenues (Bazerman & Schoorman, 1983; Stearns & Mizruchi, 1993), having fewer outside representatives on the BOD may reduce a hospital's non-operating revenues thus reducing total margin and return on assets.

We did not find support for our hypothesis that having CEOs with voting rights on the BODs is associated with poorer hospital financial performance. This may be because BODs often structure CEOs' compensation packages in a manner that incentivizes them to act in the best interest of the hospital's stakeholders (Conyon, 2006). Thus, CEO presence on the BOD may not affect hospital financial performance the same

way as the presence of other managers who may not be compensated in the same manner. These findings support the concept of agency theory that incentives will reduce and possibly eliminate agency problems caused by CEOs having voting rights on the BOD (Fama & Jensen, 1983).

It is important to note that several control variables were consistently associated with hospital financial performance across all three models. First, we found that the number of staffed beds was positively related to both total margin and operating margin, but not return on assets in our analyses for all three hypotheses. This may be because having more beds may generate more operating revenues but not enough to improve a hospital's return on assets. Next, we found that government ownership was associated with lower operating margins. This may be due to the fact that government owned hospitals often have much higher rates of charitable care patients which may reduce patient revenues (i.e. operating revenues). Lastly, we found that market concentration was positively related to operating margin which may be due to hospitals providing more services in communities where competition is low.

Our study has several limitations worth mentioning. First, our study sample consists of not-for-profit hospitals that voluntarily responded to The Governance Institute's 2011 Biennial Survey which may have introduced response bias. Further, given the sample of respondents, our results may not be generalizable to all not-for-profit hospitals—and certainly not for-profit hospitals in the US. However, our sample did include not-for-profit hospitals of different sizes from different locations with different payer mixes and teaching statuses. Additionally, we used data from the MCR to calculate the profitability measures we used to operationalize hospital financial performance.

Since this data only includes information for hospitals that provide care to Medicare beneficiaries, the generalizability of this data may be impaired (Kane & Magnus, 2001). However, this problem is mitigated by the fact that almost all acute care facilities serving adults accept Medicare.

Conclusion

The current study contributes to the healthcare management literature by being the first examination of management involvement on the BOD and hospital financial performance in several decades and by being the first study on management involvement on the board to use total margin as an outcome measure (Molinari et al., 1997; Molinari et al., 1993). As hospitals continue to face changes in their environments such as healthcare reform (Harrington, 2010) and other recent policy initiatives (Blumenthal, 2010; Morrisey, 2008) that may lead to a decline in financial performance, it is necessary for BOD's to implement strategies to improve their leadership and fiscal management of the hospital. Because our findings suggest management involvement on the BOD is associated with poorer financial performance, BODs should consider choosing members that are independent from the top management team. However, as long as BODs provide CEOs with compensation packages that incentivize them to align their interests with that of the hospital stakeholders, it may not affect hospital financial performance when having a CEO with voting rights on the BOD. Since hospitals' boards of directors have a fiduciary responsibility to assure their hospitals are adjusting to the complex demands of regulation and market forces (J. A. Alexander et al., 2001), our findings benefit decision makers interested in the impact of BOD composition on financial performance.

Table 1

Calculations for variables of interest

Variable	Calculation
Percentage of managers who have voting rights on the board	$\frac{Number\ of\ Voting\ Managers\ on\ Board}{Total\ Number\ of\ Voting\ Members\ on\ the\ Board}$
Operating Margin	$\frac{Net\ Operating\ Income}{Operating\ Revenue}$
Total Margin	$\frac{Net\ Income}{Total\ Revenues}$
Return on Assets	$\frac{Net\ Income}{Total\ Assets}$

Table 2

Descriptive statistics of our sample of not-for-profit hospitals (*n*=637)

Hospital Characteristics	***n* (%)**
Ownership	
Government	165 (25.9)
Non-government	472 (74.1)
Size	
Mean	173.75
Median	122
Range	6-1066
Teaching status	
Teaching	38 (6.0)
Non-teaching	599 (94.0)
Location	
Rural	341 (53.5)
Urban	293 (46.0)
Accreditation status	
Accredited	428 (67.2)
Not accredited	209 (32.8)
System member	
Yes	248 (38.9)
No	389 (61.1)

Table 3

Correlation matrix for variables measuring financial performance and measures of management involvement on the board

Independent Variable of Interest	Total Margin	Operating Margin	Return on Assets
Total number of managers with voting rights on the BOD	-0.089*	0.060	-0.031
Percentage of BOD members with voting rights that are managers	-0.145***	0.034	-0.050
CEO has voting rights on the BOD	-0.020	0.110**	0.037

Note: values in cells represent Pearson correlation coefficients
***p<.01; **p<.05; *p<.10

Table 4

Multivariate analyses between number of managers on the BOD and hospital financial performance (Hypothesis 1a) (n= 500)

	Total Margin		Operating Margin		Return on Assets	
	Without Propensity Strata	With Propensity Strata	Without Propensity Strata	With Propensity Strata	Without Propensity Strata	With Propensity Strata
Independent Variable:	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**
Total number of managers with voting rights on the BOD	-0.011*	-0.011*	-0.003	-0.004	-0.016	-0.017
Control Variables:						
Government owned	0.000	-0.026	-0.045***	-0.185***	-0.014	-0.138
System member	-0.003	-0.001	0.011	0.013	0.015	0.015
Bed size	0.000***	0.000***	0.000**	0.000**	0.000	0.000
Accredited	-0.014	-0.013	0.006	0.10	-0.022	-0.020
Teaching hospital	-0.019	-0.014	-0.031	-0.011	0.132***	0.149***
Rural	0.009	0.007	-0.004	-0.008	-0.023	-0.025
Medicare percent	-0.065*	-0.067*	0.021	0.016	-0.067	-0.071
Medicaid percent	-0.040	-0.041	0.002	0	-0.058	-0.058
Market concentration (HHI)	0.007	0.007	0.038**	0.037**	0.027	0.026
Low Propensity Strata		Reference		Reference		Reference
Medium Low Propensity Strata		-0.027		-0.145***		-0.130
Medium High Propensity Strata		-0.029		-0.152***		-0.132
High Propensity Strata		-0.034		-0.157**		-0.134

***p<.01; **p<.05; *p<.10

Table 5

Multivariate analyses between percentage of voting members of the BOD that are managers and hospital financial performance (Hypothesis 1b) (n= 497)

