Organizational Factors Affecting the Successful Integration Between Physician Groups and Health Systems

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Abstract

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Amidst growing vertical integration, health care delivery is moving toward a state in which the lines of responsibility begin to blur. As health reform shifts the health care industry from volume to value, the market is calling for increased care coordination and management. This in turn calls for closer working relationships between physician groups and health systems, herein referred to as "physician-system integration." Physician-system integration can be structured in a variety of ways, with the current trend shifting toward the most integrated structure, the employment model, in which physicians are employed by a hospital or health system and paid a salary. The evidence on the value of physician-system integration is mixed, however, putting into question the impact of current trends.

This dissertation focused on the organizational factors affecting the success of integration between physician groups and health systems. The objectives of were two-fold: 1) to define what

success means to different health systems, and 2) to answer the overarching research question: How is the success of an integrated delivery system affected by the degree and nature of physician-system integration? We applied a three-pronged approach – a systematic review with cluster analysis, qualitative interviews, and mixed methods – to collectively explain and predict the influence of physician integrating structures on the overall success of a health system.

In Aim 1, we identified 29 empirical articles published in 2005-2016 that examined physician-system integration. Only 38% of the articles used organizational theory to guide their approach, which suggests an imbalance in past analyses and an underutilization of theory in integration research. Of the articles that did apply theory, bargaining-market power theory and transaction cost theory were the predominant ones used. We further identified 48 organizational factors that comprise the landscape of physician-system integration.

In Aim 2, we interviewed 25 health executives across eight health systems in Washington State. Factors that made physician-system integration successful included: payment reform (how to compensate for care coordination activities), alignment between physician groups and hospitals (culture and leadership), and the establishment of more care coordination mechanisms (pre-service, point-of-service, and after-service). While all executives were proponents of increased integration, most stressed the importance of cultural and leadership alignment. We concluded that the landscape of physician-system integration is a complex array of 51 factors of the environment, physician group, hospital, care coordination, and integration success.

In Aim 3, we found that tighter integration structures were associated with higher total facility expenses, with hospitals spending $675,000 to $833,000 for each incremental "level" of integration. The trend was consistent with previous literature. However, we found that expenses were attenuated when care coordination mechanisms were considered as a mediator. This poses

an opportunity for health systems to offset costs by strengthening care coordination. Executives were aware of integration costs and care coordination deficits but will continue to invest, seeking long-term reward.

Through the three Aims, we put forth a theory-driven, practice-validated, and empirically-tested conceptual model – a tool for health executives, researchers, and instructors to more effectively address the complexities of integration. Our work indicates that physician-system integration incorporates an amalgam of 52 factors of the internal and external environment, further highlighting the important mediating role of care coordination in health system success. As trends continue to increase toward increased physician-system integration, our findings have the potential to inform regulatory policy on physician group and health system mergers and guide health systems in improving their performance and selecting their integration partners.

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DEDICATION

To my mom and dad,

who have always encouraged me

to pursue a life that makes me happy.

Chapter 1. INTRODUCTION

1.1 BACKGROUND

Health care delivery is moving toward a value-based environment, one in which patients, payers, and policymakers hold providers increasingly more accountable for cost and quality. To achieve the Quadruple Aim (Bodenheimer & Sinsky, 2014) – that is, to improve the patient experience, improve population health, reduce per capita cost, and improve the work life of health care providers – physicians and health systems are exploring ways to enhance efficiency and quality of care. Health reform has also spurred new payment methodologies and increased formation of medical homes and accountable care organizations. These market factors call for more care coordination, which in turn require closer working relationships between physicians, hospitals, and health systems. Our research on the integration between physician groups and health systems, herein referred to as "physician-system integration," is thus aligned with leading industry concerns.

The history of physician-system integration dates back to the early 1980s, when professional autonomy ruled and constrained how health care was organized and financed in the U.S. (Freidson, 1970; W. R. Scott & Davis, 2003; W. R. Scott, Ruef, Mendel, & Caronna, 2000). The predominant form of physician organization and compensation was the solo, fee-for-service practice. Patients had the freedom to choose their providers, and physicians had full authority over medical decisions. This was an era of fragmented care. In the 1980s, growing concerns about rising costs, variations in quality, and inefficiencies (W. R. Scott, 2003; W. R. Scott et al., 2000; Wholey & Bums, 2003) forced a re-examination of the health care system, spearing an important market shift away from the "physician-dominated" perspective (Freidson, 1970).

In 1996, about forty percent of all hospitals had integrated with physician groups, though the degree and type of integration varied vastly, even within regions (Rundall, Shortell, & Alexander, 2004). Physician groups and hospitals broadly viewed integration as a mutually beneficial relationship. Integration was seen a means of gaining economic and operational efficiency, lowering transaction costs through shared resources (Conrad & Shortell, 1996) and increasing bargaining power against payers (Lawton R Burns & Pauly, 2002). It was also seen as a means to improving quality, increasing access and streamlining coordination of care (Conrad & Shortell, 1996; Shortell, Gillies, & Anderson, 1994; Shortell, Gillies, Anderson, Erickson, & Mitchell, 1996). Physician-system integration was furthermore linked to cost savings (Ciliberto & Dranove, 2006; Snail & Robinson, 1998; Stensland & Stinson, 2002; Trybou, Gemmel, & Annemans, 2011), lower staffing per admission (Shortell et al., 1994), increased physician accountability, increased physician satisfaction (McCarthy & Mueller, 2009; Shih et al., 2008), and greater innovation (Goes & Park, 1997).

In some cases, however, studies have suggested the opposite, linking physician-system integration to financial losses (e.g., higher hospital prices and higher operating costs (Baker, Bundorf, & Kessler, 2014; Gans, 2012; Madison, 2004; Robinson & Miller, 2014)) with no changes in clinical outcomes (Madison, 2004), no changes in quality (K. W. Scott, Orav, Cutler, & Jha, 2017), and dampened entrepreneurial activity (Berenson, Ginsburg, & May, 2007).

Despite the importance of physician-system integration, a lack of data and inconsistent metrics (American Hospital Association's Physician Leadership Forum, 2015; Wang, 2015) have led to mixed conclusions about the contribution of physician integration to the overall success of a health system. This is in part due to the fact that there are so many ways to define success (Cuellar & Gertler, 2006; Gillies, Chenok, Shortell, Pawlson, & Wimbush, 2006; Goes & Zhan, 1995;

Madison, 2004; McCarthy & Mueller, 2009).

Regardless, the trend toward integration continues today, re-fueled by the prospect of risk-based payment approaches that rely on collaboration between hospitals and medical staff (Lawton Robert Burns & Muller, 2008; Kocher & Sahni, 2011) and the race to create accountable care organizations (ACOs). While it is unclear whether new organizational arrangements actually help physicians manage changing incentives (Kohn, 2000), from the perspectives of both hospital leaders and physicians, increased physician-system integration is forthcoming and necessary. In 2012, forty-one percent of non-federal, acute care hospitals employed members of their physician workforce (K. W. Scott et al., 2017). In 2013, two-thirds of physicians said that they expected increased integration over the next few years (Deloitte Center for Health Solutions, 2013). In terms of ACOs, one found that a patient is significantly more likely to choose the hospital that owns the patient's physician's practice, even if costs are higher and quality lower than that of other local hospitals (Baker, Bundorf, & Kessler, 2016). This suggests that physician-system integration can motivate patients to stay within a system of care (Fisher et al., 2009).

1.2 Research Aims

The objectives of the dissertation research were two-fold: 1) to begin defining what success means to different health systems, and 2) to then answer the overarching research question: How is the success of an integrated delivery system affected by the degree and nature of physician-system integration? The identification of best integration practices can guide health systems in forming strategies that will improve their overall performance, resulting in improved efficiency and quality of care for the communities they serve.

It is important to note that our unit of analysis throughout this research is the *hospital that is a part of a health system*, rather than the health system. As hospital consolidation becomes more

common, sometimes spanning state lines (Cuellar & Gertler, 2003), it has become more common for a physician group to align itself or integrate with a hospital that is already part of a health system. We posit that a physician group is more likely to partner with and serve patients within one or two local hospitals than with the health system. In FY16, 69.7% of U.S. hospitals were in health systems, 44.6% of physicians were in health systems, and 88.2% of U.S. hospital beds were in health systems (American Hospital Association, 2017). While there are known differences in success outcomes reported at various levels of hospital type, size, and market (Lawton R Burns et al., 2001), our decision to focus on hospitals that are a part of health systems is one made to coincide with theory, as well as for practicality (i.e., data driven).

This dissertation was designed such that each Aim informed the subsequent Aim. We applied a three-pronged approach to collectively explain and predict the influence of physician integrating structures on the overall success of a health system. The approaches built upon each other to continuously refine the framework (Figure 1.1). In Aim 1, we conducted a systematic literature review and cluster analysis of the organizational factors affecting the integration of physician groups with health systems. In Aim 2, we conducted a multiple-case, qualitative study with health executives to discern the factors important to physician-system integration from the practice perspective. In Aim 3, we conducted a mixed methods analyses to quantify the relationship between physician integrating structures and various health system success outcomes, as mediated by care coordination.

1.3 Overarching Conceptual Model

The complexity of management practice often requires explanations that are equally as complex (Okhuysen & Bonardi, 2011). The landscape of physician-system integration is no exception; with its array of organizational factors, it requires a multiple-lens theoretical basis for

study. We drew upon two organizational theories and frameworks – open systems theory (Von Bertalanffy, 1968) and Porter's Value Chain (Porter & Teisberg, 2006) – to guide all three of our Aims.

Open Systems Theory

First, we considered the environment of our conceptual model by employing open systems theory (Von Bertalanffy, 1968), which posits that organizations are strongly influenced by their external environment. The environment consists of political, economic, social, technological, environmental (i.e., climate), and legal forces. Healthy open systems interact with their environment, regularly conducting environmental scans, market research, and evaluations. Through a continuous feedback-loop with the environment, open systems will often also try to influence the environment through use of public relations, advertising, marketing, lobbying, cooptation, and advocacy. For example, a health organization may respond to changing Medicare reimbursement rates by adjusting internal systems (e.g., hiring additional financial analysts), bargaining with payers (e.g., explaining hospital costs), and then transacting with them (e.g., agreeing to new reimbursement rates).

In the context of physician-system integration, the system typically consists of the key players in integration, which are hospitals, physicians, and payers (Conrad & Shortell, 1996; Mick & Conrad, 1988; Miller, 1996), along with the ways in which they are structurally and/or financially organized (i.e., via an ACO and/or health system). Few health care organizations exist in a closed system, in which an organization has hard boundaries and interacts very little with the environment.

Value Chain

To operationalize the internal environment, we employed the Value Chain, an

organizational model by Michael Porter (Porter & Teisberg, 2006) and later adapted to health care (Ginter, Duncan, & Swayne, 2013) to describe the processes of care delivery. The Value Chain utilizes a systems approach, where each "link" in the chain adds value to the original input. There are two types of chains, the service delivery and the support. Service delivery is the fundamental value creation stream, which includes activities that occur pre-service (such as marketing research, services offered and branded, pricing, promotion, and distribution/logistics); point-of-service (clinical operations); and after-service (follow-up, billing, and follow-on). The support activities facilitate and improve the service delivery chain through organizational structure (by function, division, or matrix), organizational culture (shared assumptions, values, and norms), and strategic resources (financial, human, informational, and technological). The Value Chain posits that an organization must minimize transaction costs and waste to optimize the value-add.

We applied the Value Chain's service delivery chain to our conceptual model to organize the care coordination mechanisms that bridge the encounter of the patient with the health system. We concurrently applied the support activities chain to organize the characteristics of physician groups and hospitals. Finally, we considered multiple interpretations of value and allowed for multiple value/success measures. As such, we considered integration success measures through value creation along the Value Chain.

Figure 1.2 presents our underlying conceptual model. Throughout the dissertation, this conceptual model was central to our study designs, serving as a coding schema, framework for protocol development, and guidance for variable selection. The following three chapters correspond with each of the Aims, in which we explain the parts of the model and its evolution through practice-validation and empirical testing.

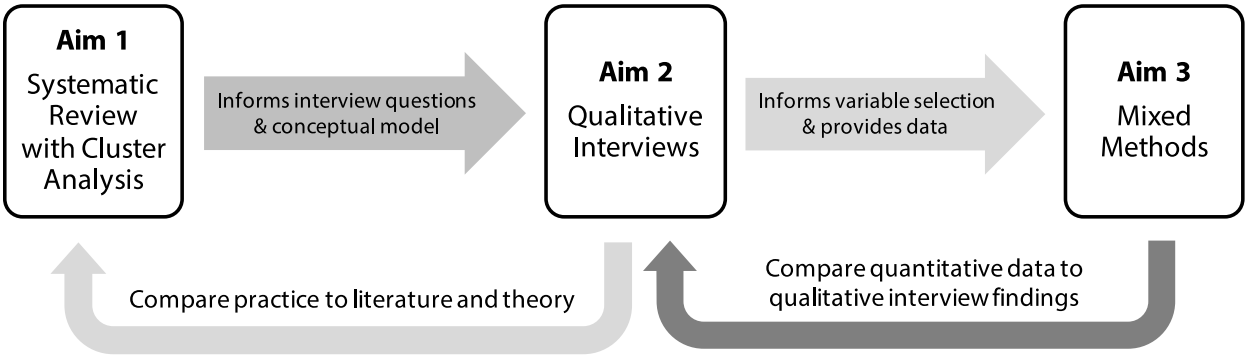

Figure 1.1. Specific aims work flow

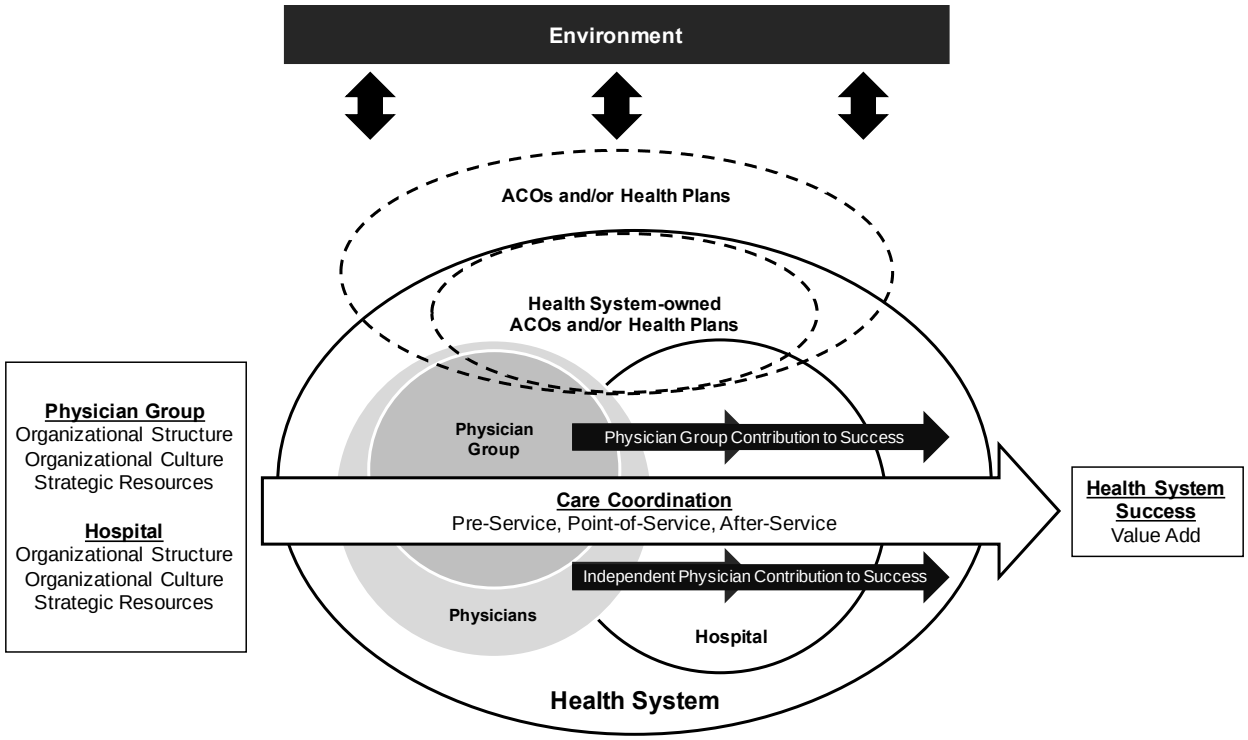

Figure 1.2. Base conceptual model of physician-system integration using the theoretical bases of open systems theory and Porter's Value Chain

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Chapter 2. ORGANIZATIONAL FACTORS AND THEORIES OF PHYSICIAN-SYSTEM INTEGRATION: A SYSTEMATIC REVIEW

2.1 INTRODUCTION

Despite the widespread pursuit of physician-health system integration, the evidence for factors affecting successful integration is mixed and inconclusive. This is in part due to the absence of a universal definition of integration and an overabundance of definitions for success (Armitage, Suter, Oelke, & Adair, 2009). This article summarizes the findings of a systematic literature review of the organizational factors affecting the integration of physician groups with health systems, herein referred to as "physician-system integration."

Physician groups and hospitals have historically viewed integration as a mutually beneficial relationship. Integration was seen as a means of gaining economic and operational efficiency, lowering transaction costs (Conrad & Shortell, 1996), increasing bargaining power against payers (Lawton R Burns & Pauly, 2002), improving quality, increasing access, and streamlining care coordination (Conrad & Shortell, 1996; Shortell, Gillies, & Anderson, 1994). However, the evidence on the value of integration is mixed. Physician-system integration has been shown to increase physician accountability and satisfaction (McCarthy & Mueller, 2009), while having a positive or null effect on the financial status of a health system (Ciliberto & Dranove, 2006; Goes & Zhan, 1995; Snail & Robinson, 1998; Trybou, Gemmel, & Annemans, 2011). Other studies, however, have linked integration to no changes in clinical outcomes (Madison, 2004) and quality (Scott, Orav, Cutler, & Jha, 2017), as well as financial loss (Baker, Bundorf, & Kessler, 2014; Gans, 2012; Madison, 2004; Robinson & Miller, 2014).

The trend toward integration continues upward regardless of mixed findings, re-fueled by the prospect of risk-based payment approaches (Lawton Robert Burns & Muller, 2008; Kocher & Sahni, 2011) and the race to create accountable care organizations (ACOs), both of which rely on collaboration between physicians and health systems. In 2002, 27% of U.S. hospitals reported having no affiliation with physicians, beyond their traditional medical staff model. In 2012, only 19% of hospitals remained unaffiliated with physicians (Scott et al., 2017). In 2013, two-thirds of physicians reported that they expected integration to continue to increase (Deloitte Center for Health Solutions, 2013).

New Contribution

Given the impetus toward increased physician-system integration, it is important for health care executives, policymakers, and researchers to effectively address the complexities of integration. Our review supplements and extends previous overviews (Armitage et al., 2009; Lawton Robert Burns & Muller, 2008; Hwang, Change, LaClair, & Paz, 2013; Trybou, Gemmel, & Annemans, 2015) to address the research question, "What organizational factors are used to measure the success of physician-system integration for different physician integration models?" Our objectives were two-fold:

1) To survey the organizational theories used in past studies to determine how theory has been used to explain changing integration strategies over time.
2) To create a comprehensive conceptual model that captures how researchers have examined this complex relationship.

Consistent with these objectives, there are two primary products of the review. First, we contribute to the knowledge on organizational theory application to physician-system integration, highlighting the theories that have been used most often to explain and predict this relationship.

Second, we contribute to the conceptual understanding of integration by creating a robust model that summarizes the past empirical research. To ensure that we capture the complete picture of integration, we employed open systems theory (Von Bertalanffy, 1968) and Porter's Value Chain framework (Porter & Teisberg, 2006) to respectively account for the external and internal organizational factors affecting successful physician-system integration.

2.2 METHOD

Conceptual Model

The complexity of management practice often requires explanations that are equally as complex (Okhuysen & Bonardi, 2011). The landscape of physician-system integration is no exception. We thus drew upon two organizational theories and frameworks – open systems theory and Porter's Value Chain – to approach the systematic review and development of the conceptual model.

Open Systems Theory

First, we considered the external environment by employing open systems theory (Von Bertalanffy, 1968), which posits that organizations are strongly influenced by their external environment. The environment consists of political, economic, social, technological, environmental (i.e., climate), and legal forces. Through a continuous feedback-loop, healthy open systems will often interact and try to influence the environment through use of public relations, advertising, marketing, lobbying, cooptation, and advocacy. For example, a health organization may respond to changing Medicare reimbursement rates by adjusting internal systems (e.g., hiring additional financial analysts), bargaining with payers (e.g., explaining hospital costs), and then transacting with them (e.g., agreeing to new reimbursement rates). In the context of physician-system integration, the system typically consists of the key players in integration, which are

hospitals, physicians, and payers, along with the ways in which they are structurally and/or financially organized (Conrad & Shortell, 1996; Mick & Conrad, 1988; Miller, 1996).

Value Chain

To operationalize the internal environment, we employed the Value Chain, an organizational model popularized by economist Michael Porter (Porter & Teisberg, 2006) and later adapted to health care (Ginter, Duncan, & Swayne, 2013) to describe the processes of care delivery. The Value Chain utilizes a systems approach, where each "link" in the chain is designed to add value to the original input. The service delivery chain is the fundamental value creation stream, which includes activities that occur pre-service (such as marketing research, services offered and branded, pricing, promotion, and distribution/logistics); point-of-service (clinical operations); and after-service (follow-up, billing, and follow-on). The support activities chain facilitates and improves the service delivery chain through organizational structure (function, division, and matrix), organizational culture (shared assumptions, values, and norms), and strategic resources (financial, human, informational, and technological). The Value Chain posits that an organization must minimize transaction costs and waste to optimize the value-add.

Using the two theories, we created a primary coding schema (Appendix 2.A) comprised of: the environment (political, economic, social, technological, environmental, and legal forces), physician group (organizational structure, organizational culture, strategic resources), hospital (organizational structure, organizational culture, strategic resources), care coordination (pre-service, point-of-service, after-service), and health system success (all parts of the Value Chain).

Qualitative Approach

For our systematic review, we started with the article retention protocol shown in Figure 2.1. We searched PubMed, ProQuest, and EBSCO for articles published between January 1, 2005

and December 31, 2016 using the terms: “physician-system integration”, “physician integration”, “hospital integration”, “integrated health system”, “integrated health delivery system”, “physician-hospital integration”, “physician-hospital affiliation”, “physician alignment”, “physician-hospital alignment”, “physician-system alignment”, “physician-hospital arrangement”, “physician-system arrangement”, and “clinical integration.” We specified the time frame to target the current health care climate, i.e., six years prior to and following the Affordable Care Act. This process returned 621 unique, English-language articles. Citations were downloaded into the EndNote® citation manager (Clarivate Analytics, 2016). We then evaluated abstracts to determine if the article was:

1. an empirical research piece (i.e., published in a peer-reviewed journal, not a perspective or theoretical piece),
2. from the U.S. (i.e., discusses at least one U.S.-based example of integration), and
3. discusses at least one type of physician integrating structure (i.e., see Appendix 2.B for the list of physicians integrating structures and their definitions).

This process returned 40 articles. We reviewed the full text of these 40 and repeated the analysis to further remove any not meeting the criteria, resulting in 21 articles. Finally, we reviewed the bibliographies to identify relevant articles (n=8), resulting in 29 articles.

Using the coding schema, we coded variables used to measure the environment, physician group, hospital, care coordination, health system success, and organizational theories applied. The coding team consisted of two co-authors, with a third co-author available to provide a tie-breaking decision. Finally, using axial coding (Strauss & Corbin, 1990) and investigator triangulation, in which two skilled researchers with different disciplinary perspectives examined the same data (Denzin, 1989), we aggregated the coded variables into organizational factors that nested within open systems theory and the Value Chain. All coding was done in Dedoose® version 7.6, a

qualitative data analysis program (SocioCultural Research Consultants, 2015).

Quantitative Approach

Health system success can be defined in many different ways (Armitage et al., 2009). Using health system success data from the systematic review, we thus performed a cluster analysis, an exploratory technique for dividing a multivariate dataset into natural clusters. We created a database that listed all identified success factors (n=146) and the number of times each was used in tandem with an organizational factor drawn from the Value Chain (see Appendix 2.C).