	Total Margin		Operating Margin		Return on Assets	
	Without Propensity Strata	With Propensity Strata	Without Propensity Strata	With Propensity Strata	Without Propensity Strata	With Propensity Strata
Independent Variable:	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**
Percentage of voting members of the BOD that are managers	-0.295***	-0.296***	-0.121	-0.124	-0.332*	-0.337**
Control Variables:						
Government owned	-0.006	-0.030	-0.048***	-0.187***	-0.018	-0.139
System member	0.001	0.003	0.013	0.015	0.018	0.019
Bed size	0***	0***	0**	0**	0	0
Accredited	-0.014	-0.013	0.006	0.009	-0.023	-0.021
Teaching hospital	-0.015	-0.011	-0.029	-0.009	0.135*	0.152***
Rural	0.008	0.006	-0.004	-0.008	-0.023	-0.025
Medicare percent	-0.067*	-0.068*	0.022	0.016	-0.069	-0.073
Medicaid percent	-0.041	-0.042	0.001	-0.001	-0.058	-0.059
Market concentration (HHI)	0.012	0.012	0.040**	0.039**	0.033	0.032
Low Propensity Strata		Reference		Reference		Reference
Medium Low Propensity Strata		-0.025		-0.144***		-0.128
Medium High Propensity Strata		-0.025		-0.150***		-0.129
High Propensity Strata		-0.031		-0.156**		-0.133

Table 6

Multivariate analyses between the CEO having voting rights on the BOD and hospital financial performance (Hypothesis 2a) (n= 553)

	Total Margin		Operating Margin		Return on Assets	
	Without Propensity Strata	**With Propensity Strata**	**Without Propensity Strata**	**With Propensity Strata**	**Without Propensity Strata**	**With Propensity Strata**
Independent Variable:	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**	**Unstanderdized Coefficient**
CEO has voting rights on the BOD	-0.008	-0.008	-0.004	-0.004	-0.003	-0.004
Control Variables:						
Government owned	0.001	-0.026	-0.043***	-0.183***	-0.003	-0.146
System member	-0.002	-0.001	0.010	0.019*	0.016	0.020
Bed size	0***	0***	0***	0***	0	0
Accredited	-0.009	-0.008	0.014	0.018*	-0.012	-0.008
Teaching hospital	-0.023	-0.019	-0.045**	-0.021	0.120***	0.143***
Rural	0.017	0.014	-0.002	-0.014	-0.002	-0.010
Medicare percent	-0.079**	-0.080**	-0.024	-0.034	-0.084	-0.092
Medicaid percent	-0.044	-0.046	-0.019	-0.027	-0.066	-0.070
Market concentration (HHI)	-0.004	-0.005	0.033**	0.031*	0.004	0.002
Low Propensity Strata		Reference		Reference		Reference
Medium Low Propensity Strata		-0.026		-0.137***		-0.143
Medium High Propensity Strata		-0.032		-0.161***		-0.162
High Propensity Strata		-0.033		-0.173***		-0.164

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CHAPTER 5

CONCLUSION

Introduction

Taken together, the purpose of the three papers included in this dissertation is to provide empirical evidence on the relationship between strategies employed by hospital managers and hospital financial performance. The findings of these studies are important to managers as they search for ways to sustain and improve hospital financial performance in light of environmental changes that have taken place over the last three decades such as the switch from a retrospective to a prospective payment system (PPS) , the growth of Healthcare Maintenance Organizations (HMOs), the passage of the Balanced Budget Act of 1997 (Morrisey, 2008), the passage of the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 (Blumenthal, 2009, 2010), and the passage of the Patient Protection and Affordable Care Act (PPACA) of 2010. Each of these initiatives have focused on ways to reduce overall healthcare costs, increase healthcare quality, or both (Langabeer Ii, DelliFraine, & Helton, 2010; Morrisey, 2008). Although these initiatives may be beneficial to third-party payers and healthcare consumers, some researchers have argued that they may have a negative impact on a hospital's financial performance (Langabeer Ii et al., 2010). Reducing healthcare costs and improving healthcare quality has previously been linked to less reimbursement (i.e. revenue) from third-party payers which translates into decreased financial returns. Because hospitals already operate on small margins, hospital managers must employ strategies to achieve sustainable financial returns which are necessary for the continued operation of hospitals. Each of the three papers in this dissertation

examines strategies hospital managers may employ to improve and sustain hospital financial performance. The findings of each paper are outlined in the following paragraphs.

Paper 1 (Chapter 2): Factors That Influence Hospital Financial Performance: A Systematic Review and Meta-Analysis

The purpose of paper 1 was to systematically review the hospital financial performance literature and conduct a meta-analysis to determine how various hospital strategies are related to financial performance. The main finding of this literature review and meta-analysis is that studies focusing on factors or strategies that typically involve decision making by hospital leaders (e.g. governance, management strategies) were more likely to find a positive association with hospital financial performance than those that examined factors that are not under such leadership control (e.g. organizational characteristics and market characteristics). This emphasizes the important role that decision making by hospital leaders plays in hospital financial performance and supports the strategic management theoretical point of view.

Our systematic review identified gaps in the hospital financial performance literature that present opportunities for future research. The limited number of articles that examined governance and quality strategies was one of the most notable gaps identified. Specifically, only a small proportion of the 89 articles we reviewed focused on governance (6.7%) and quality improvement strategies (5.6%). Most of the articles that focused on governance used data that was more than three decades old (C. Molinari, Alexander, Morlock, & Lyles, 1995; Carol Molinari, Hendryx, & Goodstein, 1997; Carol Molinari, Morlock, Alexander, & Lyles, 1992; Carol Molinari, Morlock, Alexander, &

Lyles, 1993) and none of them used total margin as the outcome measure. Furthermore, articles that focused on governance or quality used mostly cross-sectional data that did not address potential selection bias or unobserved differences in groups (Culica & Prezio, 2009; Harkey & Vraciu, 1992; Carol Molinari et al., 1992; Carol Molinari et al., 1993; Nelson et al., 1992; Smythe, Koerber, Fitzgerald, & Mattson, 2008; Young, Beekun, & Ginn, 1992). Therefore, more rigorous studies using current data are needed to examine the relationship between governance or quality improvement strategies and hospital financial performance and would be beneficial to policymakers and hospitals leaders especially in light of healthcare reform, other recent policy initiatives, and the intense focus on quality of care and cost containment in hospitals.

Paper 2 (Chapter 3): Does EHR Use Improve Hospital Financial Performance? Evidence from Panel Data

Paper 2 contributes to the healthcare management literature by being the first study to examine the relationship between the level of Electronic Health Record (EHR) adoption and hospital financial performance using a longitudinal panel study design with hospital and year fixed effects. Because this study design provides the most rigorous evidence to date on this relationship, it fills an important gap in the healthcare management literature.

The main findings of this study suggest that changes in the level of EHR adoption are not related to improved hospital financial performance from patient revenues or reduced operating costs. However, it does suggest that incentives offered under the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 to hospitals that meaningfully use their EHR may improve hospital financial

performance in the years hospitals receive them. Because these incentives are only temporary, it is still unclear if hospitals will experience long-term financial benefits from meaningfully using an EHR. Given that we did not find an improvement in operating margin nor return on assets two years after changes in the level of EHR adoption, it is likely that hospitals will not experience benefits from adopting an EHR until several years later; if at all. As more data becomes available, future research should examine the financial impacts of comprehensive EHR adoption with longer lag periods to account for the possibility that two years is insufficient time for the benefits to accrue.