We conducted a hierarchical cluster analysis to classify the health system success factors into meaningful clusters (Kaufman & Rousseeuw, 1990). We applied the Ward (1963) method, which minimizes the within-cluster variation and produces clusters of roughly similar size. To determine the number of clusters, we applied variations of two to six clusters and checked the quality of the results. We employed MANOVA, ANOVA, and regression techniques to confirm the uniqueness of each cluster. We also validated that this type of analysis had been used in other health care studies to form exploratory groups based on organizational dimensions (Dubois et al., 2012; Marlin, Sun, & Huonker, 1999; Xue, Zhou, Bundorf, Huang, & Le Chang, 2013). Quantitative analysis was done using Stata 13 (StataCorp LP, 2013).

2.3 RESULTS

We identified 29 articles. Table 2.1 provides a summary of each article's study setting, study period, organizational theories, and organizational factors.

Use of Organizational Theories

Our first objective was to survey the theoretical theories used in past studies to determine their historical use to explain and predict physician-system integration over time. Only 11 (37.9%) of the articles explicitly called upon organizational theory to guide their hypotheses or approaches.

The two most cited theories were transaction cost theory (Coase, 1937; Williamson, 1981) and bargaining-market power theory (Gal-Or, 1999). Transaction cost was a commonly-cited aspect of both open systems theory and the Value Chain, which explained and predicted a firm's decision to outsource or internalize production of a good or service (i.e., if it will "make-or-buy") to minimize the cost of a transaction. In the context of physician-system integration, this theory was a useful tool in explaining and predicting whether health systems would vertically integrate with physician groups. For example, a hospital may decide to "buy" a primary care group to minimize the transaction cost of patient referrals from those primary care physicians.

Bargaining-market power theory, another open systems theory based in economics, was popularized in the context of physician-system integration by Gal-Or (1999). The theory posited that an entity with more market power had greater bargaining power. A physician group or hospital with more market power could charge higher prices for health services. Gal-Or demonstrated that the existence of incentives for vertical mergers between health systems and physician groups depended on the relative degree of competitiveness of their respective markets. When the degree of competitiveness was comparable, a vertical merger enhanced the bargaining position of both *vis-a-vis* insurers. In contrast, when one firm's market was much more competitive than the other, a vertical merger could reduce the joint profits of the merged entity.

Elements of bargaining-market power theory aligned with our application of open systems theory to define the external environment. Likewise, elements of transaction cost theory aligned with our application of the Value Chain to define the internal environment. In two reviewed articles (Baker et al., 2014; Cuellar & Gertler, 2006), researchers used bargaining-market power theory and transaction cost theory together for this purpose. Our approach to use open systems theory and the Value Chain was consistent with the past literature, however broader.

Development of Conceptual Model

The second objective of this study was to develop a conceptual model that captures how researchers have examined the complex relationship of physician-system integration. We extracted 48 organizational factors that had been used to measure the environment, physician group, hospital, care coordination, and health system success. Most articles employed factors of the environment (86.2% of articles), physician group (100%), hospital (79.3%), and success (89.7%). Only 24.1% used care coordination. Appendix 2.D illustrates a breakdown of the number of articles that cited each factor and the average number of factors per article.

Environment

Of the environmental factors that impacted the entire health system and how each player approached integration, we identified six: (1) health reform; (2) market structure; (3) competition; (4) market demographics; (5) regulations; and (6) technology.

Health Reform. Often driven by public pressure to improve aspects of safety and quality, health reform was federal policy that affected the nature and degree of integration (Lawton Robert Burns & Muller, 2008). Such policies included Medicare payment reform, which researchers posited to influence integration by facilitating the re-organization of care delivery and the re-financing of care. Another example of health reform was Meaningful Use, a federal initiative for funding electronic health records (EHRs), as the cost and potential for EHR improvement could be a decisive factor for physician groups contemplating integration (Page, Butler, & Bozic, 2013).

Market Structure. We found market structure to be another key environmental factor. Market structure included the presence of and relationship between major players of integration. These players were typically physicians, hospitals, health systems, purchasers, payers, managed care organizations, and ACOs, with their interactions to one another determined by restrictions

such as market malpractice rates and incentive programs (Lawton Robert Burns & Muller, 2008; Casalino, November, Berenson, & Pham, 2008).

Competition. As physician-system integration is ultimately a business venture, competition was defined as how players in the market actively responded to increased mergers of physician groups with hospitals and private firms (Berenson, Ginsburg, & May, 2007). This factor was most commonly measured using the Herfindahl-Hirschman Index (HHI), an economic measure that compared the size of a firm (i.e., physician, hospital, insurance, and payer) to its market in a given area.

Market Demographics. The most widely used environmental factor was market demographics, which broadly encompassed the patient and payer mix of a health system's service area. Measures of individual-level patient demographics included: age, gender, race, income, education, geographic location (e.g., distance to hospital), insurance coverage, and health status). At a greater contextual level, measures of the population included: metropolitan statistical area (or rurality) and the physician-to-population ratio.

Regulations. Regulations were another form of government policy, more specific to aspects of health organizations. Health care-specific regulations included the Health Insurance Portability and Accountability Act (HIPAA), which was a privacy protection law; the Stark Law, which governed physician self-referral for Medicare and Medicaid patients; the Emergency Medical Treatment and Labor Act, which required hospitals participating in Medicare to maintain emergency room coverage; quality control regulations; anti-trust regulations and related FTC and DOJ investigations on physician-hospital alliances; and laws prohibiting hospital employment of physicians. There were also non-health care regulations that could impact physician-system

integration, such as: federal anti-kickbacks, electronic discovery laws, IRS laws and regulations, and the Safe Harbor Law.

Technology. Technological advances were starting to move care away from the hospital either to the post-acute or outpatient setting (Berenson et al., 2007; Lawton Robert Burns & Muller, 2008; O'Malley, Bond, & Berenson, 2011). Technology influenced where physician groups and hospitals directed their resources. Per open systems theory, technological advances that required more resources than were available to these organizations may provoke them to solicit government support and subsidies (e.g., via Meaningful Use) or look to "buy" resources through integration.

Physician Group

The physician group of interest in this study was the physician group being considered for integration with a hospital. Using the three support activities of the Value Chain as our framework, we identified thirteen physician group factors that should be considered in a decision for integration. Table 2.2 gives the definitions of each factor, along with variables we found in the literature that had been used to measure them.

Organizational Structure. Organizational structure was one aspect of an organization that enabled the value creation for patients. Organizational structure was described using physician group factors: care delivery structures; practice type; integration structures; physician composition; leadership; and governance. Of note, we found that integrating structure, which was the contractual mechanism through which a physician group was aligned with a hospital or health system, was measured in a multitude of ways, sometimes using variables that have overlapping definitions. Most articles employed one (or all) of the classifications defined by the American Hospital Association. Other articles collapsed integrating structures into broader categories (Chukmaitov, Harless, Bazzoli, Carretta, & Siangphoe, 2015; Everson, Lee, & Adler-Milstein,

2016). We also noted that leadership and governance were challenging to measure, as indicated by the lack of specific variables relative to the propensity for them to be stressed as important factors of successful integration.

Organizational Culture. Organizational culture was the overarching, internal environment within which an organization operates (Ginter et al., 2013). Organizational culture was described using the factors: physician culture; mission, vision, and values; and transparency. The reviewed articles sought to find alignment between the these factors with their counterparts on the hospital side (Kauk & Bray, 2013; Sowers, Newman, & Langdon, 2013). Researchers also honed in on the generational culture shift of the physician workforce, in which younger physicians now have higher expectations for work-life balance (Lawton Robert Burns & Muller, 2008; Casalino et al., 2008; O'Malley et al., 2011; Page et al., 2013; Sowers et al., 2013), no longer seeing the hospital as their social center.

Strategic Resources. Strategic resources were the value-creating, tangible and intangible resources necessary for the delivery of health services (Ginter et al., 2013). The factors of strategic resources included: compensation and incentives; tangible resources; strategies; and information technology. Strategic resources were considered from both the monetary and non-monetary standpoints, often playing a critical role in the bargaining and market power of a physician group. For example, physician groups considering alignment with hospitals often also considered the compatibility of their respective EHR systems, which affected the coordination of care (Felland, Grossman, & Tu, 2011; Mehrotra, 2006; O'Malley et al., 2011).

Hospital

In this study, the hospital of interest was one that was part of a health system. Once again, we used the support activities of the Value Chain as our framework, identifying twelve hospital

factors that should be considered in the decision to integrate a physician group. Table 2.3 gives the factor definitions and associated variables found in the literature.

Organizational Structure. For the hospital, organizational structure can be described using the following factors: care delivery structures; hospital type; size; leadership; and governance. We found that researchers often used publicly-availably information to measure some of these factors. For example, hospital type, which was the organizational designation of the hospital, could be measured by its metropolitan service area designation. This designation was important, as rural hospitals often had less bargaining power against their limited supply of physicians (Baker et al., 2014; Baker, Bundorf, & Kessler, 2016; Chukmaitov et al., 2015; Cuellar & Gertler, 2006; Everson et al., 2016; Lammers, 2013; McCullough & Snir, 2010).

Organizational Culture. The hospital had a wider breadth of personnel than the physician group, making the organizational culture of a hospital the more complex of the two. Cultural factors included: hospital culture; mission, vision, and values; and transparency. We found that organizational culture had a lot to do with trust in the leadership (Berenson et al., 2007; Felland et al., 2011; Kauk & Bray, 2013; Sowers et al., 2013), which had trickle-down effects on the treatment of patients, treatment of employees, and physician referral patterns (Kauk & Bray, 2013).

Strategic Resources. The hospital's strategic resources could serve as leverage for hospitals aiming to integrate a physician group, as greater quality and quantity of resources was postulated to reduce transaction costs between services. Broadly, the organizational factors of strategic resources were: patient and payer mix; tangible resources; strategies; and information technology. Strategic resources were often considered separately for the pre- and post-integration phases (Berenson et al., 2007; Lawton Robert Burns & Muller, 2008; Felland et al., 2011). The hospital also considered patient and payer mix as a pre-integration strategic resource, a resource

that did not appear on the physician group side. This was likely due to the hospital's reach being typically greater than that of a physician group, which they can use to tempt a physician group.

Care Coordination

Care coordination was important to physician-system integration, as its mechanisms bridged the players involved. Care coordination, however, had become a dimension of interest only in recent years, given that care coordination processes had been more difficult to measure than structure and outcomes (Hoenig et al., 2002). We identified only seven articles that considered care coordination in their analyses, and all were published in 2010 or after. The four factors transcended all parts of the service delivery chain included: (1) post-acute and outpatient care; (2) case management resources; (3) communication; and (4) focus on continuity of care.

Post-Acute and Outpatient Care. The availability of post-acute and outpatient facilities and services was defined as the health system's access to services across the care continuum. This included but was not limited to: home care, freestanding outpatient clinics, primary care centers, and urgent care (Chukmaitov et al., 2015).

Case Management Resources. Relatedly, case management was the mechanism through which the patient was transitioned from one service to the next. An example of case management was having an established nurse case/care management with specialized training (Evans, Baker, & Berta, 2013; Hwang et al., 2013) and access to care maps (Sowers et al., 2013). Case management was further measured by teamwork and use of best practices, standards, and protocols.

Communication. Communication focused on the timeliness of information transfer through multiple pathways (Strandberg-Larsen et al., 2010). To facilitate care coordination, communication must have occurred between inpatient and outpatient providers, between providers

in the same setting, between levels of the organization, and between the patient and caregiver.

Focus on Continuity of Care. Rather than focusing on a service line of care, we found that an important aspect of care coordination was the focus on continuity of care. One article noted that "most clinical process integration appears focused on single diagnoses or conditions rather than integration across all of a patient's medical needs" (O'Malley et al., 2011).

Health System Success

Health system success, as expected, was measured using thirteen very diverse factors. To group the factors into more tangible areas of focus, we conducted a cluster analysis, drawing from the Value Chain to differentiate the factors. We established five clusters, finding that they oriented roughly with the Triple Aim of health care – to improve patient experience, to reduce cost per capita, and to improve the health of populations (Berwick, Nolan, & Whittington, 2008). The clusters were also not amiss to physician-system integration starting out as a business transaction. A MANOVA test indicated that the five clusters were significantly different overall ($p < 0.001$). Appendix 2.E provides detailed results of the ANOVA test for significant differences along the thirteen factors. In Table 2.4, we show the thirteen success factors by cluster, along with definitions and the variables we found in the literature that have been used to measure each.

Cluster 1 – Improving Patient Experience of Care. Clusters 1-4 corresponded with the goals of the Triple Aim. Cluster 1 mostly dealt with aspects of improving the patient experience of care and included the factors: efficiency; health system culture; patient experience; and physician engagement. Efficiency clustered with the above factors, but based on the way efficiency was described in the literature (ability to minimize operational transaction costs), it was unclear how it *directly* impacted patient experience, appearing to contribute more to resource management.

The factors in this cluster tended to be associated with the organizational structure,

organizational culture, strategic resources, and point-of-service components of the Value Chain (see Appendix 2.E). Namely, when examining one of these factors as dependent variables, past studies concurrently employed independent variables that described the structure, culture, resources of physician groups and/or hospitals, as well as point-of-service type measures of care coordination.

Cluster 2 – Reducing Per Capita Cost (Earnings). Cluster 2 focused on reducing per capita cost. It contained only one success measure: financial performance. Financial performance was the revenue generated by the health system. This described the earnings of the health system post-integration and could be considered using direct (i.e., provision of a service (Robinson & Miller, 2014)) and indirect measures (i.e., rates of payer discounts (O'Malley et al., 2011; Robinson & Miller, 2014; Trybou et al., 2015)). The factors in this cluster tended to be associated with the structure, culture, resource, and after-service components of the Value Chain.

Cluster 3 – Reducing Per Capita Cost (Cost Generation). Cluster 3 also focused on reducing per capita cost, but contrary to Cluster 3, the factors of Cluster 4 dealt more with cost generation. These factors included: health services utilization; total cost of care; and IT utilization. The factors considered how much patients used the health system via administrative and patient care charges. Of note, total cost of care, which was the expense incurred by health system in caring for a patient, was the most cited success factor. It was unclear, why IT utilization clustered with the other two factors, as it was controversial whether IT implementations resulted in health system cost savings or cost generation (Congressional Budget Office, 2008; Zlabek, Wickus, & Mathiason, 2011). Cluster 3 factors drew only from the structure and resource components of the Value Chain. This suggests that successful cost reduction stemmed from reduced transaction costs between the structural and resource factors of physician groups and hospitals.

Cluster 4 – Improving the Health of Populations. Cluster 4 was aligned with the last Triple Aim, improving the health of populations. Cluster 4 consisted solely of the factor: quality and safety, which was the degree to which health services increased the likelihood of desired health outcomes and were consistent with current professional knowledge. This factor considered at multiple levels: health system, community and population level, and individual. Per the ANOVA test results, Cluster 4 tended to be associated with all parts of the Value Chain except after-service. However, it was not clear why after-service did not play a role in determining this cluster.

Cluster 5 – Gaining a Competitive Advantage. Cluster 5 was comprised of success factors that were outward-facing and oriented toward giving the integrated health system a competitive advantage. The Cluster 5 factors were: access; market share and growth; reputation; and total cost of integration. It was important to look at these factors internally (Evans et al., 2013) and externally (Berenson et al., 2007), where possible. For example, reputation, which was the perception of the health system in the community, could be measured by how charitable the health system was, as seen by its patients and employees (Berenson et al., 2007). The factors in this cluster tended to be associated with the organizational structure and pre-service components of the Value Chain.

Landscape of Physician-System Integration Model

We present the resulting conceptual model – the landscape of physician-system integration (LOPSI) model (Figure 2.2), which synthesizes 48 organizational factors affecting health system success. In the model, the physician group of interest is affiliated with a hospital that is part of a health system. The physician group is part of a larger network of physicians who are on the hospital's medical staff, which may include other physician groups and/or independent physicians. Both sets of physicians contribute to the success of the hospital, as well as to the success of the

health system. All are influenced and interact with ACOs, health plans, and the environment. Recognizing that resource limitations make it impractical and often impossible to evaluate all aspects of integration, we aligned the factors with the Value Chain to allow future users of the model to hone their approaches on outcome(s) of interest.

2.4 CONCLUSION

This study confirmed earlier beliefs that physician-system integration is complex due to its multiple internal and external layers (Armitage et al., 2009; Hwang et al., 2013; Kodner, 2009; Strandberg-Larsen & Krasnik, 2009). Our study also revealed potential deficits in the past evidence base. First, only a fraction (37.9%) of the included empirical articles used organizational theory to define their approach. The absence of theory in empirical research may lead to a potential imbalance in analysis; future research should consider employing a combination of internal and external theories. Second, process measures (i.e., care coordination mechanisms) were also lacking, despite their important role in facilitating care between physicians and health systems. We recommend more research to define the measures of care coordination.

Health care executives, policymakers, and researchers should carefully consider and effectively communicate the multiple factors that influence integration. As evidenced by our systematic review, physician-system integration is a multi-faceted change for a health system. Practitioners and researchers alike posit that to obtain success, the effective execution of change is more important than the strategy for that change (Gillies, Shortell, Anderson, Mitchell, & Morgan, 1993). A health system cannot simply adopt a generic strategy to affiliate with a physician group; it must think through the factors that affect the execution of the affiliation. What are the factors of the environment? The physician group? The hospital? How will care be coordinated between the two entities? It is only through a collective approach that considers all these

dimensions that we can uncover the major determinants of health system success.

Our study was not without limitations. First, we cannot be sure that we identified all relevant articles; however, we used a broad search strategy that included a review of bibliographies to ensure that pertinent studies were captured. Second, we included only empirical articles from 2005-2016, which excludes seminal works from the 1960s and 1970s and theoretical articles. The time frame was necessary to allow for feasibility, and we attempted to ensure rigor by grounding our work in theoretical frameworks and triangulating our results with empirical studies (Creswell, 2013). Third, cluster analysis, while it has been frequently used in management research since the 1970s, has known problems that stem from the analysis' reliance on researcher judgment (Ketchen, Jr., & Shook, 1996). To maximize value from this technique, we attempted to ensure the validity of our clusters by triangulating our findings with theory. Triangulation helps apply the strengths of one method to complement the strengths of another, neutralizing some of the latter's weaknesses (Denzin, 1989). Fourth, in developing our conceptual model, we recognized that this topic is practice-oriented, so we intend to practice-validate the model in future work.

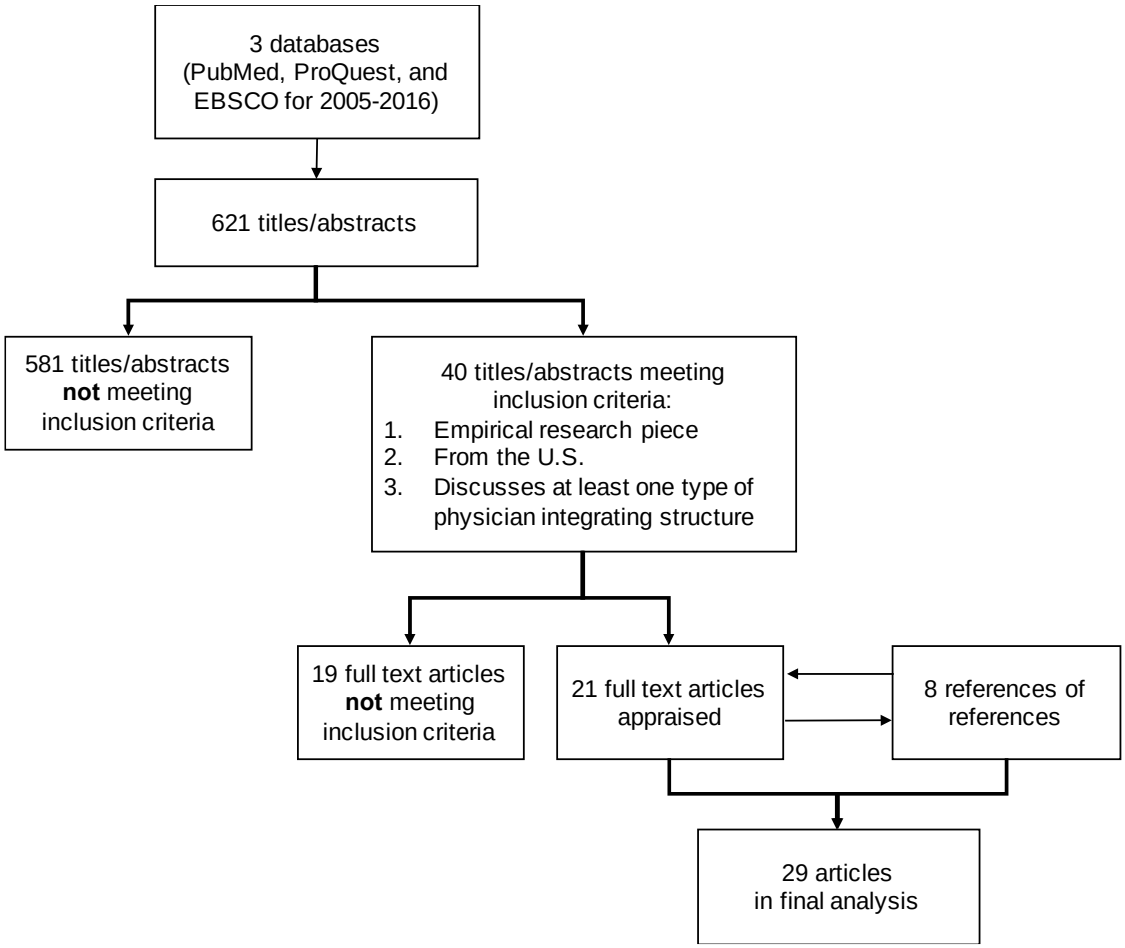
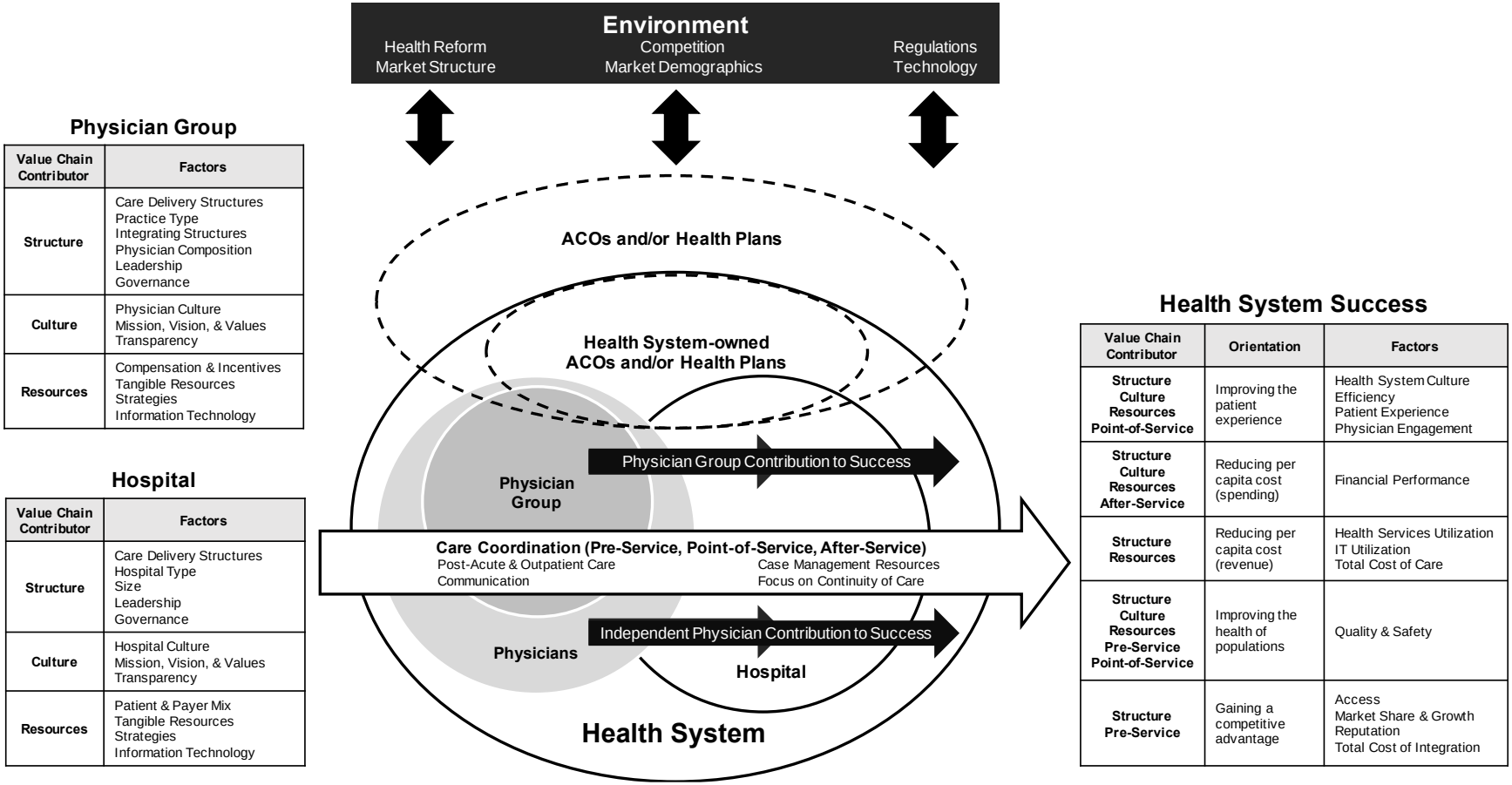


Figure 2.1. Article retention protocol



Physician Group

Value Chain Contributor	Factors
Structure	Care Delivery Structures Practice Type Integrating Structures Physician Composition Leadership Governance
Culture	Physician Culture Mission, Vision, & Values Transparency
Resources	Compensation & Incentives Tangible Resources Strategies Information Technology

Hospital

Value Chain Contributor	Factors
Structure	Care Delivery Structures Hospital Type Size Leadership Governance
Culture	Hospital Culture Mission, Vision, & Values Transparency
Resources	Patient & Payer Mix Tangible Resources Strategies Information Technology

Health System Success

Value Chain Contributor	Orientation	Factors
Structure Culture Resources Point-of-Service	Improving the patient experience	Health System Culture Efficiency Patient Experience Physician Engagement
Structure Culture Resources After-Service	Reducing per capita cost (spending)	Financial Performance
Structure Resources	Reducing per capita cost (revenue)	Health Services Utilization IT Utilization Total Cost of Care
Structure Culture Resources Pre-Service Point-of-Service	Improving the health of populations	Quality & Safety
Structure Pre-Service	Gaining a competitive advantage	Access Market Share & Growth Reputation Total Cost of Integration

Figure 2.2. Conceptual model of the landscape of physician-system integration (LOPSI), based on a systematic review and cluster analysis of empirical research studies, 2005-2016. Dotted lines denote that accountable care organizations (ACOs) and health plans can be owned by and/or independent of the health system.

Table 2.1. Summary of the reviewed empirical literature on physician-system integration, 2005-2016 (n=29)

Reference	Study Setting	Study Period	Theoretical Application	Organizational Factor Usage				
				Environment	Physician Group	Hospital	Care Coordination	Health System Success
Ciliberto & Dranove (2006)	1,031 hospitals in California	1994-2001	Bargaining-market power theory	• Market Demographics	• Integrating Structures	• Hospital Type	n/a	• Total Cost of Care
Cuellar & Gertler (2006)	1,257 hospitals in Arizona, Florida, and Wisconsin	1994-1998	Bargaining-market power theory; transaction cost theory	• Market Structure	• Integrating Structures	• Hospital Type • Information Technology • Size • Tangible Resources	n/a	• Financial Performance • Health Services Utilization • Quality & Safety • Total Cost of Care
Mehrotra (2006)	1.7 million enrollees of PacifiCare, a large HMO in California, CEOs, and medical directors	July 1999-June 2000; May 1999-June 2000	n/a	• Market Demographics	• Compensation & Incentives • Integrating Structures • Information Technology • Physician Composition • Strategies	n/a	n/a	• Quality & Safety
Berenson et al. (2007)	Hospitals in 12 nationally representative metropolitan areas	2000-01 vs. 2005	n/a	• Competition • Market Structure • Regulations • Technology	• Care Delivery Structures • Compensation & Incentives • Governance • Integrating Structures • Information Technology • Physician Composition • Physician Culture • Strategies	• Care Delivery Structures • Hospital Culture • Hospital Type • Information Technology • Leadership • Mission, Vision, & Values • Patient & Payer Mix • Strategies • Tangible Resources	n/a	• Efficiency • Financial Performance • Health Services Utilization • Market Share & Growth • Patient Experience • Physician Engagement • Quality & Safety • Reputation • Total Cost of Care

Burns & Muller (2008)	Literature review	n/a	n/a	• Competition • Health Reform • Market Structure • Regulations • Technology	• Care Delivery Structures • Compensation & Incentives • Governance • Integrating Structures • Leadership • Physician Composition • Physician Culture • Transparency	• Care Delivery Structures • Governance • Hospital Culture • Hospital Type • Information Technology • Mission, Vision, & Values • Patient & Payer Mix • Size • Strategies • Tangible Resources • Transparency	n/a	• Financial Performance
Casalino et al. (2008)	Hospitals in 12 nationally representative metropolitan areas	February-June 2007	n/a	• Competition • Market Structure	• Integrating Structures • Leadership • Physician Culture • Tangible Resources	• Care Delivery Structures • Tangible Resources	n/a	n/a
McCullough & Snir (2010)	1,346hospitals	1998-2001	Agency theory	• Competition • Market Demographics • Market Structure • Regulations	• Compensation & Incentives • Integrating Structures • Physician Composition	• Care Delivery Structures • Hospital Type • Patient & Payer Mix • Size • Tangible Resources	n/a	• IT Utilization
Strandberg-Larsen et al. (2010)	Kaiser Permanente Northern California, Danish healthcare system	2006 (Kaiser), 2007 (Danish)	n/a	n/a	• Physician Composition • Practice Type	• Information Technology • Patient & Payer Mix • Tangible Resources	• Case Management • Communication • Training	• n/a
Felland et al. (2011)	Hospitals in 12 nationally representative	2010	n/a	• Health Reform	• Integrating Structures	• Hospital Culture • Strategies	n/a	• Access • Financial Performance

	metropolitan areas			• Market Structure	• Information Technology • Physician Composition • Tangible Resources			• Market Share & Growth
O'Malley et al. (2011)	Hospitals in 12 nationally representative metropolitan areas	2010	n/a	• Competition • Health Reform • Market Structure • Technology	• Compensation & Incentives • Integrating Structures • Information Technology • Physician Composition • Physician Culture • Strategies • Tangible Resources	• Size	• Communication • Focus on Continuity of Care	• Access • Efficiency • Financial Performance • Health Services Utilization • Market Share & Growth • Patient Experience • Physician Engagement • Quality & Safety • Total Cost of Care
Evans et al. (2013)	Literature review	1985-2013	Complex-adaptive systems	• Health Reform • Market Demographics	• Governance • Integrating Structures • Physician Composition	• Governance • Size • Tangible Resources	• Case Management • Communication • Training	• Efficiency • Financial Performance • Health System Culture • Market Share & Growth • Patient Experience • Quality & Safety • Reputation • Total Cost of Care
Hwang et al. (2013)	Literature review	2000-2011	n/a	• Health Reform • Market Demographics	• Governance • Integrating Structures • Physician Composition	n/a	• Case Management • Training	• Efficiency • Health Services Utilization • IT Utilization • Quality & Safety

								• Total Cost of Care
Kauk & Bray (2013)	Literature review	n/a	n/a	• Health Reform	• Compensation & Incentives • Leadership • Mission, Vision, & Values • Physician Culture	• Hospital Culture • Leadership • Mission, Vision, & Values	n/a	• Financial Performance • Quality & Safety • Total Cost of Care
Lammers (2013)	4,502 hospitals	2008	Internal organization of hospitals; transaction cost theory	• Market Demographics • Market Structure • Regulations	• Integrating Structures	• Hospital Type • Patient & Payer Mix • Size	n/a	• IT Utilization
McWilliams, Chernew, Zaslavsky, Hamed, & Landon (2013)	4.29 million Medicare beneficiaries	2009	n/a	• Market Demographics • Market Structure	• Integrating Structures • Physician Composition	• Patient & Payer Mix	n/a	• Health Services Utilization • Quality & Safety • Total Cost of Care
Page et al. (2013)	Literature review	1992-March 2012	n/a	• Health Reform • Regulations	• Compensation & Incentives • Leadership • Physician Composition • Physician Culture • Tangible Resources	• Leadership	n/a	n/a
Sowers et al. (2013)	Literature review	n/a	n/a	• Health Reform • Regulations	• Compensation & Incentives • Governance • Integrating Structures • Leadership • Mission, Vision, & Values • Physician Composition • Physician Culture	• Governance • Hospital Culture • Leadership • Mission, Vision, & Values • Size • Strategies	• Case Management	• Efficiency • Health System Culture • Patient Experience • Quality & Safety

Baker et al. (2014)	2.1 million hospital claims from non-elderly, privately insured patients	2001–2007	Bargaining-market power theory; transaction cost theory	• Competition • Market Demographics • Market Structure	• Integrating Structures	• Hospital Type • Size • Tangible Resources	n/a	• Health Services Utilization • Total Cost of Care
Cho, Chang, & Atems (2014)	U.S. hospitals	2010	n/a	• Market Demographics	• Integrating Structures	• Care Delivery Structures • Hospital Type • Size • Tangible Resources	n/a	• Health Services Utilization • IT Utilization
Janus & Brown (2014)	151 integrated care organizations in U.S., England, and Germany	n/a	n/a	n/a	• Compensation & Incentives • Physician Composition	n/a	n/a	n/a
Robinson & Miller (2014)	4.5 million patients in California	2009-2012	n/a	• Market Demographics	• Governance • Integrating Structures • Physician Composition	• Tangible Resources	n/a	• Financial Performance • Total Cost of Care
Cho (2015)	24 physicians and hospital administrators	April-November 2012	n/a	n/a	• Integrating Structures	n/a	• Communication	• Market Share & Growth • Patient Experience • Total Cost of Care • Total Cost of Integration
Chukmaitov et al. (2015)	5.4 million patient records in Florida	2006-2009	Contingency theory	• Competition • Market Demographics • Market Structure	• Integrating Structures	• Hospital Type • Size • Tangible Resources	• Post-Acute and Outpatient Care	• IT Utilization • Quality & Safety • Total Cost of Care
Neprash et al. (2015)	7,391,335 non-elderly enrollees in PPOs or point-of-service plans	December 1, 2013 - July 13, 2015	Bargaining-market power theory	• Competition • Market Demographics	• Integrating Structures	• Hospital Type	n/a	• Total Cost of Care

Song et al. (2015)	806,266 Medicare beneficiaries; 12,567,069 commercially insured individuals	2007-2012	n/a	• Market Demographics	• Integrating Structures	n/a	n/a	• Health Services Utilization
Trybou et al. (2015)	Literature review	January 1989 - June 2013	Agency theory	n/a	• Compensation & Incentives • Integrating Structures	n/a	n/a	• Financial Performance
Baker et al. (2016)	400,000 physicians	2009	Agency theory	• Market Demographics	• Governance • Integrating Structures	• Hospital Type • Size	n/a	• Health Services Utilization • Financial Performance • Quality & Safety
Everson et al. (2016)	2,920 hospitals	2009-2012	Transaction cost theory	• Competition • Market Demographics	• Integrating Structures • Physician Composition	• Hospital Type • Size	n/a	• IT Utilization • Quality & Safety
Lanese (2016)	1 hospital in the Midwest	2012-2013	n/a	• Health Reform	• Integrating Structures	• Hospital Culture	n/a	• Patient Experience • Quality & Safety • Total Cost of Care

Table 2.2. Physician group organizational factors affecting physician-system integration

Factor	Definition	Variables from Literature
Organizational Structure		
Care Delivery Structures	Supporting structures of health services in the physician group	• Whether call practices differ between physicians and hospitalists • Whether past installation of clinical integration disrupted patient flow
Practice Type	Organizational designation of hospital	• Ownership of practice
Integrating Structures	Contractual mechanism through which a physician group is aligned with a hospital or health system	• Independent physician association (IPA) • Group practice without walls • Closed physician hospital organization (closed PHO) • Open physician hospital organization (open PHO) • Management service organization (MSO) • Employment model or integrated salary model (formerly known as integrated service model (ISM) and fully integrated organizations (FIO) • Equity model • Foundation model • Physician hospital organization (PHO) • Joint venture • No vs. weak vs. moderate vs. strong integration • Integrated vs. hybrid vs. independent • No vs. low vs. high integration • Loose vs. tight integration • Independent vs. hospital-based
Physician Composition	Size and make-up of a physician group	• Number of physicians • Number of physicians by specialty type • Ethnicity • Sex • Age • Years of experience • Specialty • Board certification • Hours worked per week
Leadership	Physician role in determining determine the direction and strategy of the physician group	• Presence of physician in physician group leadership • Presence of career path development • Participation in hospital leadership • Alignment between physician leadership and hospital leadership

Governance	Oversight of the physician group with respect to the role of the physician in the physician-hospital relationship	• Having a defined governance structure within the physician group • Whether physicians willingly take part in the hospital's governance • Presence of physicians in medical directorship roles
Organizational Culture		
Physician Culture	System of shared assumptions, values, and beliefs, which governs how people behave in the physician group	• Desire for practice control • Level of accountability • Turf issues against other specialists • Trust in hospital leadership
Mission, Vision, & Values	Physician group's objectives, approach to those objectives, and desired future position	• Alignment of interests • Alignment of goals • Alignment of priorities
Transparency	Sharing of information within the group	• Quality • Financial performance • Satisfaction • Level of anonymity of data
Strategic Resources		
Compensation & Incentives	Financial drivers of the physician group	• Quality bonuses • Compensation model (salary, productivity-based, capitation, fee-for-service, pay-for-performance) • Quality improvement opportunities • Learning opportunities (continued education, affiliation with universities) • Professional prestige • Service coordination
Strategies	Intangible resources that guide the physician group in its decision to integrate with a hospital	• Leverage with payers • Service line branding • Quality improvement
Tangible Resources	Tangible assets used or owned by the physician group	• Physician labor force • Facilities • Equipment • Financial burdens (overhead costs, educational debt, malpractice insurance premiums, and capital for expansion)
Information Technology	Systems that enable the transfer of information	• Presence of an EHR system • Stage of EHR implementation • Cost of EHR implementation

Table 2.3. Hospital organizational factors affecting physician-system integration

Factor	Definition	Variables from Literature
Organizational Structure		
Care Delivery Structures	Supporting structures of health services in the hospital	• Service mix • Specialty lines • How hospitalists are used • Whether the OR schedule is manageable • Availability of an MRI service
Hospital Type	Organizational designation of hospital	• Teaching status • Designation as a specialty hospital • Designation as an acute care hospital • Ownership (non-profit status) • Rurality • Network or system membership
Size	Patient capacity	• Number of beds (small <100 beds; medium 100-300; and large >300) • Number of staffed beds • Number of outpatient visits • Number of adjusted patient days • Number of total admissions • Inpatient growth
Leadership	Physician role in determining determine the direction and strategy of the hospital	• Identified hospital leaders • Presence of career path development • Participation of physicians in hospital leadership • Alignment between physician leadership and hospital leadership
Governance	Oversight of the hospital with respect to the role of the physician in the physician-hospital relationship	• Having a defined governance structure within the hospital • Whether physicians willingly take part in the hospital's governance
Organizational Culture		
Hospital Culture	System of shared assumptions, values, and beliefs, which governs how people behave in the hospital	• Trust • Level of formality • Level of control • Level of accountability • Level of risk tolerance • Tendency to be an early adopter • Cost orientation • Tendency for information sharing

Mission, Vision, & Values	Hospital's objectives, approach to those objectives, and desired future position	• Focus on physician issues • Focus on quality goals • Focus on population health • Emphasis on technology • Emphasis on supply chain management • Promotion of multidisciplinary care • History of physician-hospital collaboration
Transparency	Sharing of information with the physician group	• Financial performance • Cost of care
Strategic Resources		
Patient and Payer Mix	Make-up of patients who have received care from the hospital	• Percentage of Medicaid and Medicare discharges
Strategies	Intangible resources that guide the hospital in its decision to integrate a physician group	• Competition with physicians by discounting services • Loyalty of independent physicians • Presence of joint ventures with any physician groups • Openness of key specialists to talk about integration • Preparation of physician practices for change • Re-engineering of hospital processes, hospital medical staff, and physician practices • Promotion or marketing of physician groups • Service line re-branding
Tangible Resources	Tangible assets used or owned by the hospital	• Physician workforce • Registered nurses • Physician extenders • Support staff (non-clinician hospital staff) • Compensation of hospital executives • Quality of labor
Information Technology	Systems that enable the transfer of information	• Use of health IT in general • Investments in health IT • Dependence on one IT vendor (vs. multiple) • Trained implementers from IT vendors on-site • Functionalities of IT system (book referrals/consultations, communicate with patients and physicians, order tests and prescriptions, send reminders, view lab results)

Table 2.4. Health system success factors relevant to physician-system integration

Factor	Definition	Variables from Literature
Cluster 1 – Improving Patient Experience of Care		
Health System Culture	System of shared assumptions, values, and beliefs, which governs how people behave in the health system	• Shared beliefs • Shared planning • Shared attitudes • Shared assumptions • Shared norms • Shared values
Efficiency	Ability to minimize operational transaction costs	• On-time OR starts • Standardized medical devices • Avoidance of wasting supplies
Patient Experience	Patient interaction with the health system	• Patient satisfaction • Patient compliance with referring physicians • Care coordination • Patient centeredness
Physician Engagement	Physician interaction with the health system	• Relationship between hospitalists and physician groups • Presence of physicians in leadership roles • Presence of physicians on hospital committees • Physician attendance at continuing medical education programs offered at the hospital
Cluster 2 – Reducing Per Capita Cost (Earnings)		
Financial Performance	Revenue generated by the health system	• Risk sharing between physicians and hospitals or among physicians • Payment type (fee-for-service, capitation, out-of-pocket) • Provision of a service • Outmigration of a service • Rates of payer discounts • Formation of new payment models
Cluster 3– Reducing Per Capita Cost (Cost Generation)		
Health Services Utilization	Patient use of the health system to attain care	• Number of office visits • Number of outpatient visits • Number of ED visits • Number of case-mix-adjusted admissions • Admission rate per patient • Types of services • Rates of overused procedures

		• Medication use
Total Cost of Care	Expenses incurred by health system in caring for a patient	• Marketing fees • Administrative fees • Technology fees • Medical claims (per enrollee, per hospital admission, per day)
IT Utilization	Availability of specialized IT applications	• EHR system • Computerized physician order entry • Clinical decision support • Bar-coding system • Laboratory order system • Radiology information system • Clinical data repository • Nursing documentation • Utilization review
Cluster 4 – Improving the Health of Populations		
Quality & Safety	Degree to which health services in the health system increases the likelihood of desired health outcomes and are consistent with current professional knowledge	• Evidence-based practice adherence • Documentation • Chronic care management processes • Proportion of adverse events • Average case-mix index of illness severity • Hospital and surgical complication rates
	Degree to which health services in the community increases the likelihood of desired health outcomes and are consistent with current professional knowledge	• Presence of a wellness and prevention program • Vaccination rates
	Degree to which health services at the individual level increases the likelihood of desired health outcomes and are consistent with current professional knowledge	• Length of stay • Readmission rates • 30-day mortality rates • Medication errors • Medication adherence • Quality of life • Diabetes • Asthma • Women's health • Functional status
Cluster 5 – Gaining a Competitive Advantage		
Access	Ability for patients to attain timely use of health services to achieve the best health outcomes	• Emergency on-call coverage

Market Share & Growth	Health system's stake in its market	• Number of admissions • Number of diagnostic testing • Number of outpatient services • Internal referral rates
Reputation	Perception of the health system in the community	• Level of integration • Level of charity
Total Cost of Integration	Monetary and non-monetary expenses associated with undergoing integration	• Cooperation • Coordination • Monitoring

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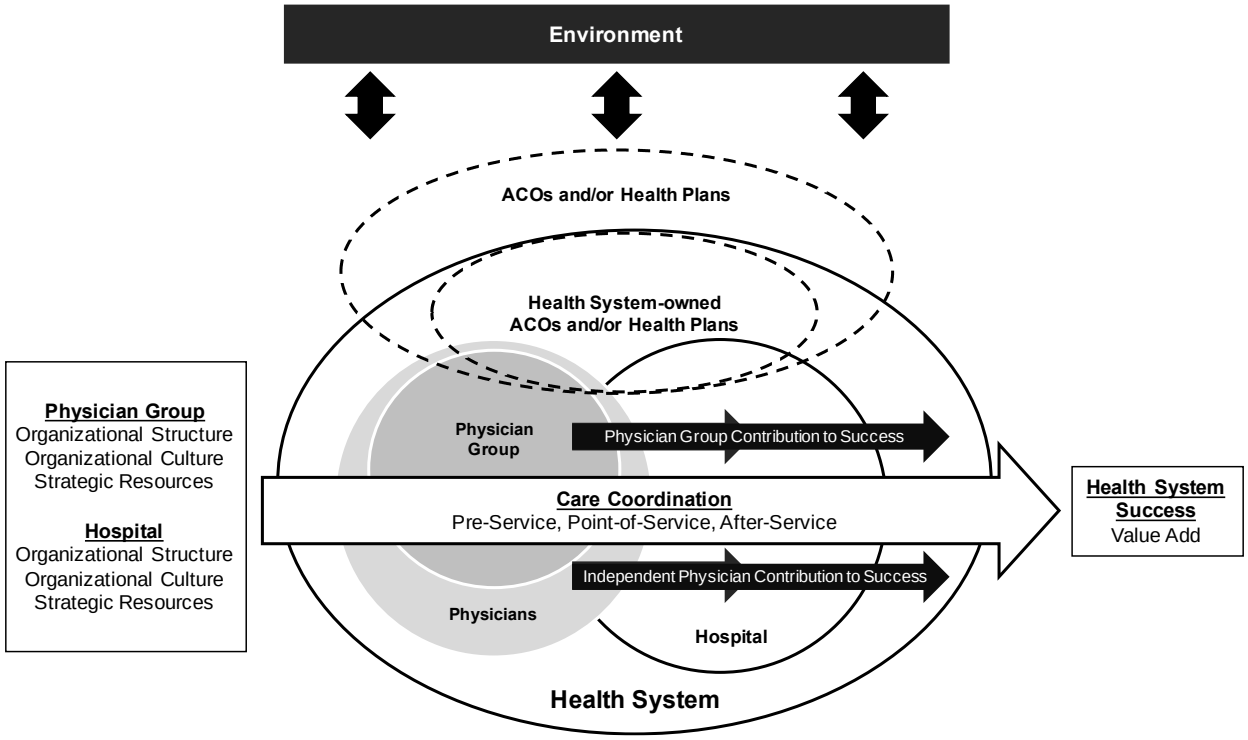
2.6 APPENDIX



Appendix 2.A. Base conceptual model of physician-system integration using the theoretical bases of open systems theory and Porter's Value Chain. Dotted lines denote that accountable care organizations (ACOs) and health plans can be owned by and/or independent of the health system.

Appendix 2.B. Definitions of physician integrating structures by the American Hospital Association (American Hospital Association, 2015)

Physician Integrating Structure	**Definition**
Open physician-hospital organization (PHO)	A joint venture between the hospital and all members of the medical staff who wish to participate. The PHO can act as a unified agent in managed care contracting, own a managed care plan, own and operate ambulatory care centers or ancillary services projects, or provide administrative services to physician members.
Closed physician-hospital organization (PHO)	A PHO that restricts physician membership to those practitioners who meet criteria for cost effectiveness and/or high quality.
Group practice without walls	Hospital sponsors the formation of, or provides capital to physicians to establish, a "quasi" group to share administrative expenses while remaining independent practitioners.
Independent practice association	A legal entity that holds managed care contracts. The IPA then contracts with physicians, usually in solo practice, to provide care either on a fee-for-service or capitated basis. The purpose of an IPA is to assist solo physicians in obtaining managed care contracts.
Management services organization	A corporation, owned by the hospital or a physician/hospital joint venture, that provides management services to one or more medical group practices. The MSO purchases the tangible assets of the practices and leases them back as part of a full-service management agreement, under which the MSO employs all non-physician staff and provides all supplies/administrative systems for a fee.
Equity model	Allows established practitioners to become shareholders in a professional corporation in exchange for tangible and intangible assets of their existing practices.
Foundation	A corporation, organized either as a hospital affiliate or subsidiary, which purchases both the tangible and intangible assets of one or more medical group practices. Physicians remain in a separate corporate entity but sign a professional services agreement with the foundation.
Employed/Salary Model	Physicians are salaried by the hospital or another entity of a health system to provide medical services for primary care and specialty care.