Paper 3 (Chapter 4): The Association between Top Management Involvement on the Board and Hospital Financial Performance

Gaps identified in paper 1 relating to the examination of governance in the hospital financial performance literature are addressed in paper 3. Specifically, paper 3 contributes to the healthcare management literature by being the first examination of management involvement on the board of directors (BOD) and hospital financial performance in several decades and by being the first study on management involvement on the board to use total margin as an outcome measure.

Because our main finding suggests management involvement on the BOD is associated with poorer financial performance, BODs should consider choosing members that are independent from the top management team. This is important because management involvement on the BOD may impair the BOD's ability to effectively monitor the actions of management which may lead to management making decisions that are in their best interest rather than that of hospital stakeholders (Fama & Jensen, 1983). Consequently, this opportunistic decision making may lead to poorer financial

performance for the hospital. Additionally, having BOD members that are independent of management (e.g. outside members) can provide linkages to the hospitals' external environments (e.g. the community, other businesses) that may result in increased non-operating revenues such as charitable contributions or revenues from business ventures that are unrelated to serving patients (Bazerman & Schoorman, 1983; Stearns & Mizruchi, 1993). Therefore, having fewer outside representatives on the BOD may reduce a hospital's nonoperating revenues thus reducing total margin and return on assets.

Conclusion

As hospitals continue to face financially constraining changes in their environments, such as healthcare reform and quality improvement initiatives, it is important for hospital leaders to choose strategies that will improve hospital financial performance. The results of this dissertation suggest that to improve financial performance hospital leaders (e.g. management, board of directors) should choose strategies that are more amenable to their control. Specifically, having BOD members that are independent from management is positively related to financial performance. Additionally, adopting an EHR can improve financial performance for hospitals, but only through receiving incentive payments for meaningfully using them. Taken together, the findings of these studies will be beneficial to hospital leaders as they are making decisions about which strategies to pursue. However, these studies only address two specific strategies. Thus, more research is needed on other strategies such as quality improvement.

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Appendix A

IRB Approval

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

Institutional Review Board for Human Use

Form 4: IRB Approval Form
Identification and Certification of Research
Projects Involving Human Subjects

UAB's Institutional Review Boards for Human Use (IRBs) have an approved Federalwide Assurance with the Office for Human Research Protections (OHRP). The Assurance number is FWA00005960 and it expires on January 24, 2017. The UAB IRBs are also in compliance with 21 CFR Parts 50 and 56.

Principal Investigator: COLLUM, TALEAH H

Co-Investigator(s):

Protocol Number: **E130312010**

Protocol Title: *Hospital Financial Performance: A Look at Governance and HIT Strategies*

The above project was reviewed on 3/18/13. The review was conducted in accordance with UAB's Assurance of Compliance approved by the Department of Health and Human Services. This project qualifies as an exemption as defined in 45CF46.101, paragraph 4.

This project received EXEMPT review.

IRB Approval Date: 3/18/13

Date IRB Approval Issued: 3/18/13

Cari Oliver
Assistant Director, Office of the
Institutional Review Board for Human
Use (IRB)

Investigators please note:

IRB approval is given for one year unless otherwise noted. For projects subject to annual review research activities may not continue past the one year anniversary of the IRB approval date.

Any modifications in the study methodology, protocol and/or consent form must be submitted for review and approval to the IRB prior to implementation.

Adverse Events and/or unanticipated risks to subjects or others at UAB or other participating institutions must be reported promptly to the IRB.

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
1530 3RD AVE S
BIRMINGHAM AL 35294-0104

IRB Reviewer – Exemption Approval Tool

This tool is to be used by the IRB reviewer to determine and document whether human subjects research meets the exemption criteria, and if so, the category or categories allowing the determination.

---

1. Exempt Category or Categories 4

2. Does the research proposed meet the exemption criteria as outlined on the application? ☑ Yes ☐ No

3. The research presents no more than minimal risk to subjects. ☑ Yes ☐ No

4. The research includes no procedures that may cause a subject either physical or psychological discomfort or is perceived as harassment above and beyond what the person would experience in daily life. ☑ Yes ☐ No

5. Selection of subjects is equitable. ☑ Yes ☐ No

6. There are adequate provisions to maintain confidentiality of data. ☑ Yes ☐ No

7. Are there interactions with subjects? ☐ Yes ☑ No
   If yes, does the consent process disclose such information as:
   - That the activities involve research. ☑ Yes ☐ No
   - The procedures to be performed. ☐ Yes ☐ No
   - That participation is voluntary. ☐ Yes ☐ No
   - Name and contact information for the investigator. ☐ Yes ☐ No

8. There are adequate provisions to maintain the privacy interests of subjects. ☑ Yes ☐ No

9. The research does not involve deception. ☑ Yes ☐ No

COMMENTS:

[signature] 3/18/13

IRB Reviewer **Date**

EXEMPTION CHECKLIST (OIRB Use Only)

Protocol Number:	E130312010
Principal Investigator:	Collum, Taleah
Faculty Sponsor:	
Contact:	

Category 1 ☐
Commonly established educational setting? ☐ Yes ☐ No
Normal educational practices? ☐ Yes ☐ No

Category 2 ☐
Test/Survey/Interview/Observation? ☐ Yes ☐ No
Use of children? ☐ Yes ☐ No
Does the investigator participate in the activity? ☐ Yes ☐ No
Is information recorded anonymously? ☐ Yes ☐ No
Subjects at risk if information disclosed? ☐ Yes ☐ No

Category 3 ☐
Test/Survey/Interview/Observation? ☐ Yes ☐ No
Use of Elected or public officials? ☐ Yes ☐ No

Category 4 ☒
Collection or study of existing data? ☒ Yes ☐ No
No information *recorded* by investigator? ☒ Yes ☐ No
Source/Type of Materials: 3 sources
Permission to use materials? ☒ Yes ☐ No ☐ NA
Collection Sheet/list of variables? ☐ Yes ☒ No

Category 5 ☐
Evaluation of public benefit or service program ? ☐ Yes ☐ No
Conducted by or subject to agency approval? ☐ Yes ☐ No

Category 6 ☐
Evaluation of taste and food quality? ☐ Yes ☐ No

Is the Study Funded?	☐ Yes ☒ No
Sponsor:	
OSP Tracking or Link #	
Copy of Funding Application?:	☐ Yes ☐ No
Titles Match?	☐ Yes ☐ No

PORF ☒ Yes ☐ No

INTERACTION WITH PARTICIPANTS? ☐ Yes ☒ No
IF YES, CONSENT PROCESS _____

NOTES FOR IRB REVIEWER:

REVIEWED BY C Collum DATE 3/18/13

IRB Exemption Review Application

- **To complete the form,** click the underlined areas and type or paste in your text; double-click checkboxes to check/uncheck. For more tips, see www.uab.edu/irb/forms.
- **Mail or deliver all materials to AB 470,** 701 20th Street South, Birmingham, AL 35294-0104.

Indicate the type of review:
☒ **New** ☐ **Continuing Review** ☐ **Final Report**
IRB Protocol #_____

1. Project Identification

a. Title of Project: **Hospital Financial Performance: A Look at Governance and HIT Strategies**

b. Principal Investigator (PI): **Taleah Collum** PI's BlazerID or E-Mail Address: **tcollum**
If the PI is a student, fellow, or resident, provide the name, number, and email of the faculty advisor or course instructor as contact information and obtain the person's signature.
Advisor/Instructor's Name: **Nir Menachemi** Telephone Number: **205-934-7192**
BlazerID: **nmenachemi**
Advisor/Instructor's Signature: Nir Menachemi

c. PI's Address (on-campus or home)
On-Campus: Department:_____ Building:_____ Room:_____ UAB Zip:_____
Phone:_____ FAX:_____
-OR-
Home Address: **8** Street: **Heritage Way** City: **Oxford** State: **AL** ZIP: **36203**
and Campus Affiliation: **Department of Health Services Administration**

d. List all staff who will be involved with the research, their degree(s) and job title, and any additional qualifications. Include individuals who will be involved in the consent process. *Repeat the table below for each individual.*
Note. For studies involving investigational drugs, include all investigators who will be listed on FDA Form 1572 and attach a copy, if applicable. Send the IRB a copy of Form 1572 anytime you update the form with the FDA.

Role:	☐Co- -*OR*- ☒Other
Full Name:	**Nir Menachemi**
Primary UAB Dept.: (Employer if not UAB)	**Health Care Organization and Policy**
Degree(s) / Job Title:	**B.S. (Biological Anthropology); M.P.H. (Health Policy and Management); Ph.D. (Health Services Administration) / Professor; Director of the Doctor of Public Health Program**
Additional Qualifications pertinent to the study:	**His areas of expertise include Health Information Technology and Strategic Management.**

Role:	☐Co- -*OR*- ☒Other
Full Name:	**Stephen J. O'Connor**
Primary UAB Dept.: (Employer if not UAB)	**Health Services Administration**
Degree(s) / Job Title:	**B.S. (Microbiology); M.P.A. (Health Systems Planning); M.B.A. (Health Services Administration); Ph.D. (Administration-Health Services) / Professor**
Additional Qualifications	**His areas of expertise include Organizational Theory.**

E130312 010

pertinent to the study:	

Role:	☐Co- -*OR*- ☒Other
Full Name:	**Robert Weech-Maldonado**
Primary UAB Dept.: (Employer if not UAB)	**Health Services Administration**
Degree(s) / Job Title:	**M.B.A.; Ph.D /Professor**
Additional Qualifications pertinent to the study:	**His areas of expertise include Healthcare Finance.**

Role:	☐Co- -*OR*- ☒Other
Full Name:	Meredith L. Kilgore
Primary UAB Dept.: (Employer if not UAB)	**Health Care Organization & Policy**
Degree(s) / Job Title:	B.A. (Political Science); MSPH (Health Care Organization & Policy); Ph.D. (Policy Analysis) / Professor
Additional Qualifications pertinent to the study:	**His areas of expertise include statistical analysis with the use of propensity scores.**

Role:	☐Co- -*OR*- ☒Other
Full Name:	Bisakha (Pia) Sen
Primary UAB Dept.: (Employer if not UAB)	**Health Care Organization & Policy**
Degree(s) / Job Title:	B.Sc. (Economics); M.A. (Economics); Ph.D. (Economics) / Professor
Additional Qualifications pertinent to the study:	**Her areas of expertise include statistical analysis with the use panel data and fixed effects.**

e. Is this activity funded in any way? ☐Yes ☒No

If yes, attach 1 copy of completed application and complete (i)-(iv):

i. Grant or Contract Title:_____

ii. PI of Grant or Contract:_____

iii. OSP Proposal Number:_____

iv. Funding Source

☐Gov't Agency or Agencies:_____

☐UAB Departmental Funds:_____

☐Other:_____

2. Mark the category or categories below that describe the proposed research:

☐1. Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods. The research is not FDA regulated and does not involve prisoners as participants.

☐2. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) Information

obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation. Attach questionnaire(s) and/or surveys. If the research involves children as participants, the procedures are limited to educational tests and observation of public behavior where the investigators do not participate in the activities being observed. The research is not FDA regulated and does not involve prisoners as participants.

☐3. Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under category (2), if: (i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) require(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter. Attach to this application a copy of any questionnaire or survey to be used. The research is not FDA regulated and does not involve prisoners as participants.

☒4. Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the Investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. Attach a specimen release form if applicable. (*Specimens must be preexisting.*) The research is not FDA regulated and does not involve prisoners as participants.

☐5. Research and demonstration projects which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs;(iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs. The protocol will be conducted pursuant to specific federal statutory authority; has no statutory requirement for IRB review; does not involve significant physical invasions or intrusions upon the privacy interests of the participant; has authorization or concurrent by the funding agency and does not involve prisoners as participants.

☐6. Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture. The research does not involve prisoners as participants.

3. Briefly describe the proposed research:

The underlying theme for each of the three papers in my dissertation will be the financial performance of hospitals. Taken together, these three papers focus on hospital financial performance and strategies hospitals may use to sustain and improve their overall financial performance. The following is a brief synopsis of each paper I plan to write for my three-paper dissertation:

Paper 1:

The first paper in my dissertation will be a quantitative systematic review and meta-analysis of factors associated with financial performance in hospitals. Using a defined inclusion criterion, I will identify articles that are empirical, peer-reviewed, written in the English language, and based on US hospitals. In order to extract various bits of information from each included article, I will develop and use a code sheet for this project. Specifically, I will extract information from each article including which measurement of financial performance was used, the finding of the study, the independent variables of interest, and the study design (e.g., cross-sectional, longitudinal). By collecting such data, I will be able to understand which study characteristics are associated with hospital financial performance and identify gaps in the literature.

Paper 2:

The second paper will be a panel study with hospital fixed effects on the relationship between the use of electronic health records (EHRs) and hospital financial performance. I will use the American Hospital Association's (AHA) annual survey data for the years 2007 through 2010 and the Medicare Cost Reports for the years 2007 through 2011 to perform my analysis. My independent variable will be whether a hospital has an EHR. The dependent variable will be hospital financial performance and will be measured with common financial performance measures that are expected to be sensitive to EHR adoption.

Paper 3:

The third paper in my dissertation will utilize high-dimensional propensity scores to examine the relationship between top management involvement on the board of directors and hospital financial performance. My key independent variables, which will measure managements' involvement on the board, will be derived from multiple survey items from The Governance Institute's 2011 Biennial Survey. My dependent variable, financial performance, will be measured with ratios that are most commonly used for non-profit hospitals. These ratios will be calculated using the Medicare cost reports. The use of high-dimensional propensity scores will address some of the potential unobserved differences in groups presented by the cross-sectional nature of these data.