Appendix 2.C. Frequency of Value Chain dimensions by health system success factor

Health System Success Factor	**Structure**	**Culture**	**Resources**	**Pre-Service**	**Point-of-Service**	**After-Service**	**Total**
Access	2	2	1	2	1	1	**9**
Efficiency	13	7	7	4	5	3	**39**
Financial Performance	26	11	23	4	4	3	**71**
Health Services Utilization	25	5	10	1	1	1	**43**
Health System Culture	16	6	8	5	8	0	**43**
IT Utilization	38	0	16	7	0	0	**61**
Market Share & Growth	6	3	3	3	3	3	**21**
Patient Experience	10	6	6	4	4	1	**31**
Physician Engagement	12	11	10	5	2	2	**42**
Quality & Safety	59	8	22	6	6	1	**102**
Reputation	4	2	3	1	1	0	**11**
Total Cost of Care	32	7	14	5	3	1	**62**
Total Cost of Integration	0	0	0	3	0	0	**3**
Total	**243**	**68**	**123**	**50**	**38**	**16**	**538**

Appendix 2.D. Number of articles that used each organizational factor of the physician-system integration conceptual model (n=29)

Dimension	Organizational Factor	# of Articles Using Factor	% of Articles Using Factor	Total # of Factors	Average # of Factors Per Article
Environment	Competition	9	31.0%	18	2.00
	Health Reform	9	31.0%	13	1.44
	Market Demographics	15	51.7%	21	1.40
	Market Structure	11	37.9%	22	2.00
	Regulations	6	20.7%	11	1.83
	Technology	3	10.3%	4	1.33
	Any Environmental Factor	**25**	**86.2%**	**71**	**2.84**
Physician Group	Care Delivery Structures	2	6.9%	9	4.50
	Compensation & Incentives	10	34.5%	32	3.20
	Culture	7	24.1%	14	2.00
	Governance	7	24.1%	9	1.29
	Integrating Structures	25	86.2%	71	2.84
	Information Technology	4	13.8%	4	1.00
	Leadership	5	17.2%	10	2.00
	Mission, Vision, & Values	2	6.9%	3	1.50
	Physician Composition	15	51.7%	25	1.67
	Practice Type	1	3.4%	1	1.00
	Strategies	3	10.3%	3	1.00
	Tangible Resources	4	13.8%	7	1.75
	Transparency & Feedback	1	3.4%	1	1.00
	Any Physician Group Factor	**29**	**100.0%**	**153**	**5.28**
Hospital	Care Delivery Structures	5	17.2%	8	1.60
	Culture	6	20.7%	8	1.33
	Governance	3	10.3%	3	1.00
	Hospital Type	12	41.4%	17	1.42
	Information Technology	4	13.8%	7	1.75
	Leadership	4	13.8%	7	1.75
	Mission, Vision, & Values	4	13.8%	8	2.00
	Patient & Payer Mix	6	20.7%	8	1.33

	Size	12	41.4%	14	1.17
	Strategies	4	13.8%	9	2.25
	Tangible Resources	12	41.4%	21	1.75
	Transparency	1	3.4%	1	1.00
	Any Hospital Factor	**23**	**79.3%**	**72**	**3.13**
Care Coordination	Post-Acute and Outpatient Care	1	3.4%	1	1.00
	Case Management	4	13.8%	5	1.25
	Communication	4	13.8%	6	1.50
	Focus on Continuity of Care	1	3.4%	2	2.00
	Training	3	10.3%	3	1.00
	Any Care Coordination Factor	**7**	**24.1%**	**12**	**1.71**
Health System Success	Access	2	6.9%	2	1.00
	Culture	2	6.9%	2	1.00
	Efficiency	5	17.2%	6	1.20
	Financial Performance	10	34.5%	24	2.40
	Health Services Utilization	9	31.0%	14	1.56
	IT Utilization	6	20.7%	9	1.50
	Market Share & Growth	5	17.2%	7	1.40
	Patient Experience	6	20.7%	6	1.00
	Physician Engagement	2	6.9%	3	1.50
	Quality & Safety	12	41.4%	38	3.17
	Reputation	2	6.9%	2	1.00
	Total Cost of Care	14	48.3%	20	1.43
	Total Cost of Integration	1	3.4%	3	3.00
	Any Health System Success Factor	**26**	**89.7%**	**109**	**4.19**

Appendix 2.E. Cluster means, standard deviations, and ANOVA results for differences along clustering measures for health system success factors

	Cluster					
	1 n=4	**2 n=1**	**3 n=3**	**4 n=1**	**5 n=4**	**F**
Structure	12.75 (sd=2.50)	26.00	31.67 (sd=6.51)	59.00	3.00 (sd=2.58)	53.53***
Culture	7.50 (sd=2.38)	11.00	4.00 (sd=3.61)	8.00	1.75 (sd=1.26)	4.80*
Resources	7.75 (sd=1.71)	23.00	13.33 (sd=3.06)	22.00	1.75 (sd=1.50)	37.17***
Pre-Service	4.50 (sd=0.58)	4.00	4.33 (sd=3.06)	6.00	2.25 (sd=0.96)	1.54
Point-of-Service	4.75 (sd=2.50)	4.00	1.33 (sd=1.53)	6.00	1.25 (sd=1.26)	3.04
After-Service	1.50 (sd=1.29)	3.00	0.67 (sd=0.58)	1.00	1.00 (sd=1.41)	0.80

*p<0.05, **p<0.01, ***p < 0.001

Chapter 3. ORGANIZATIONAL FACTORS AFFECTING SUCCESSFUL PHYSICIAN-SYSTEM INTEGRATION: A QUALITATIVE STUDY OF WASHINGTON STATE HEALTH EXECUTIVES

3.1 INTRODUCTION

Health care delivery is moving toward a value-based environment, one in which patients, payers, and policymakers hold providers increasingly more accountable for cost, quality, and the patient experience (Berwick, Nolan, & Whittington, 2008). Health reform is also driving new payment methodologies (e.g., bundled payments and shared savings) and increased formation of medical homes and accountable care organizations (ACOs). These market factors call for increased coordination and increased care management, making the integration between physician groups and health systems a leading response to health reform (Neprash, Chernew, & McWilliams, 2017).

Physician-system integration, however, can be structured in a variety of ways. As of 2015, 59% of U.S. hospitals had at least one kind of integration contract with physicians, impacting an average of 256 physicians per hospital (Health Forum LLC, 2017). Generally, there are eight main types of contracts (listed in order of loose to tight integration schemas): open physician-hospital organization, closed physician-hospital organization, group practice without walls, independent practice association, management services organization, equity model, foundation, and employment model (American Hospital Association, 2015). The employment model, in which physicians are employed by a hospital or health system and paid a salary, is the most common model, used by almost 40% of hospitals (Health Forum LLC, 2017).

Despite the prevalence of physician-system integration, the evidence on the value of physician-system integration is mixed. Physician employment models have been found to have the

strongest level of physician accountability and satisfaction (McCarthy & Mueller, 2009; Shih et al., 2008) and lower staffing per admission (Shortell, Gillies, & Anderson, 1994). Researchers have also found that physician-system integration has a positive or null effect on the financial status of a health system (Ciliberto & Dranove, 2006; Goes & Zhan, 1995; Snail & Robinson, 1998; Trybou, Gemmel, & Annemans, 2011). Other studies, however, report hospital financial losses, little evidence of improved outcomes (Baker, Bundorf, & Kessler, 2014), higher procedure rates, and higher expenditures (Madison, 2004; Scott, Orav, Cutler, & Jha, 2017).

This study contributes to the broad yet conflicting literature on physician-system integration by reporting the results of a qualitative investigation of health executive perspectives on physician-system integration. Health executives sit at a key nexus for determining when and how physician groups are integrated into health systems. Our objectives were two-fold: 1) to determine if there was congruency between how theory, research, and practice define and measure physician-system integration; and 2) to identify the organizational factors that health executives believed made physician-system integration successful.

3.2 THEORY

The landscape of physician-system integration requires consideration of multiple organizational factors affecting multiple facets of success. To study this topic, we employ two organizational theories, open systems theory (Von Bertalanffy, 1968) and Porter's Value Chain (Porter & Teisberg, 2006). Open systems theory (Von Bertalanffy, 1968) posits that organizations are strongly influenced by and interact with their environment. In the context of physician-system integration, environmental forces include: health reform, market structure, competition (i.e., market share), market demographics, regulations, and technology. The system consists of hospitals, physicians, and payers, which are the key players of physician-system integration

(Conrad & Shortell, 1996; Mick & Conrad, 1988; Miller, 1996), as well as the ways in which these entities are linked structurally and financially (e.g., via an ACO and/or health system). Per open systems theory, the entities in the system continuously interact with one another and the environment, often trying to influence the environment through use of public relations, advertising, marketing, lobbying, cooptation, and advocacy. For example, a hospital may respond to the Medicare Access & CHIP Reauthorization Act of 2015 (MACRA) by adjusting internal systems (e.g., hiring financial analysts), bargaining with physician groups (e.g., explaining the impact of value-based care on reimbursement), and then transacting with them (e.g., forming ACOs to comply to MACRA's specification for alternative payment models).

The Value Chain (Ginter, Duncan, & Swayne, 2013; Porter & Teisberg, 2006) is a model within open systems theory that describes the internal processes of an organization. The Value Chain posits that an organization seeks to minimize transaction costs between each of the "links" in the system to optimize the value-add. The service delivery chain is the fundamental value creation stream, in which each "link" in the chain is designed to add value to the original input. Service delivery consists of pre-service, point-of-service, and after-service activities. Support structures facilitate and support the service delivery chain through organizational structure, organizational culture, and strategic resources. Given that value is largely unmeasured and misunderstood in health care, there are multiple interpretations of value creation.

Using the two theories as our framework, we conducted a systematic review of the empirical literature on physician-system integration published 2005-2016 [citation redacted for peer review] to create the Landscape of Physician-System Integration (LOPSI) model, depicted in Figure 3.1. The model portrays the entities involved with physician-system integration and their relationships to one another. The boxes represent the five dimensions of physician-system

integration – the environment, physician group, hospital, care coordination, and health system success. The dimensions are further operationalized into 48 factors that make up physician-system integration. The LOPSI model served as the coding framework for this qualitative analysis.

3.3 METHOD

The study was given exempt determination by the University of Washington Institutional Review Board in March 2016 (HSD study #51683). We adhered to the consolidated criteria for reporting qualitative research (COREQ) for reporting qualitative research (Tong, Sainsbury, & Craig, 2007).

Study Population

To explore the complex social phenomena of physician-system integration, we employed a multiple-case study research design (Yin, 2013). The case study approach provided us with the opportunity to consider concurrently multi-layered influences associated with physician groups, hospitals, health systems, and the external environment. Case study research also allowed us to draw upon multiple sources of evidence and converge the data in a triangulated fashion. For this study, the cases comprised of health systems in Washington State. The embedded units of analysis included interview participants representing these health systems.

We used purposive sampling to select integrated delivery systems (IDS) located in Washington State and adapted six of Shortell's participant selection criteria in *Remaking Health Care in America* (Shortell, Gillies, Anderson, Erickson, & Mitchell, 1996) to select IDS organizations. Each resulting IDS: 1) had a primary service area in Washington State, 2) had a formal affiliation with a physician group, 3) owned hospitals, 4) was well-established, with a strong likelihood of ongoing viability, 5) had leadership willing and able to participate, and 6) was not government owned. We constrained our selection to Washington State to minimize contextual

variation and to maintain feasibility of the study given resource limitations. Using these criteria, nine IDS were eligible.

For each IDS, we selected the largest system-affiliated hospital. We requested interviews with the hospital's Chief Executive Officer (CEO), Chief Medical Officer (CMO), Chief Financial Officer (CFO), and the Chief Executive of the largest affiliated physician group. Our case definition was based on vertical integration theories, which posited that the key players in integration arrangements were hospitals, physicians, and payers (Conrad & Shortell, 1996; Mick & Conrad, 1988; Miller, 1996); the selected parties roughly corresponded with this list.

We contacted the CEOs of each IDS by email and phone, sending them a research prospectus describing the study's purpose, objectives, and interview request. Eight out of the nine (89%) IDS CEOs agreed to participate; the declining IDS represented the only for-profit organization. Among the eight participating IDS, two executive positions were unoccupied at the time of our request. We conducted a total of 25 individual interviews, representing a participation rate of 69.4% (25 out of 36 health executives).

Data Collection

Between April and September 2016, we conducted semi-structured, qualitative interviews to capture health executives' insights. We structured the interview protocol on principles of Blumer (1969) and Bogdan & Biklen (1992), who described the interview process as a focused, open-ended discussion that allowed interviewees to elaborate and compare inputs (Blumer, 1969; Bogdan & Biklen, 1992). Interview questions included the following topics: context, objectives, strategy, facilitators, barriers, and lessons learned regarding physician-system integration. The Principal Investigator (female) conducted each interview in person or by phone. Interviews lasted from 45-60 minutes and were audio-recorded with permission. We stored the audio recordings on

secure servers accessible only to the research team and sent encrypted files to a professional transcription service.

Analytical Approach

For this study, we focused on six interview questions:

- What are the key characteristics of the physician group that affect successful integration with the hospital?
- What are the key measures you use to determine the contribution of the physician group to the overall success of the hospital?
- What are the key characteristics of the hospital that affect successful integration with the physician group?
- What the key care coordination and care management processes that are important to physician-health system integration?
- What are the key characteristics of the physician group that affect successful care coordination?
- What success metrics are most important?

The research team used the constant comparison method, in which essential concepts from interview notes were compared over successive interviews to extract recurring themes (Glaser & Strauss, 1967). Assisted by Dedoose® software version 7.6, a web-based qualitative data analysis package (SocioCultural Research Consultants, 2015), two co-authors independently analyzed each transcript using the factors from the LOPSI model as a coding framework (see Figure 3.1 for the list of factors and Appendix 3.A for factor definitions). Through inductive thematic analysis, we identified supplemental codes for major themes that emerged outside the model. After each coding iteration, we also met to discuss discrepancies and come to agreement using investigator

triangulation to examine the data from differing perspectives (Denzin, 1989). The process of data triangulation helped ensure that data saturation was reached (Guest, Bunce, & Johnson, 2006). A third co-author was available as a tiebreaker when needed.

3.4 RESULTS

Of the 25 health executives, 8 (32%) were CEOs, 7 (28%) were CMOs, 4 (16%) were CFOs, and 6 (24%) were Physician Group Chief Executives (PGCEs). The executives were majority male (68%) and white non-Hispanic (84%). They had between two months to 37 years of experience at their current organization and had been in their current position for ten months to 21 years. Fifteen (60%) had clinical training (i.e., MD or RN) and 21 (85%) had formal business training (i.e., leadership certification or master's degree). Table 3.1 summarizes their profiles.

The executives represented eight hospitals, each of which belonged to one of Washington's eight largest IDS. All the hospitals are acute care and non-profit, ranging from medium (100-300 beds) to large (>300 beds) size, with an average total patient revenue of over $2 billion, average Total Performance Score (TPS) quality score of 35, and average patient experience rating of 3 out of 5. Seven out of eight hospitals were in urban areas and one in a rural area. When asked to identify how their largest, affiliated physician group was integrated with the hospital, 19 (76%) executives reported an employment/salary model, one (4%) an open PHO, one (4%) a closed PHO, one (4%) described multiple integrating structures, and three (12%) were uncertain.

Congruency Between Theory, Research, and Practice

We first focused on objective 1, which was to determine if there was congruency between how theory, research, and practice define and measure physician-system integration. Executives cited 51 factors. Forty-seven of the cited factors were consistent with the 48 factors in the base LOPSI model (98% agreement) (Figure 3.1), and four of the cited factors were not present in the

base model. The single factor not cited by executives was "total cost of integration," a health system success measure. We surmised that it was not explicitly mentioned because costs associated with integration may have been collapsed into the "financial performance" success measure in their anecdotal responses. Of the four factors not present in the LOPSI model but cited by executives, two were success factors, "employee engagement" and "population health", and two were care coordination factors: "access points" and "data."

Employee Engagement. "Employee engagement" complemented the existing measure of "physician engagement," thus broadening the scope of engagment to include the system as a whole. One CEO stressed, "*If you don't have engagement with staff, you are not going to [be able] to execute on most of these things [other success measures]*" [CEO 4]. Past research has shown that the definition of employee engagement was ambiguous to academic researchers and practitioners; therefore, information on engagement has been difficult to collect, compare, and contrast (Macey & Schneider, 2008). We posited that the absence of "employee engagement" in the base LOPSI model (i.e., in the theory and literature review) may have been due to a lack of publically-available or accessible engagement data, especially at the system level.

Population Health. "Population health" was mentioned by six executives (24%) who ranged vastly in how they defined it. According to the executives, "*population health has both quantitative and qualitative components*" [CEO 6] across the spectrum, including: affordability, child immunizations, employment rate, happiness, life expectancy, utilization, mortality, outreach and education, and pre-natal care. This lack of a clear definition among participants was consistent with the lack of a clear definition in the field (Kindig & Stoddart, 2003). We posited that "population health" not be included in the base LOPSI model for that reason.

Care Coordination. The base LOPSI model included only five factors for care

coordination, as care coordination had become a dimension of interest only in recent years due to the inherent challenges of measuring care processes (Hoenig et al., 2002). Two of the new factors cited by executives, however, were care coordination mechanisms: "access points," and "data." We collapsed the "training" factor from our initial model into the "focus on continuity of care" factor, as we found that executives considered "training" to be a component of a continuity of care. Overall, executives were quick to acknowledge the importance of care coordination process measures to unite the entities involved in physician-system integration and to share ways in which they were managing care.

In Figure 3.2, we present the updated LOPSI model based on practice perspectives. This model is a theory-driven, practice-validated model that summarizes evidence supporting physician-system integration.

Factors that Made Integration Successful

Objective 2 was to identify the organizational factors that health executives believed made physician-system integration successful. We summarized, therefore, what health executives described as success indicators of integration via the 51 organizational factors from the updated LOPSI model (Figure 3.2). Table 3.2 provides a detailed description of the success indicators along with illustrative quotes.

Environment

Environmental factors, as defined by open systems theory and specified by the LOPSI model, were external influences that impacted the nature and degree of integration between physician groups and hospitals associated with health systems.

Competition & Market Share. Executives were wary about how the transition from volume- to value-based care would influence their competition and market share. They warned of non-traditional players entering the health care space, particularly from the private sector. For

example, some of included health systems were a part of the Boeing Accountable Care Organization (ACO), which was one of the first employer-led, direct-contract ACOs in the nation, covering approximately 30,000 Boeing employees, dependents, and retirees.

Health Reform & Regulations. Medicare payment reforms typically targeted hospitals, compelling executives to re-organize care delivery. At the time of this study, executives were actively working on ways to comply with the Medicare Access & CHIP Reauthorization Act of 2015 (MACRA), which reformed Medicare payments by making changes to how Medicare paid those who provided care to its beneficiaries.

Market Demographics & Market Structure. Relatedly, executives stated that they had to pay careful attention to their patient and payer mix and its effects on reimbursement. They looked at the socioeconomic factors of their service area (e.g., race, ethnicity, smoking rates) to estimate their patient mix. In an effort to deliver care across the continuum, executives also shared upsteam plans to expand or acquire health plans and downstream efforts to secure long-term care agencies. None of our participating health systems, however, currently owned their own health plan, though one formerly owned one.

Technology. Technological advances have shifted care away from the hospital. Executives shared ways in which they have used technology to expand access and improve quality of care. Some health systems deployed telehealth services allowing providers to conduct "home" visits. Executives noted that technology also allowed them to monitor communities and promote preventive health. For example, one of our participating health systems [described by CEO 6] distributed fitness trackers to children in their service area to combat rising rates of obesity and diabetes. In general, executives described that technological advances created new ways for

providers and patients to communicate (e.g., through patient portals, email, mobile apps) and that integrated delivery systems should leverage technology to improve care.

Physician Group

Certain characteristics about a physician group were deemed to make it likely to result in a successful integration. Such characteristics aligned with Porter's Value Chain, which provided structure for our thematic coding: (1) support activities, which consisted of the organizational structure (defined by function, division, and matrix), (2) organizational culture (shared assumptions, values, and norms), and (3) strategic resources (financial, human, informational, and technological).

Organizational Structure. To facilitate successful physician-system integration, physician groups needed to have standardized care delivery structures that did not compete with those of the hospitals. The practice's age and cost orientation (i.e., for-profit status) may have also influenced their bargaining power with the hospital. In terms of integrating structures (i.e., contracting models), most executives praised the employment model (i.e., a tighter contract) as the easiest integrating structure for enabling care coordination. However, they believed that cultural and leadership alignment were more important that the contracting model. Clinician executives tended to have stronger opinions against hospital-based employment, preferring to be employed by a physician-owned physician group. Regardless of who was doing the employing, executives stressed that it was important to see the physician group's leaders participating in the hospital's leadership (e.g., in dyadic partnerships with hospital administrators). Some believed that physician leaders should have exemplified business acumen, which could be acquired through a leadership development program (provided by the hospital or externally) to better understand the corporate

necessity of health care. These physician leaders should also have been paid fairly for their time for their leadership service.

Organizational Culture. Physician groups were defined by how they interacted not only with the hospital but also with their peers. Executives shared that physicians must be willing to change and learn. It was also foundational for executives to build trust with physicians – to see one another as partners – and to work collaboratively; both parties needed to be willing to relinquish some control. One executive [CMO 3] reflected that this has been particularly challenging for some physicians, as physicians wanted control over their own patients. As the wealth of care coordination tasks increased, however, physicians needed to trust the patient care team enough to hand-off patients. Cultural alignment was facilitated if the physician group's mission, vision, and values were aligned with those of the hospitals. In addition, it was noted that executives should be transparent with physicians. For example, they needed to keep an open dialogue with physicians and facilitate conversations with individual-level scorecards, which provide pre-defined, consistent measures for mutual expectations.

Strategic Resources. As care shifted toward value, executives indicated that a leading concern was how to compensate physicians for care coordination activities. Previous production models did not account for the financial payment or time cost of physician-patient communication over email, for example. Successful physician-system integration should, therefore, account for compensation and incentives of these essential activities. Some executives also believed that success could be facilitated if health systems created clear communication channels, such as quarterly all-provider meetings, which helped physician groups retain their identity while still uniting physicians with the health system. Hiring strategies also facilitated success; if the physician group's hiring plan was like that of the affiliated health system, the two were more likely able to

consolidate recruitment and hiring efforts. Finally, EHR systems between the physician group and the health system needed to be identical or compatible, as data transfer was essential to both short-term and long-term success.

Hospital

Likewise, certain characteristics about a hospital were deemed to make it likely to result in a successful integration. Hospital characteristics also aligned with the Value Chain's support activities. Here, executives emphasized culture and leadership as being the most important drivers for health system success.

Organizational Structure. One CEO [CEO 7] stressed the importance of organizational structure, stating upfront, "*You've got to have the right structures, you've got to have the right processes, you've got to have the right people.*" Executives shared that hospitals should have care delivery structures that met physicians' needs. They should also have a similar cost orientation (i.e., non-profit status) or be able to account for differing orientations. Hospitals that were a part of health systems had the advantage in physician integration, a belief corroborated by a recent Healthcare Management Partners report (Betbeze, 2017). The location and size of the hospital may also determine the number of services it can offer; however, one executive [PGCE 2] warned that a system could get too large for it to do a good job acclimating new physician groups. In terms of leadership, executives representing four of hospitals mentioned dyad relationships as crucial to success. A dyad relationship in the health care setting was typically one in which a hospital administrator was paired with a physician group counterpart to bridge business and clinical perspectives. We also heard interesting views regarding whether there was value to having a clinician CEO. While one hospital indicated that they only considered MDs for the CEO position, overall, they all valued multi-disciplinary teams governed by dyadic partnerships.

Organizational Culture. Executives described that successful integration meant that hospitals and physician groups had common mission, vision, and values. This fostered a synergistic relationship and helped extend physician-system integration beyond the business transaction. They also felt that the hospital's culture should be open to systems thinking, change, and learning. For example, changes to hospital processes should consider the corpus of physicians, including primary care physicians who worked outside the walls of the hospital, as exclusionary changes may result in segmented physician networks. Finally, to build a transparent organizational culture based on trust, hospitals should be willing to share their financial and satisfaction data with physicians. One executive [CMO 4] provided an example stating that his/her hospital's accounting books were made available to physicians, as well as the public.

Strategic Resources. Executives noted that patient and payer mix influenced the financial success of physician-system integration. This was of particular concern among executives whose hospitals served patient populations that were largely low-income or underserved. All our participating hospitals were non-profit and accepted Medicare and Medicaid patients; however, privately insured patients generated more revenue. Regardless of non-profit status, hospitals needed to generate revenue to stay open. We found that executives were strategic with their physician contracts, considering the resulting impact on their patient and payer mix. As mentioned earlier in the Physician Group section, health system success had to also be facilitated by resources that created cohesion between administrators and physicians, including: physician compensation for increased care coordination activities, clear communication pathways with physicians (e.g., separate newsletters for physicians vs. the rest of hospital staff), and anticipation of EHR needs (e.g., compatibility of the EHR systems and ease of use). Notably, these strategic resources required upfront financial investments.

Care Coordination

While executives expressed enthusiasm for the many ways in which they were attempting to coordinate care, they struggled to precisely identify care coordination mechanisms due, in part, to a lack of financial reimbursement (i.e., claim codes) for such activities by payers. Care coordination, however, was broadly recognized to have contributed to physician-system integration success by tying together the various entities and services. Employing the LOPSI model and the Value Chain, we defined care coordination as service delivery activities, which were comprised of three parts: (1) pre-service (marketing research, services offered and branded, pricing, promotion, and distribution/logistics), (2) point-of-service (clinical operations), and (3) after-service (follow-up, billing, and follow-on). By nature of care coordination, all seven of the mechanisms identified by executives fell into the service delivery chain. The following are examples of what executives reported to be care coordination mechanisms that attributed to successful physician-system integration.

Access Points. We found that a key aspect of care coordination was the creation of new access points to serve a growing, diverse population of multiple generations and socioeconomic statuses. Executives gave examples of pre-service and point-of-service access points, such as virtual/telehealth care, which enabled providers to see patients who had transportation challenges (e.g., those living in rural areas). In addition, executives observed that virtual care was appealing to younger generations. Some health systems had also expanded physical access points by opening retail clinics and embedding pharmacists in primary care settings, thereby adding value at pre-service and point-of-service. Finally, we heard about after-service access points, such as electronic monitoring systems, which allowed providers to collect post-care data from patients.

Case Management Resources. Case management added to health system success by facilitating care transition from point-of-service to after-service. Case management required dedicated staff, which included: behavioral health specialists, care coordinators, health coaches, navigators, nurse care/case managers, and social workers. Once a patient entered a health system, these dedicated staff members were often responsible for collecting information about the patient's needs and preferences, working with family members and caregivers, and conducting follow-up calls or visits. The resources for case management varied between hospitals depending on their approaches to care coordination; however, most approaches attempted to expand case management into the outpatient setting. For example, executives reported that they wanted to expand their health systems to include home health and skilled nursing facilities so that their case managers could readily follow-up with patients who had been referred to outpatient care. Notably, executives shared that most of their outpatient clinic affiliations were created through relationship-building rather than formal contracts.

Communication. Executives believed that consistent, process-based, verbal, and electronic hand-offs were important to success. Effective hand-off communication was thought to be essential between staff at the point-of-service (e.g., nurses and physicians) and along the service delivery chain (e.g., appointing through discharge planning). They further emphasized that communication needed to occur in a timely fashion (e.g., using text messaging) and across the care continuum, facilitated by a common EHR system.

Data. To enhance pre-service, point-of-service, and after-service care, three executives explicitly identified the need for a centralized data repository, one that allowed users to track patients across the care continuum. Administrators and managers needed to use data to preemptively identify patients with special needs and/or complex care needs in order to

appropriately assign case managers. With regard to physician-system integration, ideally, the data repository ideally needed to consolidate inputs collected by the physician group with those collected by the hospital. One of the participating health systems [as described by PGCE 2] had contracted with a vendor to create such a repository.

Focus on Continuity of Care. In terms of pre-service care coordination prior to hospital admission, executives shared targeted strategies, like reducing no-show appointments and increasing preventive care screenings. In terms of point-of-service, they felt that hospitals could immediately focus on ways to discharge patients (or ways to allow for home-based patient care). With regard to after-service, executives believed that the key to care coordination was to form relationships with post-acute care settings. Executives representing six hospitals spoke about the value of a dedicated, physician-led department or model (e.g., population health department, patient-centered medical home) to own care coordination activities. A dedicated department or model allowed for allocation of resources, role definition, and formation of a new cost center.

Post-Acute and Outpatient Care. In support of the focus on continuity of care, executives stressed the growing importance of the post-acute and outpatient care, which was a means for addressing the after-service component of care coordination. Executives identified the need to partner or acquire long-term care services and facilities (e.g., home health, skilled nursing facilities). To facilitate current relationships with these services and facilities, health executives noted the use of dedicated discharge planners, embedded specialists, and follow-up calls after patient discharge.

Health System Success

Finally, health system success was informed by all parts of the Value Chain. Per the LOPSI model, we found that physician-system integration success was categorized into four clusters:

gaining a competitive advantage; improving the patient experience; reducing cost per capita; and improving the health of populations. The first cluster was a business-oriented aim, and the remaining three corresponded with the Triple Aim (Berwick et al., 2008). While the executives generally agreed with the LOPSI model's list of health system success measures, they identified the three most important measures as: (1) quality and safety, (2) physician engagement, and (3) patient experience. (See Appendix 3.B for the full ranking list.) Several executives stressed, however, that success could not be described by a single outcome. As summarized by CEO 5, "*I look at each of this [success measures] like an instrument in the orchestra. What we need is an orchestra that makes decent music, and it takes all of this*."

Gaining a Competitive Advantage. Successful physician-system integration should result in an integrated system with an increased competitive advantage. Executives explained a vision for enhanced access to providers exemplified by shorter call-to-appointment times and more clinic locations. Competitive advantage was also affected by reputation, which could be thought of in two ways: internal (identity of a system as it expands) and external (how the community sees the system). In terms of market share and growth, integration was considered successful if executives could see increased internal referral rates. A CFO from a rural hospital [CFO 1] noted, however, that growth was region-dependent.

Improving the Patient Experience. Integration also had the ability to improve the patient experience. One executive [CEO 5] shared a strategy to introduce a new culture for the integrated entity rather than attempting to merge two different cultures. The shared language (e.g., Toyota Lean management) promoted alignment of mission, vision, and values. Furthermore, executives described that combined structures, resources, and processes (e.g., hiring practices) enabled integrated systems to be more efficient. We found that employee and physician engagement were

believed to be very important to the patient experience. Executives recognized that most hospital employees had patient touchpoints. Physicians needed to engage with the system by participating on hospital committees, in leadership roles, and attending meetings, as success depended on physician being onboard with the leaderships' direction. Finally, executives noted the need to monitor patient satisfaction throughout the hospital stay. Patient satisfaction, which included wait times, had direct implications on Medicare reimbursement rates, as measured by the Hospital Consumer Assessment of Healthcare Providers and Systems survey and other instruments.

Reducing Cost Per Capita. Generally, while revenue was important to keeping the health system sustainable, executives did not consider revenue to be an important indicator of health system success, specifying that financial performance lay downsteam of other success factors. A CEO [CEO 7] went as far as to say that financial performance was the least important success measure, "*because we are a business, but we are not in the business alone to make money, unlike other private businesses, banks, that have customers to serve. And they have shareholders to pay. […] But we have certainly have physical obligations and goals that we have to hit*."

Generally, they measured financial performance via service line and downstream revenues and through physician productivity, service migration, and patient volume. They noted that it was impossible, however, to isolate the direct contribution of a physician group to overall success, as revenue was often reported at the system level rather than the group level. Relatedly, physician groups directed the volume of services offered and performed, which was a way to generate revenue. Integration of resources was one way believed to minimize transaction costs, which could result in reduced total cost of care for patients. Costs could also be generated through IT utilization, as the sharing of information generated additional services scheduled. A PGCE was quick to

question the role of IT in health system success, seeing EHRs as a vehicle to success rather than the end goal:

> "*It's kind of like in a city street, the goal is not have the street. The goal is to have people to be able to get from one part of the city to the next part of the city. […] So at some places, they're subways. And some places, they're cabs. Some places, they're Uber. Some places, they rent a bike. The end ordeal isn't the road; it's the issue of getting people where they want to be. Electronic health records have taken over as becoming the end game or with Meaningful Use criteria. In my mind, it all is a means to the end, and you never put means on the top of your goal list.*" [PGCE 1]

Improving the Health of Populations. Our results indicated that successful physician-system integration may result in the improved health of populations, and executives reported that quality and safety, in particular, was their top priority. They believed it to be the most important indicator of success: "*If you don't have quality and you don't have safety, you're not going to be able to achieve any of these other things*," [CMO 4]. Quality was most commonly described using the standard Centers for Medicaid and Medicare Services (CMS) quality measures, such as readmission rates, surgical site infections, and lengths of stay – all of which spoke to service delivery components: pre-service, point-of-service, and after-service. A clinician executive connected quality to cost, saying, "*It needs to be reinforced that when you have improved quality, your cost goes down*," [CMO 5]. Ultimately, most executives agreed that the end goal was to improve population health. Population health meant that care was affordable and utilized only when needed and mostly for prevention (e.g., immunizations). For some executives, the scope of population health extended out into the community, as they considered certain social determinants (e.g., employment, general happiness, and life expectancy rates) associated with their service

areas. Summarizing the complexity of population health, one CFO [CFO 4] shared: "*I think that population health is something that's going to take a while for us to figure out exactly how we're going to measure certain things.*"

3.5 DISCUSSION

Key Takeaways

As health care delivery moves toward a value-based environment, it is becoming more important to identify organizational factors affecting physician-system integration success. This study contributes to the broad yet conflicting literature on physician-system integration by reporting the results of a qualitative investigation of health executive perspectives in Washington State on physician-system integration. We utilize a conceptual model we developed from prior work which incorporated theory (i.e., open systems theory and Porter's Value Chain) and a systematic review of the literature on physician-system integration (Nguyen, Wood, Johnson, & Dowling, 2018). We refer to this model as the Landscape of Physician-System Integration (LOPSI) model.

Our first objective was to determine if there was congruency between how theory, research, and practice define and measure physician-system integration. This study indicates that there is strong congruency between theory and practice, as executives cited 98% of the factors in our base LOPSI model and four not present in the model – two are care coordination factors ("access points" and "data"), and two are health system success factors ("employee engagement" and "population health"). We assert that the complex landscape of physician-system integration includes 51 factors of the environment, physician group, hospital, care coordination, and health system success, depicted in Figure 3.2.

Our second objective was to identify the organizational factors that executives believed made physician-system integration successful. Executives contribute to the literature by providing real-world examples of how the factors of physician-system integration can manifest to achieve success (see Table 3.2). In summary, factors that make physician-system integration successful include: payment reform (how to compensate for and incentivize care coordination activities), alignment between physician groups and hospitals (culture and leadership), and the establishment of more care coordination mechanisms (pre-service, point-of-service, and after-service). Notably, our executives are proponents of increased integration, agreeing that the employment model (i.e., tightest form of integration contract) has its benefits, but most stress the importance of cultural and leadership alignment over a single type of integration contract.

Contribution to Theory

As expected from an open systems model, our study demonstrates ways in which physician groups and hospitals are continuously interacting with one another, as well as the external environment (i.e., health reform). As physician-system integration increases, however, we posit that the bargaining-market power of the integrated health system should also increase, better positioning them to negotiate reimbursement rates for their efforts to improve population health. In applying Porter's Value Chain to consider the internal environment, we also see that executives' strategies are indicative of attempts to minimize transaction costs between the various Value Chain "links," as they emphasize the role of culture and leadership in doing exactly that. Thus, the internal environment must be optimized by a culture of collaboration grounded in its leadership, which is exemplified through shared mission, vision, and values. The literature has established leadership as a critical success factor in physician alignment (Mostashari, Sanghavi, & McClellan, 2014). Thus, hospitals and health systems must identify leaders from both the hospital and

physician group sides to facilitate successful integration and form dyadic governance. The American Hospital Association's Physician Leadership Forum has promoted such a focus, declaring that shared leadership is essential to physician-system integration (American Hospital Association's Physician Leadership Forum, 2015).

Clinician Executive Perspectives

Among the participants in our study, it is also interesting to note the high percentage of clinically trained executives, showcasing that they are practicing what they preach in terms of physician leadership and physician engagement. A recent study found that physician-led hospital systems have higher quality ratings across all specialties than non-physician-led hospitals, though there are no differences in financial performance (Tasi, Keswani, & Bozic, 2017). This study suggests that physician leaders may possess skills, qualities, or management approaches that positively affect hospital quality and the value of care delivered. In our data analysis, we did not see clear distinctions between the clinician executives and the non-clinician executives – hence, we did not focus our analysis on comparison – however, the lack of variability may be due to the relatively small sample size and abundance of clinician executive representation.

Limitations

This study is not without its limitations. Due to the focus on Washington State, we recognize that our findings may not be generalizable. To minimize these issues, the study is designed to generalize to the context of physician-system integration rather than geographic region. As noted earlier, participants were chosen by case definition, as defined by theory, models (Conrad & Shortell, 1996; Mick & Conrad, 1988; Miller, 1996), and related work (Shortell et al., 1996). Our data analysis plan also employs data triangulation (Denzin, 1970); we compare cases to themes found in literature and theory (Nguyen et al., 2018). Triangulation strategies have been

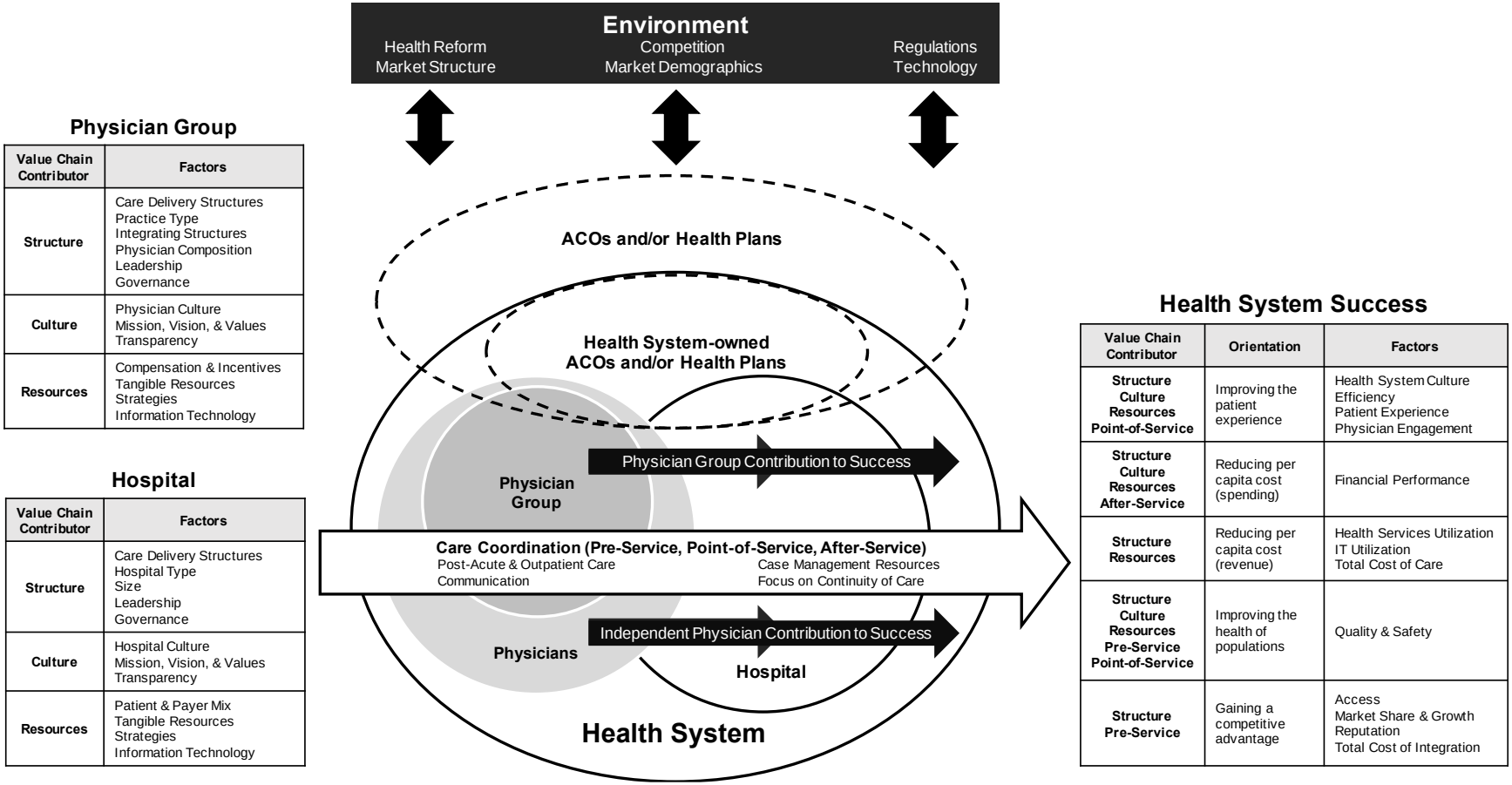
shown to improve generalizability (Falk & Guenther, 2006; Yin, 2013). As stated by one of our participants [CFO 2], "*I don't think the story is different [across the country]. I think the story is still the same. I think you might have a little bit of flavor in different parts of the country though, where may be unions that might impact the unionization of your workforce*." We invite others to expand this work and further test our findings.

3.6 Practice Implications

Increased physician-system integration is forthcoming, and for many, it is deemed a necessity. Presently, health administrators and managers are contemplating what type of physician integration contract would work best but are met with conflicting evidence on the value of integration (Baker et al., 2014; Ciliberto & Dranove, 2006; Goes & Zhan, 1995; Madison, 2004; McCarthy & Mueller, 2009; Scott et al., 2017; Shih et al., 2008; Shortell et al., 1994; Snail & Robinson, 1998; Trybou et al., 2011). As exemplified by our executives, another growing problem is the inability to compare success indicators across systems, in part due to the multitude of ways in which indicators are defined, how data are collected, and the reluctance to share data amongst growing market share concerns.

As we demonstrated, the most important indicators of health system success are generally considered as having improved quality and safety; physician engagement; and patient experience, but success truly is an amalgam of measures affected by internal and external organizational factors. As succinctly put by a clinician executive [PGCE 6], however, even though quality and safety, physician engagement, and physician engagement are at the top of the list, "*I think hospitals can do very well financially and not do very well on those [other measures], which is the dilemma of our environment*." It very easy for hospitals to concentrate solely on business goals, especially given that physician-system integration typically begins with a financial transaction. To achieve

population health, health systems that holistically consider the external and internal environments of physician-system integration are better positioned to attain success and survive pressures to integrate. Our theory-driven, practice-validated model (Figure 3.2) is put forth to support health care executives in more effectively strategizing integration plans.



Physician Group

Value Chain Contributor	Factors
Structure	Care Delivery Structures Practice Type Integrating Structures Physician Composition Leadership Governance
Culture	Physician Culture Mission, Vision, & Values Transparency
Resources	Compensation & Incentives Tangible Resources Strategies Information Technology

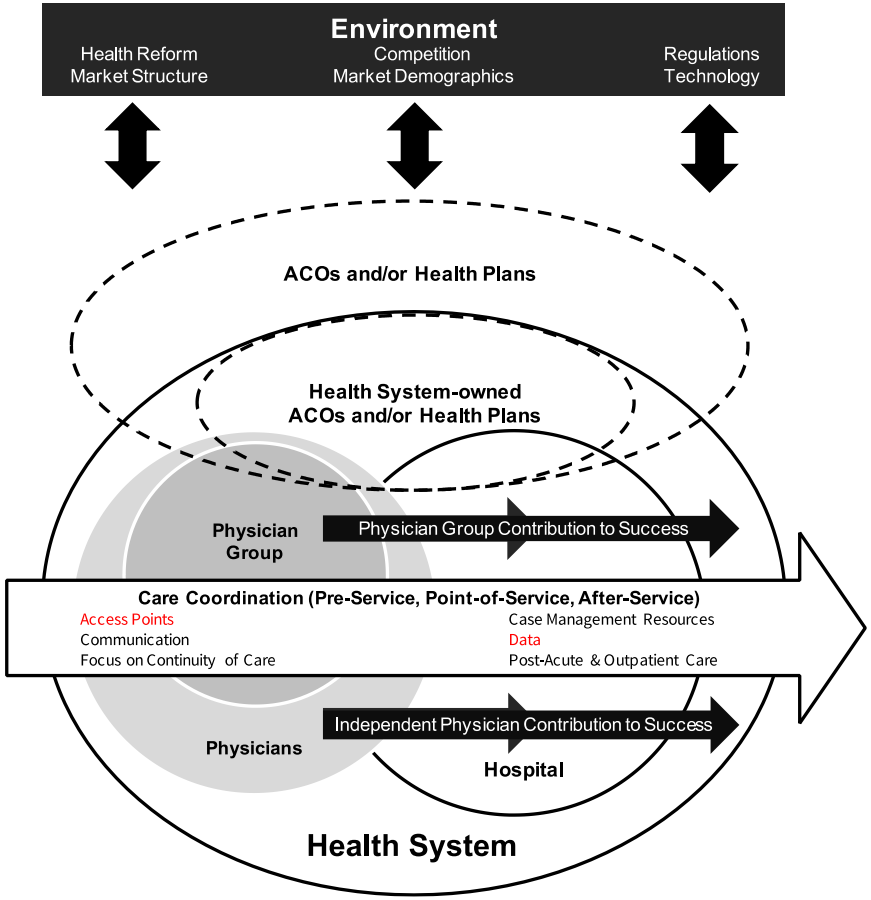
Hospital

Value Chain Contributor	Factors
Structure	Care Delivery Structures Hospital Type Size Leadership Governance
Culture	Hospital Culture Mission, Vision, & Values Transparency
Resources	Patient & Payer Mix Tangible Resources Strategies Information Technology

Health System Success

Value Chain Contributor	Orientation	Factors
Structure **Culture** **Resources** **Point-of-Service**	Improving the patient experience	Health System Culture Efficiency Patient Experience Physician Engagement
Structure **Culture** **Resources** **After-Service**	Reducing per capita cost (spending)	Financial Performance
Structure **Resources**	Reducing per capita cost (revenue)	Health Services Utilization IT Utilization Total Cost of Care
Structure **Culture** **Resources** **Pre-Service** **Point-of-Service**	Improving the health of populations	Quality & Safety
Structure **Pre-Service**	Gaining a competitive advantage	Access Market Share & Growth Reputation Total Cost of Integration

Figure 3.1. Base conceptual model of the landscape of physician-system integration (LOPSI) created from on a systematic review and cluster analysis of empirical research studies published 2005-2016 (Nguyen et al., 2018). Dotted lines denote that ACOs and health plans can either be owned by or independent of the health system.



Physician Group

Value Chain Contributor	Factors
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Hospital

Value Chain Contributor	Factors
Structure	Care Delivery Structures Hospital Type Size Leadership Governance
Culture	Hospital Culture Mission, Vision, & Values Transparency
Resources	Patient & Payer Mix Tangible Resources Strategies Information Technology

Health System Success

Value Chain Contributor	Orientation	Factors
Structure Pre-Service	Gaining a competitive advantage	Access Market Share & Growth Reputation
Structure Culture Resources Point-of-Service	Improving the patient experience	Health System Culture Efficiency Employee Engagement Patient Experience Physician Engagement
Structure Culture Resources After-Service	Reducing per capita cost	Financial Performance
Structure Resources		Health Services Utilization IT Utilization Total Cost of Care
Structure Culture Resources Pre-Service Point-of-Service	Improving the health of populations	Population Health Quality & Safety

Figure 3.2. Resulting conceptual model of the landscape of physician-system integration (LOPSI), which combines organizational theories, a systematic review of empirical research studies published 2005-2016 (Nguyen et al., 2018), and practice perspectives. Red text denotes additions to the model.