4. Describe how subjects/data/specimens will be selected. If applicable, include the sex, race, and ethnicity of the subject population:

I am using three pre-existing data sources for my research:

(1) 2011 Biennial Survey Data from The Governance Institute

I obtained access to this data directly from The Governance Institute. I signed an "Agreement for Proper Use" and they sent me the data via e-mail in an Excel file. See Attachment 1 for the "Agreement for Proper Use." I will use the following variables from this data to operationalize my independent variable in paper 3.

- The number of voting managers on the hospital's board
- The total number of voting members on the hospital's board
- The CFO's role on the board (Voting versus Non-voting member)
- The CEO's role on the board (Voting versus Non-voting member)

(2) 2007-2010 American Hospital Association's (AHA) Annual Survey Data

UAB Faculty and Students (with their advisor's approval) have access to this data through UAB's Lister Hill Center (LHC). See Attachment 2 for permission from the LHC to use the data and for the AHA "Data Use Agreements." A description of this data a link to purchase it can be found at http://www.ahadataviewer.com/book-cd-products/aha-survey/ (See attachment 4)

I will use the AHA Annual Survey for the following control variables in Papers 2 and 3

- Competition
- Bed size
- Location
- Payer mix
- System affiliation

I will also use the following variable from the AHA Annual Survey data to operationalize my independent variable in Paper 2:

- Does the hospital have an EHR or not?

(3) 2007-2011 Medicare Cost Reports from Centers for Medicare and Medicaid Services (CMS)

This data is publicly available via CMS's website.

A description of the data can be obtained through the following link:
http://www.cms.gov/research-statistics-data-and-systems/files-for-

order/costreports/index.html#. See Attachment 3 for a screenshot of this website and a description of the data.

The data for each year can be accessed through the following link: http://www.cms.gov/Research-Statistics-Data-and-Systems/Files-for-Order/CostReports/Cost-Reports-by-Fiscal-Year.html I will use the following variables from the Medicare Cost reports to calculate my outcome variables in Papers 2 and 3:

- Net Income
- Total revenues
- Operating income
- Operating revenues
- Total Assets

5. Does the research involve deception? ☐Yes ☒No

6. Describe why none of the research procedures would cause a subject either physical or psychological discomfort or be perceived as harassment above and beyond what the person would experience in daily life:

The data I am using is pre-existing, publicly available data. I will not be interacting with human subjects.

7. Describe the provisions to maintain confidentiality of data:

It's on a password protected computer in a locked office.

8. Describe the provisions included in the research to protect the privacy interests of participants (e.g., others will not overhear your conversation with potential participants; individuals will not be publicly identified or embarrassed).

The data I am using is pre-existing and there will be no interaction with human subjects. See number 7 for how I will keep hospital identity confidential.

9. Will the research involve interacting with the subjects? ☐Yes ☒No
If yes, describe the consent process and information to be presented to subjects, including:
- That the activities involve research.
- The procedures to be performed.
- That participation is voluntary.
- Name and contact information for the investigator.

10. Additional Information

In the space below, provide any additional information that you believe may help the IRB review the proposed research, or enter "None." None

11. Findings? **(applicable for Continuing Review or Final Report only)**
State both the positive and negative results received to date: **Not Applicable**

Since the last IRB review, have any of the following occurred?

a. Have participants experienced any harms (expected or unexpected)? ☐Yes ☐No
If yes, attach Problem Summary Sheet, and briefly describe here the harms (serious and/or non-serious) experienced by participants:____

b. Have there been any unanticipated problems involving risks to participants or others? ☐Yes ☐No

If yes, attach Problem Report, and briefly describe here the unanticipated problems involving risks to participants or others:____

c. Have you have any problems obtaining informed consent? ☐Yes ☐No ☐N/A
If yes, briefly describe the problems here:____

d. Have any participants or others complained about the research? ☐Yes ☐No
If yes, briefly describe the number and nature of the complaints:____

e. Have any participants withdrawn from the research? ☐Yes ☐No
If yes, indicate the number of withdrawals and include the reason for each:____

f. Have any obvious, study-related benefits occurred for participants? ☐Yes ☐No
If yes, briefly describe the benefits here:____

g. Have the risks or potential benefits of this research changed? ☐Yes ☐No
If yes, briefly describe the changes here:____

h. Has there been any published literature? ☐Yes ☐No
If yes, attach a copy and summarize the published findings here:_____

Principal Investigator's Signature: Taleah H. Collum Date: 3/8/13

Attachment 1

Agreement for Proper Use of Copyright-Protected Data

I, Taleah Collum, will be using the 2011 Biennial Survey Data from The Governance Institute for research purposes only, in order to complete my dissertation on how corporate governance affects the financial performance of hospitals. I understand that the dataset is protected under U.S. copyright laws, and that the organizations represented in the data were informed that their responses would remain anonymous. I will not distribute this data file to any parties not involved in this specific research project. I will not publish any information that could be used to identify individual organizations represented in this dataset.

Upon publication, I will provide a copy of my dissertation to Kathryn Peisert, Managing Editor, of The Governance Institute.

Taleah Collum
Signature

10/04/2012
Date

The Governance Institute
9685 Via Excelencia • Suite 100 • San Diego, CA 92126
Toll Free (877) 712-8778 • Fax (858) 909-0813
GovernanceInstitute.com

Attachment 2

LISTER HILL CENTER FOR HEALTH POLICY

February 21, 2013

TO: Nir Menachemi, Ph.D.
Professor, HCOP

FR: Michael A. Morrisey, Ph.D.
Professor and Director

RE: AHA Data

You have requested the use of the 2007 to 2010 American Hospital Association Annual Survey Database for use by Ms. Taleah Collum in her dissertation. I understand that you are her dissertation chair.

As you know, the LHC purchases the AHA data annually for use by the Lister Hill Center Scholars. As part of this purchase, the University agrees to abide by the Data Use Agreement required by the American Hospital Association. Thus, as a LHC Scholar you are eligible to use these data and make them available to a dissertation student under your direction. However, we do require that you sign a copy of the same Data Use Agreement that the University signed. I have attached a copy.

330 Ryals Public Health Building
1665 University Boulevard
205.934.6041
Fax 205.934.3347
www.healthpolicy.uab.edu

Mailing Address:
RPHB 330
1530 3RD AVE S
BIRMINGHAM AL 35294-0022

Single User Terms and Conditions

FY 2003 - 2008

REVISED OCTOBER 2006

1. Health Forum, LLC, an American Hospital Association company (LICENSOR) is the owner of the property (hereinafter "DATA") that is the subject of this Agreement. LICENSEE shall be the organization identified on the Data Order Agreement, or if no organization is identified, the individual identified on the Data Order Agreement. LICENSEE is granted a limited, non-exclusive, non-transferable license to use the DATA at the site to which the DATA were shipped, in accordance with the Terms and Conditions of this Agreement.

2. The Effective Date of this Agreement is the date of its execution by the LICENSEE. The Term of this Agreement shall be the twelve (12) month period commencing as of the Effective Date and terminating on the anniversary date of the Effective date. At least thirty (30) days prior to the end of the initial Term or any renewal Term, LICENSOR shall send LICENSEE a renewal notice asking LICENSEE to choose: (a) renewal of the terms of this Agreement for an additional one (1) year Term or (b) termination of this Agreement. In the event LICENSEE fails to return the renewal option notice prior to the end of the Term, this Agreement shall automatically terminate. Upon termination of this Agreement LICENSEE shall promptly cease use of the DATA. LICENSEE's exercise of option (a) also serves to renew all other licenses of historical DATA previously acquired from the LICENSOR by the LICENSEE.

3. LICENSEE acknowledges that the DATA are the proprietary and confidential property of LICENSOR and constitute valuable trade secret information, and that LICENSEE acquires no right in the DATA except to use the DATA solely within its own organization and for its own business purposes, in accordance with this Agreement. Unless otherwise agreed upon in writing by LICENSOR, LICENSEE agrees to hold the DATA in strict confidence and agrees not to provide, disclose, or otherwise make available any DATA to any third party, including but not limited to subsidiary and parent corporations, and that in no event shall LICENSEE release DATA which might reasonably be used to identify any particular institution without the prior express written permission of LICENSOR and of such institution. Notwithstanding the foregoing, LICENSOR agrees that LICENSEE shall be permitted to disclose and extend use of such DATA to its employees, agents, and consultants whose assigned duties reasonably require such disclosure and use, and only to the extent necessary to enable such persons to reasonably perform their assigned duties. LICENSEE will take appropriate measures, by instruction, agreement, or otherwise, to ensure compliance with this and the other provisions of this Agreement by LICENSEE, its employees, agents, and consultants. This provision shall survive the termination of this Agreement.

4. LICENSEE agrees that if the DATA are supplied on magnetic tape, disk, CD-ROM, or hard copy, no copies of the tape, disk, CD-ROM, or hard copy report shall be made except that one copy may be made solely for back-up purposes. LICENSEE agrees that the DATA will only be used with a single stand-alone computer, integral with a CD-ROM drive containing the DATA, which can only be accessed by a single user. LICENSEE agrees not to use, read, or transfer any part of the DATA by means of a network or modem or by any remote means of accessing the single stand-alone computer or the CD-ROM drive containing the DATA. No restrictions in this Agreement preclude the "Fair Use" printing of relatively small portions of the DATA by either a dedicated printer or through a network connection.

5. LICENSOR acknowledges that LICENSEE may have contact with individual health care institutions that contribute to the DATA in the course of its normal business operation; however, LICENSEE agrees that it will not refer to the DATA during any such contact and will not contact such institutions regarding the DATA or information contained in the DATA. However, at LICENSEE's request and expense, LICENSOR will use its best efforts to clarify any questions LICENSEE may have with reference to the DATA.

6. LICENSEE recognizes that the DATA are collected by LICENSOR and while LICENSOR believes the DATA to be accurate, LICENSOR MAKES NO WARRANTIES OR REPRESENTATIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. In no event shall LICENSOR's liability for any damages, regardless of the form of action, exceed the fee paid by LICENSEE for use of the DATA. Under no circumstances shall LICENSOR be liable for incidental, consequential, special, or exemplary damages of any kind or for lost profits.

7. This Agreement also applies to all "Updates" or other versions of the DATA subsequently supplied to LICENSEE. Thus, LICENSEE may use such updated DATA only in accordance with this Agreement. Such updated DATA may be used and transferred only as part of the single product package which includes the original DATA, and may not be separated for use on more than one computer.

8. Whenever LICENSOR has knowledge or reason to believe that LICENSEE has failed to observe the terms and conditions of this Agreement, LICENSOR will notify LICENSEE of the suspected breach. If, within 30 days of such notice, LICENSEE fails to make available for inspection by LICENSOR all records and documents of LICENSEE necessary to verify compliance, LICENSOR may terminate the license granted herein and prevent LICENSEE from obtaining future licenses from LICENSOR. Upon termination, LICENSEE shall immediately return all DATA to LICENSOR. This relief for breach shall in no way limit LICENSOR from pursuing whatever other relief it deems appropriate and LICENSEE specifically agrees that in the event of a breach or threatened breach by LICENSEE, LICENSOR shall be entitled to an injunction restraining LICENSEE from further breaching action.

9. No waiver by LICENSOR of any breach on the part of LICENSEE or of any right or remedy incident thereto shall constitute a continuing waiver or a waiver of any breach or right or remedy incident thereto.

10. This Agreement supersedes all prior agreements and understandings of any nature whatsoever, oral or written, and constitutes the entire understanding between the parties hereto.

11. Each paragraph and provision of this Agreement is severable from the entire Agreement, and if one provision shall be declared invalid, the other provisions shall remain in full force and effect without regard to the invalidity of said provision.

12. This Agreement may be modified only by a written instrument executed by both parties.

13. This Agreement shall be governed by the laws of the State of Illinois.

The undersigned understands the conditions of the data agreement, as stated on this form, and agrees to abide by same. All orders must contain a signature that acknowledges acceptance of these conditions.

Nir Menachemi

Signature

Nir Menachemi, Associate Professor

Name & Title

HCOP

Organization

3/12/10

Date

Single User Terms and Conditions

FY 2009

REVISED OCTOBER 2006

1. Health Forum, LLC, an American Hospital Association company (LICENSOR) is the owner of the property (hereinafter "DATA") that is the subject of this Agreement. LICENSEE shall be the organization identified on the Data Order Agreement, or if no organization is identified, the individual identified on the Data Order Agreement. LICENSEE is granted a limited, non-exclusive, non-transferable license to use the DATA at the site to which the DATA were shipped, in accordance with the Terms and Conditions of this Agreement.

2. The Effective Date of this Agreement is the date of its execution by the LICENSEE. The Term of this Agreement shall be the twelve (12) month period commencing as of the Effective Date and terminating on the anniversary date of the Effective date. At least thirty (30) days prior to the end of the initial Term or any renewal Term, LICENSOR shall send LICENSEE a renewal notice asking LICENSEE to choose: (a) renewal of the terms of this Agreement for an additional one (1) year Term or (b) termination of this Agreement. In the event LICENSEE fails to return the renewal option notice prior to the end of the Term, this Agreement shall automatically terminate. Upon termination of this Agreement LICENSEE shall promptly cease use of the DATA. LICENSEE's exercise of option (a) also serves to renew all other licenses of historical DATA previously acquired from the LICENSOR by the LICENSEE.