Table 3.5. Profile of interviewees

Demographics (n = 25)	**Interviewees**
Male	68%
White non-Hispanic	84%
Average experience at current organization	14.7 years
Average experience in current position	5.3 years
Had formal clinical training	60%
Had formal business training	84%
Position level	
Chief Executive Officer	32%
Chief Medical Officer	28%
Chief Financial Officer	16%
Physician Group Chief Executive	24%

Table 3.6. Indicators of successful physician-system integration with illustrative quotes from health executives

Organizational factor	Indicators of success	Illustrative quotation
Environment		
Competition and market share	Health system accounted for new, non-traditional players	"[Health systems are] starting to create health plans where you don't even need them." [CEO 6]
Health reform	Health system accounted for changing Medicare payment reforms	"A lot of new payment reforms are going to aim toward the hospital." [CMO 3]
Regulations	Health system accounted for Medicare Access & CHIP Reauthorization Act of 2015 (MACRA)	"And then you're looking at the MACRA and kind of scratching their heads and saying, 'Well what's this going to do?'" [PGCE 4]
Market demographics	Health system accounted for socioeconomic influences on the patient payer mix	"I know that the socioeconomic indicators of health are every bit as important as anything else, whether it's smoking, obesity, or genetics." [CMO 6]
Market structure	Health system had plans to broaden outpatient care	"[The hospital] needs nursing homes and such where they can discharge patients to" [CMO 3]
Technology	Health system had plans for care shifting away from the hospital	"Then this piece of how do you offer physicians visiting the home? Obviously docs can't drive house to house to house […] How do we leverage technology that docs could be checking our patients?" [CEO 4]
Physician group		
Organizational structure		
Care delivery structures	Physician group's care delivery structures did not compete with the hospital's	"So they have their own cardiac program. We have a cardiac program. So, do we have two cardiac programs? […] You have to be very careful on how you migrate these big programs to make sure you don't end up losing something you can't afford to lose." [PGCE 4]
Practice type	Physician group was an older practice (or has a proven track record)	"I think the key for our success one has been longevity." [PGCE 3]
	Physician group's cost orientation was similar to hospital's	"Most physician groups are for-profit" [CEO 6]
Integrating structures	Physician group was affiliated with the hospital (but did not necessarily	"It's not our purpose or desire to employ every physician. That's a bad model. We need to use different alignment strategies.

	have to be contracted with the hospital via an employment/salaried model)	Employment is certainly one, but it can't be the only one." [PGCE 4]
Physician composition	Physician group was oriented toward primary care	"It requires a substantial primary care presence that you would not be able to do with just specialists. You would […] not have the care coordination mechanism that would really be the whole value of it. You certainly need that primary care presence to be large." [CFO 3]
Leadership	Physician group leaders had hospital administrators as a dyad partners	"We have a… traditionally, a physician leader paired with a non-physician leader. That may not always be quite true, but we really try to bring that business and clinical piece together and have partners. One because it blends both worlds and also, it's nice to have somebody you can collaborate with." [CEO 7]
Governance	Physician group governance consisted of leaders with business acumen	"People who can understand the corporate necessity and translate that to their colleagues." [CMO 4]
Organizational culture		
Physician culture	Physician group was willing to change and learn	"The biggest thing, I think, to be successful right now is to be able to change fast enough as the environment is changing." [CEO 6]
	Physician group trusted the hospital leaders as partners	"They have to feel like they are part of the system and that the hospital is also part of the system and that the physician group in the hospital are partners in achieving system goals." [CMO 3]
	Physician group was collaborative	"A lot of times, physicians want to have personal control of their patients. But we really can't have that because sometimes the physicians are too busy, or sometimes the tasks at hand for care coordination is kind of mundane. So, it just sits in that physician's inbox for a couple of days, because it's not exciting or seemingly pressing, even though it really is." [CMO 3]
Mission, vision, & values	Physician group's mission, vision, and values was aligned with the hospital's	"That philosophical alignment has to happen first." [CEO 4]
Transparency	Physicians were transparent with their peers	"I think we are getting more transparent internally. We…we really have to give doctors their own score cards. It just can't be aggregate." [CEO 2]
Strategic resources		

Compensation & incentives	Physician group had a compensation and incentive structure for care coordination activities	"[With] the current model of our view and production, how do you add time to a physician's day for this care management?" [CMO 2]
Tangible resources	Physician group had clear communication pathways	"We even have our quarterly what we call all-provider meetings that we bring everybody together." [PGCE 3]
Strategies	Physician group aligned hiring with health system's growth	"We want them [physician group] to be strategic in working with us [the health system] on how do we grow as a system and deal with everything going on." [CEO 2]
Information technology	Physician group used IT to facilitate communication	"So, we're going with one system-wide electronic health record […], which I think will solve a lot of the transition of care communication issues." [CMO 3]
Hospital		
Organizational structure		
Care delivery structures	Hospital's care delivery structures met the needs of physicians	"If ORs aren't running on time, if docs don't have access to EPIC, the nurses aren't going to be around, if supplies and medications aren't available. So, hospital operations are […] how you get docs to want to practice here." [CEO 4]
Hospital type	Hospital's cost orientation was similar to physician group's	"You can't have a truly like operating margin because you have a non-profit and for profit." [CFO 1]
	Hospital had system membership	"I can't imagine being an independent hospital in this day in age. You're not going to survive very long. So, there is pros and cons about being in a large system, but the pro is stability." [CEO 6]
	Hospital accounted for its geography (metropolitan statistical area)	"The difference for us here in this [rural] region, is we don't have what you would consider normal, competition out on the street. […] And so in many ways, we look at ourselves like a utility, like the power company." [CEO 5]
Size	Hospital was a manageable size	"We'll only get so big that we lose what people came for." [PGCE 2]
Leadership	Hospital leaders had clinicians as dyad partners	"They are integrated not only from the stand point of doctor care delivery, but they are also integrated with the standpoint of leadership they carry." [CMO 5]
	Hospital leaders had clinical backgrounds	"I think there's utility and understanding how a successful business works and, you know, outside of your industry. […]

		But you would have to have someone who understands medicine [as CEO] to interpret that management system to run it." [PGCE 1]
	Hospital leadership was multidisciplinary	"I believe the way that the structure is now in the United States for administrators and administrative teams within hospitals is to have a very strong physician leader, a very strong nursing leader, and a very strong finance and operating leader. You get that cohort and that helps everyone be more successful." [CEO 3]
Governance	Hospital was governed by multiple councils	"There're a variety of councils where people can sit and they talk. There's the quality council and an executive council. […] And then there are lots of informal work groups that are particular to solve problems where there may be multi-group membership." [PGCE 5]
Organizational culture		
Hospital culture	Hospital leadership was comprised of systems thinkers	"[The hospital] has to be conscious of the needs of the primary care providers outside the walls of the hospital." [PGCE 1]
	Hospital leadership was willing to change and learn	"You have to be willing to make changes on both parties' sides. […] I said that we can easily figure out ways to maybe work out the financial piece, but if you, if the parties aren't willing to make the changes necessary, then you run into other issues." [CFO 4]
Mission, vision, & values	Hospital's mission, vision, and values was aligned with the physician group's	"We have to have a common compelling vision of where we're headed. Otherwise it's just a business transaction." [CEO 7]
Transparency	Hospital leadership was transparent with physicians	"The books are open and anybody can just walk in. We report our financials to our physician leaders every month, nothing is hidden here. Everything, everything, all of our data are un-blinded, all of our physician data is un-blinded, it's all reported, un-blinded." [CMO 4]
Strategic resources		
Patient & payer mix	Hospital accounted for its patient and payer mix	"What's absolutely killing the rural and critical access hospitals [is] the payer mix. They just are not good. And I mean, if I could

		turn 10% or 15% of our business into commercial, I'd be happy." [CFO 1]
Tangible resources	Hospital provided funding for care coordination activities	"The challenge is that there's a cost associated with it all [care coordination]." [CEO 8]
Strategies	Hospital maintained clear communication with physicians	"I would go to conferences [and hear], 'Well, if the doctors would just do what we tell them to do, everything would be good.' Well, that isn't how cultures in medical groups work. You need doctors to tell doctors what they need to do, and you need to tell them why." [CFO 1]
Information technology	Hospital had an EHR that is compatible with the physician group	"EMR so the… that more experienced physicians, older physicians. EMRs have been more of a hustle than an attractive attribute." [PGCE 2]
Care coordination		
Access points	Health system created/expanded new virtual access points	"How do you extend the reach of a provider or physician? […] We really have a robust virtual center. In other words, we're piloting, having the inpatient hospice help support the care and needs of inpatients remotely. We have EICU, so we're enhancing the support that we have for our critical care patients." [CEO 8]
	Health system created/expanded new physical access points	"Retail we are rolling out right now, and we'll have 50 retail clinics within the next year." [CEO 6]
Case management resources	Health system had dedicated staff for case management, with expanded focus on outpatient care	"There has been a ton of learning in the last three years. But we now have a common case management program with individuals assigned inpatient and individuals assigned outpatient. But it's got one over-ranging management system." [CEO 5]
Communication	Health system maintained a system of verbal hand-offs	"The way we look at it is this: a means to be a warm hand-off, a face-to-face hand-off, essentially, a voice hand-off between members of the same team." [CMO 6]
	Health system maintained a system of electronic hand-offs	"Think about discharge planning. If we're saying every medical patient that gets discharged needs to see their primary care doc within three to five days, letting that discharge clerk just be able to schedule the appointment from the hospital when the patient is still sitting there would be great." [CFO 1]

	Health system had timely information transfer	"It's that degree of quickness that you can get to that person that, you know. It would be ideal if everybody just shared cell numbers. And if you had a question about a patient who was being discharged and wanted to make sure that everything was set up by the, you know, from a care manager-management perspective and the clinic, you could just call him, you could text him." [CMO 5]
	Health system operated under a common EHR system	"A lot of our patients aren't within our system, so they might be going an outside provider that's not on EPIC, or if they have EPIC, they have a different instance of EPIC that we don't have access to. So, it's challenging for us to really follow up what happens then after they leave the hospital." [CMO 1]
Data	Health system had a centralized data repository	"You really have to be able to have a central repository of all the data when it comes to issues around patient care." [CEO 8]
Focus on continuity of care	Health system had a physician-led department/model dedicated to care coordination	"It takes almost a common management structure across the whole thing, where somebody is looking and asking all these questions all the time." [CEO 5]
	Health system provided training on care coordination	"It has to be easy, and it takes role definition of what's the role of the inpatient care management people, what's the role of the outpatient piece, who's doing the hand-off, who's doing the transition, and so on." [CEO 5]
	Health system took action pre-admission	"I think the direction we're going is going to be proven to be key. It's taking the proactive approach, not saying, 'Okay, this patient was admitted five days ago. They are leaving tomorrow. What do we need to do?'" [PGCE 3]
	Health system focused on discharging patients	"It's also buying into the fact that when the patient enters. Right then, we should be assessing their estimated date of discharge." [CEO 3]
	Health system had a relationship with post-acute care services	"I think it's key that you have people who are experts on both care coordination within the hospital and on the ambulatory side, that those folks are working together." [PGCE 3]
Post-acute and outpatient care	Health system had relationships with outpatient care facilities	"We have a group. It's not big enough, but we have a group of docs who manage patients in the SNFs [skilled nursing

		facilities], so we try to send their patients, but there is not enough beds." [CEO 4]
Health system success		
Gaining a competitive advantage		
Access	Patients had access to providers through shorter call-to-appointment times	"Any patient that gets discharged from hospital, we try to get them to see their PCP within three to five days because it's been proven the sooner they get in a follow-up situation with their PCP readmission rates drop." [CFO 1]
	Patients had access to providers through more clinic locations	"We're building clinics and recruiting physicians, so you can increase the number of visits." [CEO 8]
Market share & growth	Integrated health system had increased market share and growth due to increased internal referral rates	"A lot of the connection to the patient is the key. […] So the thing that a medical group does for a hospital is they keep the patients internal." [CFO 3]
Reputation	Integrated health system had an improved reputation (internal)	"Some people call them growing pains, and it's like, it's kind of made our system identity somewhat confusing to people who's who. […] So just people not knowing… geez, I used to know everyone, now I don't, kind of that thing." [CEO 2]
	Integrated health system had an improved reputation (external)	"People want to always align with the winner or somebody that is stable." [CEO 6]
Improving the patient experience		
Health system culture	Integrated health system had a culture of aligned values	"We have to have a common compelling vision of where we're headed. Otherwise it's just a business transaction." [CEO 7]
Efficiency	Integrated health system was more efficient due to shared structures and processes	"We'll slowly move together. We've moved our compensation together, we've moved many of our administrative procedures and what we pay, hiring practices, position control." [PGCE 4]
Employee engagement	Integrated health system had improved employee engagement	"In the hospital world, it is so intense, it's so demanding, there are so many little things that need to be adjusted so that the patient's experience is good. People [Employees] need to care, and they need to try." [PGCE 6]
Patient experience	Patient satisfaction was improved	"We all care about patient satisfaction because happy patients will come back and use your services again. […] Number one, it reflects on the providers, less on the institution. […] Number two, satisfied engaged patients take their medicines, comply

		with their instructions, they reach out to you when they have questions, and they have lower complication rates and lower readmission rates." [PGCE 6]
	Health system had reduced wait times	"How much time of theirs are we wasting?" [PGCE 2]
Physician engagement	Physicians were engaged in hospital committees and/or leadership	"By and large if you can get the physicians engaged, everything moves. That's the biggest problem everybody has." [PGCE 5]
Reducing per capita cost		
Financial performance	Integrated health system had improved financial performance through increased revenue	"Integration a lot of times is economically challenging, so it is important to keep your eye on sustainability, […] especially as the amount of money coming into the system declines. It's challenging, harder and harder." [CFO 3]
Health services utilization	Integrated health system offered more health servcies	"Our physician group is responsible for probably over 90% of all the surgeries that are performed in that facility are performed by our physicians." [PGCE 4]
IT utilization	Integrated health system used IT to share information	"I think the true key here is going to be your ability to share information and then... and then with that information, you can look at delivering care differently. [CEO 1]
Total cost of care	Integrated health system had minimized total cost of care	"Because it's the truth, we're massively expensive. We don't always create high value." [CMO 6]
Improving the health of populations		
Population health	Health care was used minimally in the community/population	"Our role in population health is you should use us as little as possible but when you have to use us we should make it at least the safest, best care and cheapest we can." [CMO 4]
Quality & safety	Integrated health system had improved quality and safety measured using CMS quality measures	"We would be looking at readmission for physician group and then 30 day admits. […] You could see how effective they are in actually discharging the patient appropriately. So instead of just discharging them, discharging them to an appropriate place where they are safe and will continue receiving our patient treatments." [CMO 1]

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3.8 APPENDIX

Appendix 3.C. Codes and definitions corresponding with the Landscape of Physician-System Integration (LOPSI) model

Factor	Definition
Environment	
Health Reform	Federal policy that affected the nature and degree of integration
Market Structure	Presence of and relationship between major players of the service area
Competition	How players in the market actively responded to increased mergers of physician groups with hospitals and private firms
Market Demographics	Patient and payer mix of a health system's service area
Regulations	Form of government policy specific to aspects of health organizations
Technology	Advances that moved care away from the hospital
Physician Group	
Care Delivery Structures	Supporting structures of health services in the physician group
Practice Type	Organizational designation of physician group
Integrating Structures	Contractual mechanism through which a physician group is aligned with a hospital or health system
Physician Composition	Size and make-up of a physician group
Leadership	Physician role in determining the direction and strategy of the physician group
Governance	Oversight of the physician group with respect to the role of the physician in the physician-hospital relationship
Physician Culture	System of shared assumptions, values, and beliefs, which governs how people behave in the physician group
Mission, Vision, & Values	Physician group's objectives, approach to those objectives, and desired future position
Transparency	Sharing of information within the group
Compensation & Incentives	Financial drivers of the physician group
Strategies	Priorities that guide the physician group in its decision to integrate with a hospital
Tangible Resources	Tangible assets used or owned by the physician group
Information Technology	Systems that enable the transfer of information
Hospital	
Care Delivery Structures	Supporting structures of health services in the hospital
Hospital Type	Organizational designation of hospital
Size	Patient capacity

Leadership	Physician role in determining determine the direction and strategy of the hospital
Governance	Oversight of the hospital with respect to the role of the physician in the physician-hospital relationship
Hospital Culture	System of shared assumptions, values, and beliefs, which governs how people behave in the hospital
Mission, Vision, & Values	Hospital's objectives, approach to those objectives, and desired future position
Transparency	Sharing of information with the physician group
Patient and Payer Mix	Make-up of patients who receive care from the hospital
Strategies	Priorities that guide the hospital in its decision to integrate a physician group
Tangible Resources	Tangible assets used or owned by the hospital
Information Technology	Systems that enable the transfer of information
Care Coordination	
Post-Acute and Outpatient Care	Health system's access to services across the care continuum
Case Management	Mechanism through which the patient transitions from one service to the next
Communication	Information transfer through multiple pathways
Focus on Continuity of Care	Focus on more than just the service line of care but the care across multiple touchpoints
Health System Success	
Health System Culture	System of shared assumptions, values, and beliefs, which governs how people behave in the health system
Efficiency	Ability to minimize operational transaction costs
Patient Experience	Patient interaction with the health system
Physician Engagement	Physician interaction with the health system
Financial Performance	Revenue generated by the health system
Health Services Utilization	Patient use of the health system to attain care
Total Cost of Care	Expenses incurred by health system in caring for a patient
IT Utilization	Availability of specialized IT applications
Quality & Safety	Degree to which health services increase the likelihood of desired health outcomes and are consistent with current professional knowledge
Access	Ability for patients to attain timely use of health services to achieve the best health outcomes
Market Share & Growth	Health system's stake in its market
Reputation	Perception of the health system in the community
Total Cost of Integration	Monetary and non-monetary expenses associated with undergoing integration

Appendix 3.B. Most important health system success factors by Chief Executive Officer (CEO), Chief Medical Officer (CMO), Chief Financial Officer (CFO), and Physician Group Chief Executive (PGCE)

Rank Order	Health System Success Factors	Count				
		CEO	CMO	CFO	PGCE	Total
1	Quality & Safety	6	3	6	3	18
2	Physician Engagement	3	2	5	2	12
3	Patient Experience	4	1	4	2	11
4	Total Cost of Care	0	2	2	1	5
5	Market Share & Growth	2	2	0	0	4
6	Health System Culture	2	0	0	1	3
6	Employee Engagement	1	0	1	1	3
8	Access	1	0	0	1	2
8	Financial Performance	1	1	0	0	2
8	Population Health	1	0	0	1	2
11	IT Utilization	1	0	0	0	1
11	Reputation	1	0	0	0	1
13	Efficiency	0	0	0	0	0
13	Health Services Utilization	0	0	0	0	0

Chapter 4. THE CONTRIBUTION OF PHYSICIAN-SYSTEM INTEGRATING STRUCTURE TO HEALTH SYSTEM SUCCESS

4.1 INTRODUCTION

In 2010, the Affordable Care Act (ACA) was passed into law, calling for increased care coordination and care management. The American Hospital Association (AHA) responded by calling on hospitals to "align [with] physicians and other providers across the care continuum" (Health Research & Educational Trust, 2011) in order to survive and thrive in the health care market. We focused our study on the relationship between physician groups and health systems, herein referred to as "physician-system integration." Physician-system integration is broadly defined as, "the extent to which physicians are economically linked to a system, use its facilities and services, actively participate in its planning, management, and governance, […] share common objectives with the system, and respond to incentives that foster collaboration with the system" (Gillies, Shortell, Anderson, Mitchell, & Morgan, 1993).

While there are numerous ways to structure physician-system integration, the AHA has identified eight major types of integrating structures (listed in order of loose to tight integration): open physician-hospital organization, closed physician-hospital organization, group practice without walls, independent practice association, management services organization, equity model, foundation, and integrated salary model (American Hospital Association, 2014). Definitions are provided in Table 4.1. In 2012, 58% of hospitals were engaged in at least one of these structures (American Hospital Association, 2014), and both hospital leaders and physicians expect this percentage to increase over time (Cantlupe, 2010; Deloitte Center for Health Solutions, 2013).

Note that the differences between integrating structures are not always clear-cut. Each integrating structure has variation, and hospitals can be engaged in more than one type of integrating structure.

The evidence on the value of physician-system integration is mixed. Some studies have shown positive results, with tighter integration associated with lower staffing per admission (Shortell, Gillies, & Anderson, 1994), improved physician satisfaction (McCarthy & Mueller, 2009; Shih et al., 2008), improved financial status (Ciliberto & Dranove, 2006; Goes & Zhan, 1995; Shortell et al., 1994; Snail & Robinson, 1998; Stensland & Stinson, 2002; Trybou, Gemmel, & Annemans, 2011), increased cancer screening rates, and more appropriate emergency department use (Carlin, Dowd, & Feldman, 2015). Other studies have linked tighter integration to financial losses, higher prices, increased spending (Baker, Bundorf, & Kessler, 2014), and no changes in clinical outcomes (Madison, 2004).

To increase understanding, researchers have also begun exploring the role of care coordination in integration. Care coordination is the integration of care across a patient's conditions and needs, providers, and settings, accounting for the preferences and capabilities of the patient's family (Institute of Medicine, 1996; Ranji et al., 2007; Starfield, 1998). Physician group characteristics and their integrating structures have been shown to have mixed impact on care coordination, linking physician group characteristics to improved screening and monitoring (Kralewski, Dowd, Knutson, Tong, & Savage, 2015), improved patient-sharing relationships (Geissler, Lubin, & Ericson, 2018), and inefficiencies (Bodenheimer, 2008; Mehrotra, 2006; Paulus, Davis, & Steele, 2008). Likewise, the effect of care coordination on health system outcomes has been mixed, with care coordination linked to improved quality (Bodenheimer, 2008), but also no changes to cost (Hofmarcher, Oxley, & Rusticelli, 2007), quality, hospitalizations, and net savings (Peikes, Chen, Schore, & Brown, 2009).

Our objective was to examine the relationship between physician-system integrating structure and health system success among U.S. hospitals. We argue that this relationship is not direct but rather, mediated by variables representing care coordination. To complete our objective, we used a mixed methods approach to complete two aims: 1) to identify longitudinal trends of physician-system integration over time, and 2) to estimate the causal effects of physician-system integrating structure on health system success. Our hypotheses were two-fold. We hypothesized that: a) care coordination would have mediation effects, and b) tighter physician integration structures would be more strongly associated with greater health system success, per theoretical expectations that integration lends itself to increased care coordination (Conrad & Shortell, 1996).

4.2 Conceptual Model

In our prior work, we posited that the mixed evidence on the value of integration was in part due to the complex landscape of physician-system integration, in which there are numerous pathways leading to success (Nguyen, Johnson, Wood, & Dowling, 2018; Nguyen, Wood, Johnson, & Dowling, 2018). We conducted a systematic review of the literature and interviewed health executives to develop a practice-validated conceptual model of the Landscape of Physician-System Integration (LOPSI) (Figure 4.1) – one that discerns and operationalizes the pathways. The LOPSI model depicts the entities involved in integration, as well as the interactions between them. In Figure 4.1, the boxes represent five dimensions of integration – the environment, physician group, hospital, care coordination, and integration success. The dimensions are operationalized into 52 factors, grouped by constructs of Porter's Value Chain (Porter & Teisberg, 2006).

4.3 Methods

Data Sources

We created a database of U.S. hospitals for seven years (FY09-15) using the American Hospital Association (AHA) Annual Survey and AHA IT Survey. The AHA Annual Survey is the most widely-used database for those in the business of health care, profiling 6,400 hospitals each year (American Hospital Association, 2014). The survey collects information on organizational structure, facility and service, utilization, physician arrangement, managed care relationships, community health, staffing, and expense. The IT Survey collects data on technology integration and includes data on hospital readiness for Meaningful Use, adoption of computerized systems, electronic health record (EHR) interoperability, and EHR vendors.