3. LICENSEE acknowledges that the DATA are the proprietary and confidential property of LICENSOR and constitute valuable trade secret information, and that LICENSEE acquires no right in the DATA except to use the DATA solely within its own organization and for its own business purposes, in accordance with this Agreement. Unless otherwise agreed upon in writing by LICENSOR, LICENSEE agrees to hold the DATA in strict confidence and agrees not to provide, disclose, or otherwise make available any DATA to any third party, including but not limited to subsidiary and parent corporations, and that in no event shall LICENSEE release DATA which might reasonably be used to identify any particular institution without the prior express written permission of LICENSOR and of such institution. Notwithstanding the foregoing, LICENSOR agrees that LICENSEE shall be permitted to disclose and extend use of such DATA to its employees, agents, and consultants whose assigned duties reasonably require such disclosure and use, and only to the extent necessary to enable such persons to reasonably perform their assigned duties. LICENSEE will take appropriate measures, by instruction, agreement, or otherwise, to ensure compliance with this and the other provisions of this Agreement by LICENSEE, its employees, agents, and consultants. This provision shall survive the termination of this Agreement.

4. LICENSEE agrees that if the DATA are supplied on magnetic tape, disk, CD-ROM, or hard copy, no copies of the tape, disk, CD-ROM, or hard copy report shall be made except that one copy may be made solely for back-up purposes. LICENSEE agrees that the DATA will only be used with a single stand-alone computer, integral with a CD-ROM drive containing the DATA, which can only be accessed by a single user. LICENSEE agrees not to use, read, or transfer any part of the DATA by means of a network or modem or by any remote means of accessing the single stand-alone computer or the CD-ROM drive containing the DATA. No restrictions in this Agreement preclude the "Fair Use" printing of relatively small portions of the DATA by either a dedicated printer or through a network connection.

5. LICENSOR acknowledges that LICENSEE may have contact with individual health care institutions that contribute to the DATA in the course of its normal business operation; however, LICENSEE agrees that it will not refer to the DATA during any such contact and will not contact such institutions regarding the DATA or information contained in the DATA. However, at LICENSEE's request and expense, LICENSOR will use its best efforts to clarify any questions LICENSEE may have with reference to the DATA.

6. LICENSEE recognizes that the DATA are collected by LICENSOR and while LICENSOR believes the DATA to be accurate, LICENSOR MAKES NO WARRANTIES OR REPRESENTATIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. In no event shall LICENSOR's liability for any damages, regardless of the form of action, exceed the fee paid by LICENSEE for use of the DATA. Under no circumstances shall LICENSOR be liable for incidental, consequential, special, or exemplary damages of any kind or for lost profits.

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The undersigned understands the conditions of the data agreement, as stated on this form, and agrees to abide by same. All orders must contain a signature that acknowledges acceptance of these conditions.

Signature

Nir Menachemi, Professor

Name & Title

HCOP

Organization

2/2/12

Date

Single User Terms and Conditions

FY 2010

REVISED OCTOBER 2006

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Nir Menachemi

Signature

Nir Menachemi, Professor

Name & Title

NCOP

Organization

6/1/12

Date

Attachment 3

http://www.cms.gov/Research-Statistics-Data-and-Systems/Files-for-Order/CostReports/index.html#

Cost Reports

Hospital Form 2552-96

Hospital Form 2552-10

Skilled Nursing Facility 1996 form

Skilled Nursing Facility 2010 form

Renal Facility

Hospice

Home Health Agency

Health Clinic

Cost Reports by Fiscal Year

click here to access reports (data)

Cost Reports

HCRIS Data Request Disclaimer:

The Centers for Medicare & Medicaid Services (CMS) has made a reasonable effort to ensure that the provided data/records/reports are up-to-date, accurate, complete, and comprehensive at the time of disclosure. This information reflects data as reported to the Healthcare Cost Report Information System (HCRIS) by Medicare Administrative Contractors. These reports are a true and accurate representation of the data on file at CMS. Authenticated information is only accurate as of the point in time of validation and verification. CMS is not responsible for data that is misrepresented, misinterpreted or altered in any way. Derived conclusions and analysis generated from this data are not to be considered attributable to CMS or HCRIS.

General Information:

Medicare-certified institutional providers are required to submit an annual cost report to a Medicare Administrative Contractor (MAC). The cost report contains provider information such as facility characteristics, utilization data, cost and charges by cost center (in total and
for Medicare), Medicare settlement data, and financial statement data. CMS maintains the cost report data in the Healthcare Provider Cost Reporting Information System (HCRIS). HCRIS includes subsystems for the Hospital Cost Report (CMS-2552-96 and CMS-2552-10), Skilled Nursing Facility Cost Report (CMS-2540-96 and CMS-2540-10), Home Health Agency Cost Report (CMS-1728-94), Renal Facility Cost Report (CMS-265-94), Health Clinic Cost Report (CMS-222-92) and Hospice Cost Report (CMS-1984-99).

The data consists of every data element included in the HCRIS extract created for CMS by the provider's Administrative Contractor.

Cost Report Data Available:

System	Form	Beginning Year	Ending Year	Release Date	Last Update
Hospitals 1996 form	CMS-2552-96	1996	2011	01/30/2013	12/31/2012
Hospitals 2010 form	CMS-2552-10	2010	2012	01/30/2013	12/31/2012
SNF 1996 form	CMS-2540-96	1996	2012	01/30/2013	12/31/2012
SNF 2010 form	CMS-2540-10	2011	2012	01/30/2013	12/31/2012
Home Health Agencies	CMS-1728-94	1994	2012	01/30/2013	12/31/2012
Renal Dialysis Facilities	CMS-265-94	1994	2011	01/30/2013	12/31/2012
Hospices	CMS-1984-99	1999	2012	01/30/2013	12/31/2012
Health Clinics	CMS-222-92	2009	2012	01/30/2013	12/31/2012

Technical Assistance:

Free assistance to academic, government and non-profit researchers interested in using HCRIS data is available at : ResDAC, the Research Data Assistance Center.

Freedom of Information Act:

Individual cost reports may be requested from the Medicare Administrative contractors via the Freedom of Information Act (FOIA). For more information on this process, visit the FOIA page.

Organization of data files:

For the **Hospital Form 2552-1996, Hospital Form 2552-2010 , SNF Form 2540-1996, SNF Form 2540-2010** and **HHA** cost reports, there is one zipped file for each fiscal year. The links to these can be found on the "Downloads by Fiscal Year" page.

For the **Hospice, Renal** and **Health Clinic** cost reports, there is one zipped file each that contains all data for all the fiscal years. The links to these can be found on their section pages.

Each zipped file contains the Report (Rpt); Numeric(Nmrc); and Alpha-Numeric(Alphnmrc) files for the fiscal year covered. Additionally, **Hospital(1996), SNF(1996)**and **HHA** data sets will contain a Rollup file for each year. These files may be unzipped with Winzip 8.0 or a higher version.

NOTES:

The Hospital and Skilled Nursing Facility cost report data cannot be loaded into Microsoft Excel. The numeric data file for both cost reports is too large for this application.

Most of our data users are loading the data into Oracle, SAS, SPSS Statistical Package, Microsoft SQL Server, and DB2. Some users have reported successfully loading the data into Microsoft Access 2007; however, the stated limit from Microsoft is 2GB. CMS does not support or provide any technical assistance of user's choice of data load.

Please see the report specific documentation on the each cost report's web page. Send any further questions about this data to our Healthcare Cost Report Information System (HCRIS) mailbox HCRIS@cms.hhs.gov.. You can also send any special cost report data requests to this mailbox; however, there is a charge for customized data reports.

Related Links

Cost Reports by Fiscal Year
Provider Reimbursement Manual - Part II
Skilled Nursing Facility PPS
SNF Consolidated Billing

Page last Modified: 01/30/2013 2:29 PM
Help with File Formats and Plug-Ins

Attachment 4

Home » Book & CD Products » AHA Annual Survey Database

AHA Annual Survey Database™ is recognized as a reliable source on United States hospitals. The data are gathered through the *AHA Annual Survey of Hospitals*, conducted by the American Hospital Association since 1946. Secondary sources include the AHA corporate database, accrediting organizations, and the United States Census Bureau. The Database can be used autonomously as a reference on hospitals; or in conjunction with other datasets by matching on variables such as the Medicare Provider Number or the National Provider Identifier (NPI).

Up to 1,000 data fields of information on 6,500 hospitals is included in the Database covering topics such as:

- Organizational Structure
- Facility and Service Lines
- Inpatient and outpatient utilization
- Expenses
- Physician arrangements
- Staffing
- Corporate and purchasing affiliations
- Teaching status
- Geographic indicators (state, region, CBSA, county)
- Cross-reference identifiers (Medicare Provider Number and National Provider Identifier (NPI))

This valuable resource is used by government agencies, universities, health policy organizations and health care providers for:

- Health services research
- Benchmarking
- Time-series analysis (data is available beginning with Fiscal Year 1980)

AHA Annual Survey Database is delivered on CD. A documentation book with data and technical specifications, and a year-to-year reconciliation of open, closed and merged hospitals is included.

Reference Documents:

Data Fields & File Layout

Survey Instrument

Data Collection Methods

AHA Item Number: 083512
Delivered on CD with three formats: ASCII, Microsoft Access® and Comma Delimited

- A signed licensing agreement is required at the time of purchase
- The Database is not returnable
- Multi-user pricing is available

For purchase and license agreement information call 866-375-3633 or email ahadatainfo@healthforum.com.

- Book & CD Products
  - AHA Guide
  - AHA Hospital Statistics
  - AHA Annual Survey Database
  - 2011 Hospital IT Adoption Database
  - Trends: Emerging Health Care Delivery
  - Profile of U.S. Community Hospitals

Recent Updates

- Fiscal Year 2011 System Data Now Added Updated on 01/31/13
- January 2013 Hospital Data Update Updated on 01/31/13
- AHA Hospital Statistics 2013 edition Now Available Updated on 01/31/13
- Data Dashboard - Continuity of Care Updated on 01/01/13

Quick Reports

Births – Top 100 by Volume of Births

List of 100 hospitals by the total number of infants born in the hospital

during the reporting period (excludes fetal deaths).

$100

- ◉ PDF
- ○ Excel

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UAB SCHOOL OF HEALTH PROFESSIONS

Department of Health Services Administration

Institutional Review Board
Protocol Oversight Review Form

Date Submitted to IRB: 3/8/2013

Title of Project: **Hospital Financial Performance: A Look at Governance and HIT Strategies**

Name of Principal Investigator: **Taleah Collum**

Signature of Principal Investigator: Taleah Collum

School: **School of Health Professions**
Department: **Health Services Administration**
Division: **Administration-Health Services, Ph.D.**

Review Process (as determined by Department Chair):

- ☒ Departmental Review
- ☐ Divisional Review (Division Director or Designate)
- ☐ Center or Departmental Protocol Review Committee Review
- ☐ Project Review Panel (PRP)—Appointed by the Department Chairman or Division Director (PRP report attached)

I have reviewed the proposed research and concluded that the following apply:

- The research is scientifically valid and is likely to answer the scientific question;
- The researcher and the study team are qualified and/or credentialed to conduct the procedures proposed;
- The researcher has identified sufficient resources in terms of experienced research personnel, facilities, and availability of medical or psychological services that may be necessary as a consequence of participation in the research to protect the research participants.

Name of Official: Gerald L. Glandon (type or print) Title: Chair

Signature: Gerald L. Glandon Date: 3/8/13

524 Webb Nutrition Sciences Building
1675 University Boulevard
205.934.5665
Fax 205.975.6608
www.uab.edu/hsa

The University of Alabama at Birmingham
Mailing Address:
WEBB 524
1530 3RD AVE S
BIRMINGHAM AL 35294-3361

Investigator Training Summary

Protocol Number E130312010 Hospital Financial Performance: A Look at Governance and HIT Strategies

Name	Web Date	Course Type	Credits	Course Name
COLLUM, TALEAH H				**(Principal Investigator)**
	No Current Training			
	8/14/2009	Initial Training	4.0	CITI Social & Behavioral Basic Course
KILGORE, MEREDITH L				**(Other Investigator)**
	10/3/2012	Continuing Education	1.5	Financial Conflict of Interest
	9/22/2010	Continuing Education	1.5	IRB Informed Consent
	7/30/2010	Continuing Education	1.5	CITI Social & Behavioral Refresher Course
	10/31/2002	Initial Training	4	Collaborative IRB Training Initiative (CITI) Basic Course
O'CONNOR, STEPHEN J				**(Other Investigator)**
	8/20/2012	Continuing Education	1.5	Financial Conflict of Interest
	12/29/2011	Continuing Education	1.5	IRB Informed Consent
	2/1/2006	Initial Training	2.5	Student Introduction II: CITI and UAB's Human Subject Protection Training
	1/11/2005	Initial Training	1.5	Health Services Update- (Students)
SEN, BISAKHA				**(Other Investigator)**
	7/26/2012	Continuing Education	1.5	Financial Conflict of Interest
	3/15/2010	Continuing Education	1.5	IRB Informed Consent
	1/8/2003	Initial Training	4	Collaborative IRB Training Initiative (CITI) Basic Course
WEECH-MALDONADO, ROBERT				**(Other Investigator)**
	8/22/2012	Continuing Education	1.5	Financial Conflict of Interest
	11/9/2010	Continuing Education	1.5	IRB Informed Consent
	6/4/2009	Initial Training	4.0	VA Overview of Good Clinical Practice and Human Subjects Protection
MENACHEMI, NIR				**(Faculty Advisor)**
	8/14/2012	Continuing Education	1.5	Financial Conflict of Interest
	5/11/2010	Continuing Education	1.5	IRB Informed Consent
	8/28/2001	Initial Training	4	Original Program: UAB Human Subjects Protection Training