The qualitative data came from our earlier work (Nguyen, Johnson, et al., 2018), in which we conducted a multiple-case study using semi-structured interviews with 25 health executives in the roles of chief executive officer (CEO), chief medical officer (CMO), chief financial officer (CFO), and physician group chief executive (PGCE). The executives represented eight integrated health systems in Washington State. Interviews took place in 2016. Questions included the topics: context, objectives, strategy, facilitators, barriers, and lessons learned regarding physician-system integration.

Variables Used in Analysis

Figure 4.2 gives the directed acyclic graph of our study, which is derived from the LOPSI model (Figure 4.1). At a high level, the variable categories are: physician-system integrating structure (predictor), care coordination (mediators), physician-system integration success (outcomes), physician group factors (controls), hospital factors (controls), and environmental factors (controls).

We hypothesized that there is an association between each of these variables and thus tested four major pathways. Pathway a represents the relationship between integrating structure and care

coordination. Pathway b represents the causal effect of care coordination on health system success, treating integrating structure as a confounder. Pathway c represents the relationship between integrating structure and health system success without care coordination. Pathway c' represents the direct effect of integrating structure on health system success, where c' = c – ab.

We selected variables from the AHA database *a priori* per the LOPSI model. We identified 43 variables available in the database that corresponded with the model. Variable definitions are given in Table 4.1.

Physician-System Integrating Structure as the Predictor. The predictor variable is the integrating structure. There are eight variables in our database corresponding with integrating structure. We were interested in the effect of progressively tighter integration structures and thus treated the predictor as a categorical variable. In our data, some hospitals reported having physicians in more than one type of integrating structure; in FY15, 16.17% of hospitals reported at least two. If a hospital reported more than one type of integrating structure, we classified its integrating structure by the one used by the greatest number of physicians. For example, if Hospital A had 5 physicians in an open physician-hospital integrating structure, 100 in a group practice without walls, and 20 in an integrated salary model, Hospital A was classified as having a group practice without walls.

Care Coordination as Mediators. The mediator variable is care coordination. Care coordination is important to physician-system integration, as its mechanisms and processes bridge the entities involved. Per the LOPSI model, care coordination can be operationalized as: access points, case management resources, communication, data, focus on continuity of care, and post-acute and outpatient care. We identified 12 variables in our database that corresponded with care coordination: skilled nursing home, acute long-term care, other long-term care, home health

services, hospital-based outpatient care center/services, telehealth, case management, health screenings, immunization program, transportation to health services, computerized system to compare medication lists, and computerized system to update medication list at discharge. All were treated as binary where 0 = absent, 1 = present, except telehealth where 0 = not fully implemented, 1 = fully implemented.

Health System Success as Outcomes. The outcomes of interest are health system successes. As depicted in the LOPSI model, success can be oriented in four ways: gaining a competitive advantage, improving the health of populations, improving the patient experience, and reducing cost per capita. We identified eight variables in our database that corresponded with health system success: community outreach, facility expenses, capital expenses, facility admissions, facility Medicare discharges, facility Medicaid discharges, emergency room visits, and outpatient visits. Community outreach was treated as binary where 0 = absent, 1 = present. The expense variables were treated as continuous. The remaining were treated as count.

Physician Group Factors as Controls. Control variables include physician group factors. Physician group factors can impact successful integration as well as care coordination (Hulka, Kupper, Cassel, & Babineau, 1975; Kralewski et al., 2015; Shortell et al., 2001). These factors can be operationalized by organizational structure (defined as function, division, and matrix), organizational culture (shared assumptions, values, and norms), and strategic resources (financial, human, informational, and technological). The database had no direct variables on physician group factors, given that it is a hospital database, and this is noted as a limitation.

Hospital Factors as Controls. Control variables also include hospital factors. These factors can impact successful integration as well as care coordination, as a hospital's type, size, and resources affect the hospital's bargaining power against other entities (e.g., health plans)

(Baker, Bundorf, & Kessler, 2016; Chukmaitov, Harless, Bazzoli, Carretta, & Siangphoe, 2015; Everson, Lee, & Adler-Milstein, 2016; Lammers, 2013; McCullough & Snir, 2010). We identified 11 variables in our database that corresponded with hospital factors: ownership, accreditation, teaching status, designation as a Critical Access Hospital, total number of hospital beds, staffing (physicians, nurses, and other personnel), equipment (CT scanners, MRI machines), and electronic health record (EHR) system. Most were treated as binary where 0 = absent, 1 = present, except hospital beds and staffing which were count variables.

Environmental Factors as Controls. Finally, environmental factors were used as control variables. Physician-system integration is influenced by interactions between physician groups and health systems with health reform, market structure, competition, market demographics, regulations, and technology (Burns & Muller, 2008; Casalino, November, Berenson, & Pham, 2008). We identified four variables that corresponded with environmental factors: the Herfindahl-Hirschman Index (HHI) (Connor, Feldman, & Dowd, 1998; Makuc, Haglund, Ingram, Kleinman, & Feldman, 1991), health maintenance organization, preferred provider organization, and contract with an employer organization. The latter three were treated as binary where 0 = absent, 1 = present.

Data Analysis

Using mixed methods, we estimated the direct effect of physician-system integrating structure on health system success (i.e., quantitative approach) and compared the findings to interview data collected through semi-structured interviews with health executives (i.e., qualitative approach) (Nguyen, Johnson, et al., 2018). Our unit of analysis was the hospital. We included only hospitals that were part of a health system and in operation for 12 full months of the reporting period. Our resulting sample had 19,962 observations, equating to about 2,852 hospitals per year.

Quantitative Data Analysis. We ran multilevel mediation regression models. We assumed that anything unobserved was likely to be time-invariant (Verbeek & Nijman, 1992). The models included year and hospital as fixed effects and a random error term. Fixed effects allowed us to identify the effect of integrating structure on success outcomes for within-hospital variation, rather than between-hospital variation. We confirmed the use of fixed effects using the Hausman test (Hausman, 1978). Fixed effects are commonly used in analyses of multi-year AHA data (Ciliberto & Dranove, 2006; Madison, 2004).

The models also included a control for health system type, in which hospitals were classified into five distinct health system types (i.e., centralized health system, centralized physician-insurance health system, decentralized health system, moderately centralized health system, and independent hospital system) (Bazzoli et al. 1999). This accounted for possible intraclass correlation due to system variation.

We ran multiple regression models to coincide with each success outcome and care coordination mediator. Because the study considers multiple care coordination variables as mediators, we used the multiple mediator approach proposed by Baron & Kenny (1986), which includes bootstrapping, a non-parametric method based on resampling with replacement, for testing indirect effects. We ran 1,000 bootstrapping resamples using 95% confidence intervals. In total, we ran 8 models with 13 specifications each to explore the pathways depicted in the directed acyclic graph (Figure 4.2), resulting in 308 models. Analyses were done in Stata 15 (StataCorp LP, 2017).

Qualitative Data Analysis. To help assess the internal validity of the study, we used a technique called pattern matching (Trochim, 1989), in which we compared the empirically-based patterns (i.e., quantitative results) to a predicted pattern made before data collection (i.e.,

qualitative results). Two co-authors analyzed each interview transcript employing an inductive (open) thematic analysis to triangulate key themes. The authors met after each coding iteration to discuss alignment and discrepancies, using person-, space-triangulation (Denzin, 1970), and to review axial coding techniques. Data analysis was complete when we reached consensus themes were saturated and stable and quotes were coded appropriately. Analyses were done using Dedoose® (version 7.6) (SocioCultural Research Consultants, 2015).

4.4 RESULTS

Our objective was to examine the relationship between physician-system integrating structure and health system success among U.S. hospitals, as mediated by variables representing care coordination. Our results followed the two aims: 1) to identify longitudinal trends over time, and 2) to estimate the causal effects of physician-system integrating structure on health system success.

Longitudinal Trends

Table 4.2 gives the descriptive statistics of the research variables by year from FY09-15. The results show that, of the eight integrating structures, the trend has moved toward tighter integrating structures. The integrated salary model, which is the tightest integrating structure, was the main one used by most hospitals – by 73.92% in FY09 and increased to 77.35% in FY15. That is, in FY15, 77.35% of U.S. hospitals reported that its largest group of physicians was integrated via the integrated salary model. The second most used integrating structure was the independent physician association (8.52% in FY06 and 7.30% in FY15). There were very few hospitals where the loose structures were dominant.

The trend was supported by qualitative interviews with health executives. Among the 25 participants, 19 (76%) reported that their largest affiliated physician group was in an integrated

salary model, which is consistent with the numbers in the AHA database. The executives reported that, over the next 3-5 years, they expected to see increased physician-system integration. Most executives, however, offered a more conservative viewpoint, noting that physician-system integration, "*will come to a homeostasis of some sort where [the health system] will have enough to provide coverage but they'll be much more conscious of the labor cost*." [PGCE 4]

Table 4.2 also gives the trends for care coordination, health system success, hospital factors, and environmental factors from FY06-15. Most variables exhibited a slight increase or no change. The biggest percentage increases were for variables related to information technology – full EHR implementation (from 25.14% to 69.56%), computerized system to compare medication lists (37.62% to 57.62%), and computerized system to update medication list at discharge (51.07% to 59.96%).

These trends were supported by the qualitative interviews. All the health executives shared their organization's financial and strategic commitment to improving the integration of information technology with patient care. Such commitments, they noted, worked in parallel with physician-system integration efforts that they were being requested by a "*younger generation*" [CEO 6] of physicians who pursued work-life balance. Executives believed that EHR systems added value to integration by facilitating communication between physicians, payers, health system executives, and patients. "*It's really the backbone, the glue that allows a whole bunch of things to happen when it works right for both patients as well as for the provider.*" [CEO 7]

Some variables exhibited notable decreases. For care coordination, the availability of skilled nursing care, acute long-term care, other long-term care, home health services, and transportation to health services decreased over time. The decreases were supported by the interviews. Comments like the following reflected the status of most organizations we spoke with:

"*We don't have any long-term care facilities, but we do have a pretty robust referral program*." [PGCE 1] The executives cited collaborations with post-acute services but did not have definitive plans to acquire the services.

Causal Effects of Physician Integrating Structure on Health System Success

Table 4.3 presents the results of the regression analyses. The table gives point estimates for models corresponding with the eight outcome variables (i.e., health system success). For each model, we tested multiple pathways that included the 12 mediator variables (i.e., care coordination).

Hypothesis a, which expected a mediation effect for care coordination, was supported by the data – however, only for four mediators across five outcomes. A variable is a mediator if pathways a, b, and c are all significant. Skilled nursing care, home health services, health screenings, and computerized system to update medication list at discharge were mediators for models where the outcome was total facility admissions, total facility Medicare discharges, or total emergency room visits. The same set of variables, minus computerized system, were mediators for the model where the outcome was total facility expenses. The same set of variables, minus home health services, were mediators for the model where the outcome was total facility Medicaid discharges.

Hypothesis b, which expected tighter integrating structures to be more strongly associated with health system success, was also supported by the data – however, only for the outcome of total facility expenses along three mediator pathways. First, we found a positive association between integrating structure (X) and total facility expenses (Y), also known as the total effect ($X \rightarrow Y$; pathway c). For each unit increase in the tightness of the integration structure, a hospital

spent an estimated $744,700.10 (95% CI: 180,211.70-1,309,188) more in mean total facility expenditures, given the same environmental and hospital factors (p=0.01).

When we added a mediator, we continued to find an overall positive association between integrating structure (X) and total facility expenses (Y), also known as the direct effect (X→Y, moderated by M; pathway c'); however, the point estimates changed. When hospital-based outpatient care center/services was considered as a mediator, for each unit increase in the tightness of the integration structure, a hospital spent an estimated $833,060.30 (95% CI: 230,113.80-1,532,008.00) more in mean total facility expenditures, given the same environmental and hospital factors (p= 0.013). In other words, the costs went up, suggesting challenges with hospital-based outpatient care/services. When computerized system to compare inpatient and preadmission medication list was considered, the estimate was $674,891.90 (95% CI: 86,621.52-1,293,146.00; p= 0.028). When computerized system to provide an updated medication list at discharge was considered, the estimate was $708,176.40 (95% CI: 129,641.60-1,261,810.00; p= 0.014). For both, costs went down. Notably, we did not find significant evidence that these three variables were mediators, so the causal pathways remain unclear.

When looking at the association between care coordination (M) and outcomes (Y) (M→Y; pathway b), most results were significant, suggesting that care coordination affects outcomes. When looking at the total effects alone (X→Y; pathway c), there were also significant associations between integrating structure (X) and the following outcomes (Y): total facility admissions, total facility Medicare discharges, total facility Medicaid discharges, and total emergency room visits. These associations were minimal (i.e., 0.001), however, and became insignificant when a mediator was added (see X→M→Y; pathway ab for indirect effect).

The qualitative results supported these findings, as executives were aware of the costs associated with integrating physician groups. To encourage revenue gain, one CEO said, "*We have to be sure that in terms of compensation, [physician] productivity standards have to be met for certain levels of compensation*." [CEO 8] Another CEO elaborated that tension stemmed from the shift from volume- to value-based care. "*We are living in a little bit of two worlds today, where we were primarily reimbursed on a fee-for-service basis, so that's more of revenue coming in than expenses going out. So now, how do you hit our bottom-line targets? How do we align between the payer and ourselves?*" [CEO 7]

One executive acknowledged that the high cost of integrating a physician group was expected and sometimes a strategic investment to capture the market. "*We look at our market share and we know that neurosurgery… that we have an outmigration to other healthcare systems. And we know patients are leaving for their [neurosurgical] care to a greater degree than they are for other services. So, we will hire neurosurgeons."* [PGCE 2] This executive further noted a nuance about the physician group being integrated – if the group was already referring all their patients to the health system, *"we'll have more providers but really not any more new patients."* [PGCE 2] In this case, there was no immediate growth in patient volume and health services utilization, which meant no growth in revenue to offset the costs of integration. Thus, as a single budget line item, the now more tightly-integrated physician group may appear to be a financial loss.

Executives who were more optimistic about integration focused on the potential, big picture return on investment, rather than the budget line item. An executive suggested a systems approach: "*We've tried not to look at our physician group as a standalone. We would show a loss per provider, and so, because of that sensitivity out there, we try to look at ourselves as a system.*" [CFO 4] A physician group chief executive elaborated that it was difficult to quantify a physician

group's contribution to the health system, particularly as its financial contributions are often entwined with quality contributions. "*The one big case is all the downstream [returns] and the security*." [PGCE 3]

Executives further noted that they did not have the tools to parse out a physician group's contribution, even if they wanted to: "*We don't routinely measure the business and the downstream. And by that I mean, when the orthopedic surgeon goes into a hospital and does surgery, we don't look at that profit or that margin onto the clinic bottom-line because we just … we don't the ability with the tools to do that*." [CEO 1] Because of the lack of tools, a CMO reflected, "*I don't think the physician group gets the financial credit that it deserves for the business it brings to the hospital. […] Yes it's fed back through the physician group, but it's fed back with a lot of negotiating and a lot of bargaining rather than directly*." [CMO 4]

4.5 DISCUSSION

Our study showed that there are longitudinal trends of more tightly integrated physician groups, coinciding with trends of increased EHR implementation. Health executives believed that the push for both came, in part, from a younger generation of physicians who valued work-life balance and efficiency. Moreover, they noted that market pressures to transition from volume- to value-based care required hospitals to work more closely with physician groups and utilize information technology.

The trends we found were consistent with prior literature, which notes a nationwide shift toward the integrated salary model (Health Forum LLC, 2017), as well as a decrease in physician ownership of practices (Kane, 2017). The AHA reported that hospitals have also collectively spent over $47 billion per year between 2010 and 2014 on information technology (American Hospital Association, 2017). One study suggested that the cost and potential for EHR improvement may be

a decisive factor for physician groups contemplating integration (Page, Butler, & Bozic, 2013), further supporting the trends we found.

Interestingly, we also found trends of decreased post-acute facilities and services owned by hospitals (or its subsidiaries), specifically for skilled nursing, acute long-term care, other long-term care, and home health. This trend was corroborated by health executives, who recognized a deficit in post-acute facilities and services within their own health systems. We posited that some of the decreases may be related to technological advancements to provide post-acute and outpatient care. That is, while the above services decreased, we found a concurrent trend of increased telehealth implementation. Prior literature supports that technological advances have spurred hospitals to explore ways to move care closer to the patient (O'Malley, Bond, & Berenson, 2011). We also posited that hospitals refrained from owning post-acute facilities and services, which tend are unprofitable to hospitals due to strict Medicare reimbursements (Grabowski, Huckfeldt, Sood, Escarce, & Newhouse, 2012).

Finally, the main finding of our study was that physician-system integrating structure causally affects total facility expenses, but this is effect is mediated by care coordination. That is, as the integrating structure becomes tighter, the more expensive it is for the hospital to maintain. This high cost of integration was not surprising, as it is consistent with existing literature that has linked the integrated salary model to higher hospital prices (Baker et al., 2014), procedure rates, and patient expenditures (Madison, 2004), especially when the integrated organization is exclusive and in a less competitive market (Cuellar & Gertler, 2006). Moreover, as hospitals move toward tighter physician-system integration, they are contractually compensating more of the physicians' salaries, naturally resulting in higher costs.

Our study provides contextual understanding that the high cost of integration is not unexpected to health executives. Rather, in some cases, it may even be an intentional investment by a health system for the possibility of higher profits or long-term benefits for the system. This finding adds value to the literature by demonstrating how care coordination attenuates costs. Our findings indicate that, while physician-system integration is costly to a health system, some of that cost is offset through care coordination. Our study thus adds a new level of precision which accounts for mediators, highlighting a patient-centric opportunity to mitigate integration cost.

Limitations

Some of the study's limitations are artifacts of the AHA datasets (Mullner & Chung, 2002). The AHA surveys contain voluntarily-reported data, so there may be response bias and respondent error. Structural changes in the hospital industry may have caused problems in how data are reported, such that there are no clear delineations between the integrating structures and hospital- vs. system-level data. Lastly, we recognize that we did not test all components of the LOPSI conceptual model. The analysis was limited to the variables in the database. Future research may explore more of the model using additional data.

We recognize limitations with the Baron and Kenny method for mediation analysis, with new literature pointing toward the Preacher and Hayes method (Preacher & Hayes, 2008) to consider multiple mediators concurrently. The next step is to use apply alternative, complementary methods. Given that most of our care coordination variables were significantly associated with outcomes (see Table 4.3, pathway b), future research may assess multicollinearity.

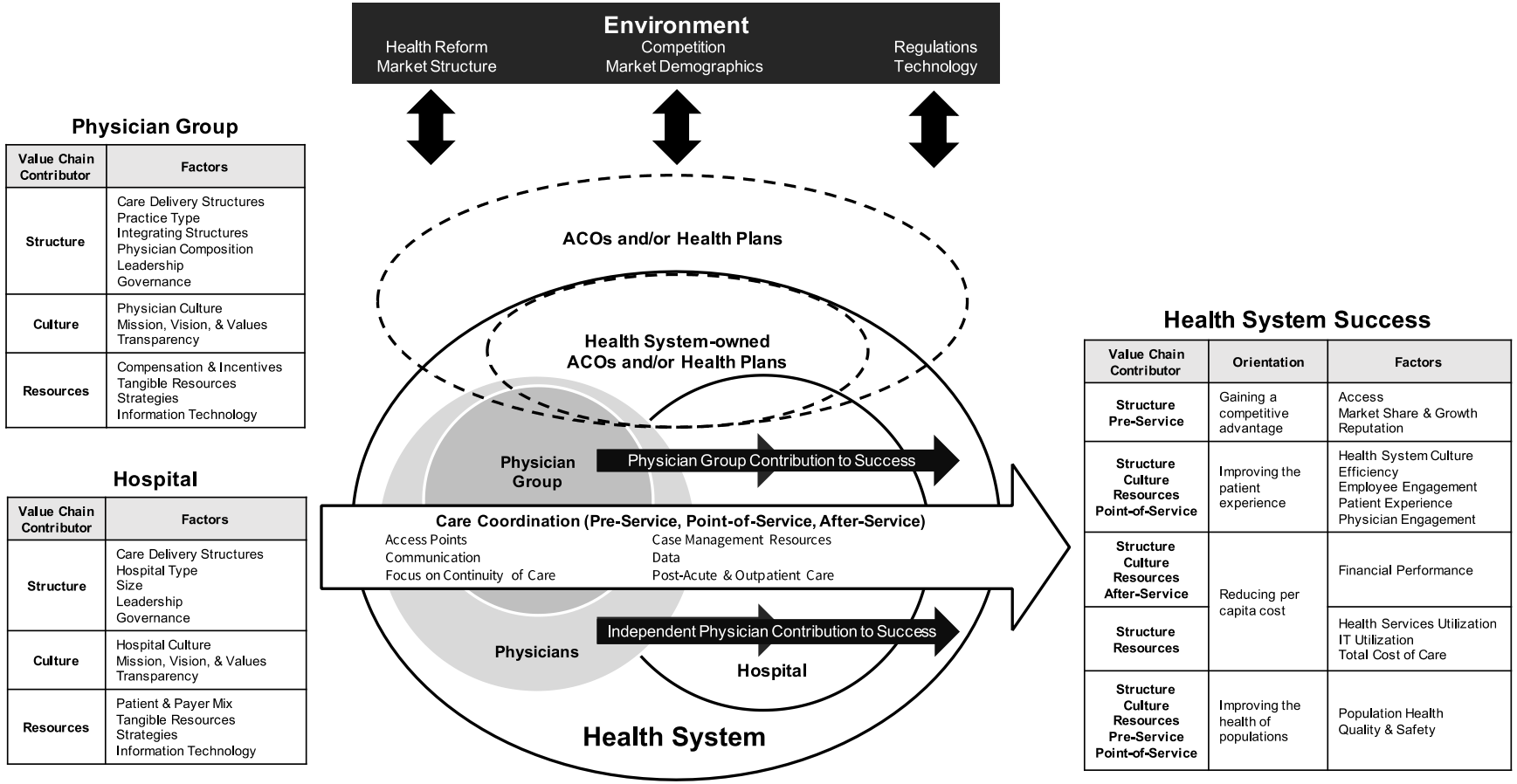
For our qualitative data, we recognize that our findings may not be generalizable due to our focus on Washington State. To minimize generalizability issues, the study was designed to the context of physician-system integration rather than geographic region (Mick & Conrad, 1988) and

employed data triangulation (Denzin, 1970), shown to improve generalizability (Falk & Guenther, 2006; Yin, 2013).

4.6 CONCLUSIONS

As physician-system integration continues to be a focus and direction for health systems, we conclude with two broad strategies for future integration. First, integration should aim for sustainability, rather than a set integrating structure. As we have demonstrated, there are high costs associated with tighter integration, which hospitals and health systems should be mindful of, before investing. As noted by a CFO, "*Integration a lot of times is economically challenging, so it is important to keep your eye on sustainability, especially as the amount of money coming into the system declines.*" [CFO 3]

Second, integration should aim for shared accountability between the physician group, hospital, and health system. Accountability could manifest itself as mutual care coordination goals, given that care coordination is a mediator to health system success (through select pathways). This suggests that integration efforts may have an opportunity to offset costs by strengthening care coordination processes and mechanisms. Special attention should be given to skilled nursing care, home health services, health screenings, and computerized system to update medication list at discharge – shown to be mediators in this study. As noted by a CEO, shared savings and risks could be built into the integration contract: "*If [the health system] does well, the physician group financially does better. If [the health system] doesn't do well, then the physician group is taking some of that down side risk as well.*" [CEO 5] As physician-system integration increases across the nation, our findings aim to support researchers, practitioners, and policymakers in better understanding the pathways to success.



Physician Group

Value Chain Contributor	Factors
Structure	Care Delivery Structures Practice Type Integrating Structures Physician Composition Leadership Governance
Culture	Physician Culture Mission, Vision, & Values Transparency
Resources	Compensation & Incentives Tangible Resources Strategies Information Technology

Hospital

Value Chain Contributor	Factors
Structure	Care Delivery Structures Hospital Type Size Leadership Governance
Culture	Hospital Culture Mission, Vision, & Values Transparency
Resources	Patient & Payer Mix Tangible Resources Strategies Information Technology

Health System Success

Value Chain Contributor	Orientation	Factors
Structure Pre-Service	Gaining a competitive advantage	Access Market Share & Growth Reputation
Structure Culture Resources Point-of-Service	Improving the patient experience	Health System Culture Efficiency Employee Engagement Patient Experience Physician Engagement
Structure Culture Resources After-Service	Reducing per capita cost	Financial Performance
Structure Resources		Health Services Utilization IT Utilization Total Cost of Care
Structure Culture Resources Pre-Service Point-of-Service	Improving the health of populations	Population Health Quality & Safety

Figure 4.1. Conceptual model of the landscape of physician-system integration (LOPSI), which combines organizational theories, a systematic review of empirical research studies, and practice perspectives (Nguyen, Johnson, et al., 2018)

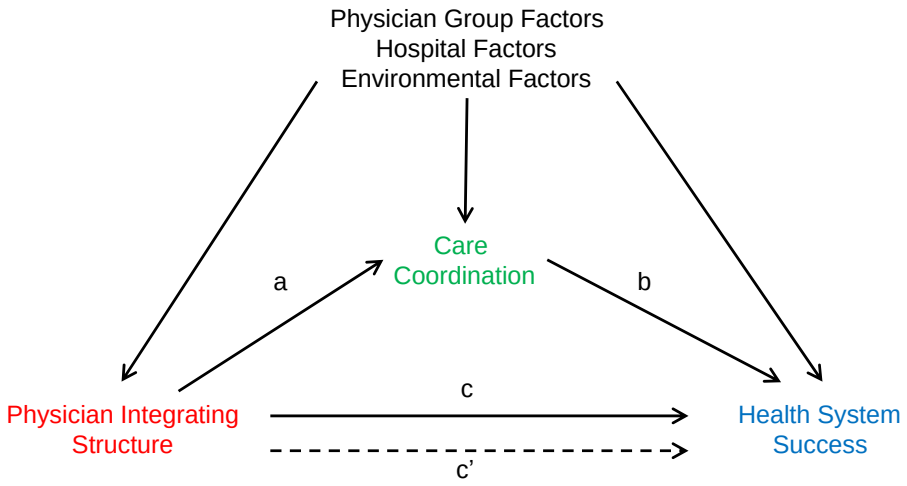


Figure 4.2. Directed acyclic graph

Table 4.7. Variable descriptions

Variable	Description
Predictor Variable: Physician Integrating Structure	
Open physician-hospital organization (PHO)	A joint venture between the hospital and all members of the medical staff who wish to participate. The PHO can act as a unified agent in managed care contracting, own a managed care plan, own and operate ambulatory care centers or ancillary services projects, or provide administrative services to physician members.
Closed physician-hospital organization (PHO)	A PHO that restricts physician membership to those practitioners who meet criteria for cost effectiveness and/or high quality.
Group practice without walls	Hospital sponsors the formation of, or provides capital to physicians to establish, a "quasi" group to share administrative expenses while remaining independent practitioners.
Independent practice association (IPA)	A legal entity that holds managed care contracts. The IPA then contracts with physicians, usually in solo practice, to provide care either on a fee-for-service or capitated basis. The purpose of an IPA is to assist solo physicians in obtaining managed care contracts.
Management services organization (MSO)	A corporation, owned by the hospital or a physician/hospital joint venture, that provides management services to one or more medical group practices. The MSO purchases the tangible assets of the practices and leases them back as part of a full-service management agreement, under which the MSO employs all non-physician staff and provides all supplies/administrative systems for a fee.
Equity model	Allows established practitioners to become shareholders in a professional corporation in exchange for tangible and intangible assets of their existing practices.
Foundation	A corporation, organized either as a hospital affiliate or subsidiary, which purchases both the tangible and intangible assets of one or more medical group practices. Physicians remain in a separate corporate entity but sign a professional services agreement with the foundation.
Integrated salary model	Physicians are salaried by the hospital or another entity of a health system to provide medical services for primary care and specialty care.
Mediator Variables: Care Coordination Mechanisms	
Post-Acute and Outpatient Care	
Skilled nursing care	Provides non-acute medical and skilled nursing care services, therapy, and social services under the supervision of a licensed registered nurse on a 24-hour basis.
Acute long-term care	Provides specialized acute hospital care to medically complex patients who are critically ill, have multisystem complications and/or failure, and require hospitalization averaging 25 days, in a facility offering specialized treatment programs and therapeutic intervention on a 24-hour/7 day a week basis.

Other long-term care	Provision of long-term care other than skilled nursing care or intermediate care for those who do not require daily medical or nursing services, but may requires some assistance in the activities of daily living. This can include residential care, elderly care, or care facilities for those with developmental or intellectual disabilities.
Home health services	Service providing nursing, therapy, and health-related homemaker or social services in the patient's home.
Hospital-based outpatient care center/services	Organized hospital health care services offered by appointment on an ambulatory basis. Services may include outpatient surgery, examination, diagnosis, and treatment of a variety of medical conditions on a nonemergency basis, and laboratory and other diagnostic testing as ordered by staff or outside physician referral.
Telehealth	Telehealth is fully implemented across all units in hospital.
Case Management Resources	
Case management	A system of assessment, treatment planning, referral and follow-up that ensures the provision of comprehensive and continuous services and the coordination of payment and reimbursement for care.
Focus on Continuity of Care	
Health screenings	A preliminary procedure such as a test or examination to detect the most characteristic sign or signs of a disorder that may require further investigation.
Immunization program	Program that plans, coordinates and conducts immunization services in the community.
Transportation to health services	A long-term care support service designed to assist the mobility of the elderly.
Computerized system to compare medication lists	Hospital currently has a computerized system which allows for comparing a patient's inpatient and preadmission medication lists.
Computerized system to update medication list at discharge	Hospital currently has a computerized system which allows for providing an updated medication list at discharge.
Outcome Variables: Health System Success	
Quality & Safety	
Community outreach program	A program that systematically interacts with the community to identify those in need of services, alerting persons and their families to the availability of services, locating needed services, and enabling persons to enter the service delivery system.
Total Cost of Care	
Facility expenses	Includes all payroll and non-payroll expenses as well as any non-operating losses (including extraordinary losses). Excludes bad debt.
Capital expenses	Expenses used to acquire assets, including buildings, remodeling projects, equipment, or property.
Health Services Utilization	
Facility admissions	Include the number of adult and pediatric admissions (exclude births).
Facility Medicare discharges	A discharge day where a Medicare Managed Care Plan is the source of payment.

Facility Medicaid discharges	A discharge day where a Medicaid Managed Care Plan is the source of payment.
Emergency room visits	The number of visits to the emergency unit.
Outpatient visits	A visit by a patient who is not lodged in the hospital while receiving medical, dental, or other services.
Control Variables: Hospital Factors	
Hospital Type	
Ownership by physician group	Hospital owned in whole or in part by physicians or a physician group.
Accreditation	Accreditation by The Joint Commission.
Teaching hospital	Member of Council of Teaching Hospital of the Association of American Medical Colleges.
Critical access hospital	Classified by the Centers for Medicare and Medicaid as a critical access hospital.
Size	
Hospital beds	Beds set up and staffed for use at the end of the reporting period
Tangible Resources	
Full-time equivalent physicians and dentists	Include only those physicians and dentists engaged in clinical practice and on the payroll.
Full-time equivalent registered nurses	Nurses who have graduated from approved schools of nursing and who are currently registered by the state.
Full-time equivalent all other personnel	Include all other non-clinical personnel.
Computed-tomography (CT) scanner	Computed tomographic scanner for head or whole body scans.
Magnetic resonance imaging (MRI) machine	The use of a uniform magnetic field and radio frequencies to study tissue and structure of the body. This procedure enables the visualization of biochemical activity of the cell in vivo without the use of ionizing radiation, radioisotopic substances or high-frequency sound.
Information Technology	
Electronic health record (EHR)	An electronic health record (EHR) integrates electronically originated and maintained patient-level clinical health information, derived from multiple sources, into one point of access. An EHR replaces the paper medical record as the primary source of patient information.
Control Variables: Environmental Factors	
Competition	
Herfindahl-Hirschman Index	An economic measure that compares the size of a firm (i.e., physician, hospital, insurance, and payer) to its market in a given area. Calculated using the Health Service Area Code and hospital unit inpatient days.
Market Structure	
Health maintenance organization (HMO)	Health insurance organization to which subscribers pay a predetermined fee in return for a range of health services from providers registered with the organization.

Preferred provider organization (PPO)	Health insurance organization that contracts with hospitals and providers to create a network.
Contract with employer(s)	Hospital contract directly with employers or a coalition of employers to provide care on a capitated, predetermined or shared risk basis.

Source: American Hospital Association

Table 4.8. Descriptive statistics of U.S. hospitals, fiscal year 2006-2015, N = 19,960

	Fiscal Year						
	2009 n = 2,698	**2010** n = 2,759	**2011** n = 2,834	**2012** n = 2,902	**2013** n = 2,802	**2014** n = 2,923	**2015** n = 3,042
Predictor: Physician Integrating Structure							
Open physician-hospital organization[a]	23 (0.87%)	28 (1.05%)	27 (1%)	25 (0.91%)	19 (0.72%)	19 (0.69%)	20 (0.71%)
Closed physician-hospital organization[a]	1 (0.04%)	1 (0.04%)	1 (0.04%)	1 (0.04%)	0 (0%)	2 (0.07%)	1 (0.04%)
Group practice without walls[a]	37 (1.41%)	32 (1.2%)	41 (1.52%)	36 (1.31%)	34 (1.29%)	33 (1.2%)	28 (0.99%)
Independent physician association[a]	224 (8.52%)	221 (8.31%)	220 (8.15%)	209 (7.63%)	208 (7.87%)	206 (7.49%)	207 (7.30%)
Management services association[a]	85 (3.23%)	88 (3.31%)	80 (2.96%)	74 (2.7%)	63 (2.38%)	62 (2.25%)	71 (2.51%)
Equity[a]	16 (0.61%)	13 (0.49%)	12 (0.44%)	13 (0.47%)	16 (0.61%)	12 (0.44%)	15 (0.53%)
Foundation[a]	23 (0.87%)	23 (0.86%)	25 (0.93%)	33 (1.2%)	32 (1.21%)	27 (0.98%)	40 (1.41%)
Integrated salary model[a]	1,944 (73.92%)	1,993 (74.9%)	2,025 (75.03%)	2,063 (75.29%)	1,976 (74.76%)	2,111 (76.76%)	2,192 (77.35%)
None[a]	277 (10.53%)	262 (9.85%)	268 (9.93%)	286 (10.44%)	295 (11.16%)	278 (10.11%)	260 (9.17%)
Mediators: Care Coordination							
Post-Acute and Outpatient Care							
Skilled nursing care[b]	609 (22.57%)	568 (20.59%)	585 (20.64%)	608 (20.95%)	540 (19.26%)	565 (19.33%)	530 (17.42%)
Acute long-term care[b]	269 (9.97%)	245 (8.88%)	252 (8.89%)	285 (9.82%)	247 (8.81%)	278 (9.51%)	249 (8.19%)
Other long-term care[b]	149 (5.52%)	113 (4.1%)	113 (3.99%)	145 (5%)	129 (4.6%)	161 (5.51%)	109 (3.58%)
Home health services[b]	667 (24.72%)	634 (22.98%)	646 (22.79%)	634 (21.85%)	620 (22.11%)	613 (20.97%)	614 (20.18%)
Hospital-based outpatient care center/services[b]	1,940 (71.91%)	1,970 (71.4%)	2,061 (72.72%)	2,129 (73.36%)	2,100 (74.89%)	2,180 (74.58%)	2,260 (74.29%)
Telehealth (fully implemented) [b]	272 (10.08%)	229 (8.3%)	222 (7.83%)	286 (9.86%)	360 (12.84%)	378 (12.93%)	422 (13.87%)
Case Management Resources							
Case management[b]	2,408 (89.25%)	2,468 (89.45%)	2,568 (90.61%)	2,630 (90.63%)	2,569 (91.62%)	2,683 (91.79%)	2,799 (92.01%)
Focus on Continuity of Care							

Health screenings[b]	2,018 (74.8%)	2,042 (74.01%)	2,140 (75.51%)	2,177 (75.02%)	2,133 (76.07%)	2,233 (76.39%)	2,297 (75.51%)
Immunization program[b]	915 (33.91%)	983 (35.63%)	1,036 (36.56%)	1,111 (38.28%)	1,140 (40.66%)	1,191 (40.75%)	1,255 (41.26%)
Transportation to health services	658 (24.39%)	661 (23.96%)	640 (22.58%)	638 (21.98%)	623 (22.22%)	637 (21.79%)	660 (21.7%)
Computerized system to compare medication lists[b]	1,015 (37.62%)	1,010 (36.61%)	1,026 (36.2%)	1,411 (48.62%)	1,482 (52.85%)	1,618 (55.35%)	1,748 (57.46%)
Computerized system to update medication list at discharge[b]	1,378 (51.07%)	1,294 (46.9%)	1,272 (44.88%)	1,564 (53.89%)	1,604 (57.2%)	1,683 (57.58%)	1,824 (59.96%)
Outcomes: Health System Success							
Quality & Safety							
Community outreach program[b]	1,835 (68.01%)	1,865 (67.6%)	1,952 (68.88%)	2,037 (70.19%)	2,014 (71.88%)	2,104 (71.98%)	2,197 (72.22%)
Total Cost of Care							
Total facility expenses (mean)	$150,373,879	$153,056,002	$159,113,991	$170,412,223	$181,661,677	$186,989,658	$196,128,528
Total capital expenses (mean)	$13,872,762	$13,302,755	$13,685,919	$13,550,753	$18,336,954	$14,587,723	$15,783,253
Health Services Utilization							
Total facility admissions (mean)	8,022.47	7,860.69	7,906.22	7,780.11	7,875.72	7,735.55	7,815.42
Total facility Medicare discharges (mean)	3,280.91	3,275.14	3,368.16	3,303.86	3,375.30	3,307.91	3,419.06
Total facility Medicaid discharges (mean)	1,523.67	1,518.08	1,542.77	1,504.15	1,532.19	1,611.06	1,677.31
Total emergency room visits (mean)	26,959.15	26,643.14	27,705.20	28,451.46	29,453.54	29,973.35	31,406.73
Total outpatient visits (mean)	137,394.70	137,310.70	140,530.70	145,520.60	150,315.20	151,589.10	157,316.70
Control Variables: Hospital Factors							
Hospital Type							
Ownership by physician group	92 (3.41%)	102 (3.70%)	118 (4.16%)	122 (4.20%)	143 (5.10%)	144 (4.93%)	132 (4.34%)
Accredited by Joint Commission	2,300 (85.25%)	2,226 (80.68%)	2,285 (80.63%)	2,397 (82.60%)	2,231 (79.56%)	2,309 (78.99%)	2,403 (78.99%)
Teaching hospital	207 (7.67%)	209 (7.58%)	214 (7.55%)	200 (6.89%)	201 (7.17%)	183 (6.26%)	194 (6.38%)
Critical Access Hospital	419 (15.53%)	435 (15.77%)	452 (15.95%)	476 (16.40%)	459 (16.37%)	490 (16.76%)	504 (16.57%)
Size							

Hospital beds (mean)	183.16	181.44	180.89	181.57	184.06	180.77	180.44
Tangible Resources							
FTE physicians and dentists (mean)	25.58	25.34	27.00	28.52	30.59	29.83	30.44
FTE Registered Nurses (mean)	287.25	289.91	296.14	304.26	317.06	322.88	331.86
FTE other personnel (mean)	681.75	670.03	679.91	686.08	704.72	694.50	708.15
CT scanner[b]	2,230 (82.65%)	2,262 (81.99%)	2,354 (83.06%)	2,380 (82.01%)	2,322 (82.84%)	2,430 (83.13%)	2,518 (82.77%)
MRI machine[b]	1,793 (66.46%)	1,835 (66.51%)	1,918 (67.68%)	1,942 (66.92%)	1,930 (68.85%)	2,031 (69.48%)	2,116 (69.56%)
Information Technology							
EHR (fully implemented)[b]	582 (25.14%)	651 (33.94%)	858 (36.22%)	1180 (46.62%)	1476 (59.47%)	1719 (70.02%)	1953 (76.53%)
Control Variables: Environmental Factors							
Market Structure							
Health maintenance organization[b]	1,834 (74.40%)	1,842 (73.53%)	1,897 (74.54%)	1,976 (73.84%)	1,984 (74.36%)	2,047 (75.48%)	2,067 (75.16%)
Preferred provider organization[b]	1,975 (80.61%)	1,980 (79.33%)	2,023 (79.74%)	2,088 (78.91%)	2,111 (79.57%)	2,167 (80.38%)	2,196 (80.06%)
Contract with employer(s)[b]	67 (2.84%)	75 (3.09%)	77 (3.06%)	100 (3.76%)	129 (4.72%)	163 (5.92%)	193 (6.89%)

[a] Number of hospitals where the given type of integrating structure was the one used by the greatest number of physicians.
[b] 0 = absent; 1 = present at hospital

Table 4.9. Bootstrapped point estimates and confidence intervals (1,000 simulations) for the indirect and direct effects of physician integrating structure (predictor, X) on health system success (outcome, Y), N = 19,960.

Outcome (Y)	Mediators (M)	X→M (a path)	M→Y (b path)	X→Y Total Effect (c path)	X→M→Y Indirect Effect (ab)	X→Y Direct Effect (c' path)	Bootstrap 95% CI Lower Limit	Bootstrap 95% CI Upper Limit
Community outreach program	Skilled nursing care	-0.091*	0.328	-	-0.035	0.088	-0.214	4.324
	Acute long term care	0.006	0.378	-	0.003	0.050	-0.430	13.230
	Other long-term care	-0.120	0.139	-	-0.061	0.114	-97.981	21.371
	Home health services	-0.121**	0.029	-	-0.004	0.057	-2.211	0.709
	Hospital-based outpatient care center/services	-0.034	1.164***	-	-0.045	0.097	-0.586	0.252
	Telehealth	0.031	0.042	-	0.002	0.050	-0.097	0.150
	Case management	-0.142	2.129***	-	-0.327	0.380	-0.586	123.922
	Health screenings	0.098*	2.999***	-	0.332	-0.279	-1.064	1.049
	Immunization program	0.061	1.452***	-	0.085	-0.032	-0.223	0.774
	Transportation to health services	-0.017	1.432***	-	-0.025	0.078	-0.123	6.491
	Computerized system to compare medication lists	0.029	0.184	-	0.003	0.049	-0.073	0.156
	Computerized system to update medication list at discharge	0.037*	0.140	-	0.003	0.050	-0.074	0.163
	None	-	-	0.053	-	-	-0.027	0.132
Total facility expenses	Skilled nursing care	-0.09*	-4,454,763.00*	-	448,379.26	296,320.83	-836,958.30	1,155,556.00
	Acute long term care	0.01	-1,952,108.00	-	-20,343.35	765,043.40	-437,793.10	1,869,473.00
	Other long-term care	-0.12	-2,386,125.00	-	375,312.90	369,387.20	-1,219,390.00	1,582,193.00
	Home health services	-0.12**	-10,600,000.00***	-	1,433,172.00	-688,471.60	-2,411,931.00	672,130.00
	Hospital-based outpatient care center/services	-0.03	2,440,364.00	-	-88,360.16	833,060.30*	230,113.80	1,532,008.00
	Telehealth	0.03	3,604,810**	-	120,099.20	624,600.90	35,608.17	1,266,256.00
	Case management	-0.14	-3,866,181.00	-	555,898.20	188,801.90	-2,714,738.00	1,720,095.00
	Health screenings	0.10*	5,715,162.00*	-	689,353.00	55,347.13	-1,536,693.00	1,202,316.00
	Immunization program	0.06	3,739,369.00*	-	204,187.70	540,512.40	-304,692.20	1,303,509.00
	Transportation to health services	-0.02	-3,727,262.00	-	53,180.41	691,519.70	-29,098.77	1,412,223.00
	Computerized system to compare medication lists	0.03	2,364,687.00	-	69,808.15	674,891.90*	86,621.52	1,293,146.00
	Computerized system to update medication list at discharge	0.04*	1,157,661.00	-	36,523.65	708,176.40*	129,641.60	1,261,810.00
	None	-	-	744,700.10**	-	-	180,211.70	1,309,188.00
Total capital expenses	Skilled nursing care	-0.09*	-250,056.60	-	27,479.94	-529,199.70	-1,199,414.00	172,872.70
	Acute long term care	0.01	1,460,743.00	-	7,196.88	-508,916.60	-1,270,344.00	411,502.90
	Other long-term care	-0.12	1,843,101.00	-	-194,528.10	-307,191.60	-1,501,482.00	2,827,860.00
	Home health services	-0.12**	2,672,116.00	-	-175,516.00	-326,203.80	-1,287,459.00	631,538.30
	Hospital-based outpatient care center/services	-0.03	-560,940.00	-	18,598.49	-520,318.30	-1,278,620.00	136,828.60
	Telehealth	0.03	-239,949.90	-	-933.57	-500,786.20	-1,133,978.00	109,944.00
	Case management	-0.14	-3,039,126.00	-	521,890.70	-1,023,610.00	-4,016,185.00	73,179.81
	Health screenings	0.10*	-1,959,416.00	-	-206,540.00	-295,179.80	-1,223,007.00	775,949.60
	Immunization program	0.06	2,743,195.00	-	182,771.80	-684,491.50	-1,364,132.00	313,802.10
	Transportation to health services	-0.02	56,091.70	-	-2,537.78	-499,182.00	-1,186,844.00	230,046.20
	Computerized system to compare medication lists	0.03	-1,000,068.00	-	-28,243.46	-473,476.30	-1,208,544.00	42,199.52
	Computerized system to update medication list at discharge	0.04*	-1,411,939.00	-	-54,011.17	-447,708.60	-1,071,048.00	231,739.10
	None	-	-	-501,719.80	-	-	-1,073,089.00	69,649.19

Total facility admissions	Skilled nursing care	-0.091*	0.009***	-	-0.001	0.002	-0.001	0.005
	Acute long term care	0.006	0.000	-	0.000	0.000	-0.002	0.004
	Other long-term care	-0.120	0.013***	-	-0.001	0.002	-0.002	0.008
	Home health services	-0.121**	0.003***	-	-0.001	0.001	-0.001	0.004
	Hospital-based outpatient care center/services	-0.034	-0.010***	-	0.000	0.000	-0.002	0.002
	Telehealth	0.031	-0.007***	-	0.000	0.001	-0.001	0.003
	Case management	-0.142	-0.004***	-	0.001	-0.001	-0.020	0.008
	Health screenings	0.098*	-0.021***	-	-0.002	0.003	0.000	0.008
	Immunization program	0.061	-0.004***	-	0.000	0.001	-0.001	0.003
	Transportation to health services	-0.017	0.009***	-	0.000	0.001	-0.001	0.003
	Computerized system to compare medication lists	0.029	-.006***	-	0.000	0.001	-0.001	0.002
	Computerized system to update medication list at discharge	0.037*	-0.001***	-	0.000	0.001	-0.001	0.002
	None	-	-	0.001***	-	-	0.000	0.001
Total facility Medicare discharges	Skilled nursing care	-0.091*	0.0186***	-	-0.002	0.001	-0.002	0.005
	Acute long term care	0.006	-0.005***	-	0.000	-0.001	-0.005	0.002
	Other long-term care	-0.120	0.001	-	0.000	-0.001	-0.006	0.005
	Home health services	-0.121**	0.006***	-	-0.001	0.000	-0.003	0.003
	Hospital-based outpatient care center/services	-0.034	-0.004**	-	0.000	-0.001	-0.004	0.002
	Telehealth	0.031	-0.001**	-	0.000	-0.001	-0.003	0.001
	Case management	-0.142	-0.013***	-	0.002	-0.003	-0.039	0.007
	Health screenings	0.098*	-0.038***	-	-0.004	0.003	-0.002	0.010
	Immunization program	0.061	-0.004***	-	0.000	0.000	-0.003	0.002
	Transportation to health services	-0.017	0.005***	-	0.000	-0.001	-0.003	0.002
	Computerized system to compare medication lists	0.029	0.000	-	0.000	-0.001	-0.003	0.001
	Computerized system to update medication list at discharge	0.037*	0.003***	-	0.000	-0.001	-0.003	0.001
	None	-	-	-0.001***	-	-	-0.001	-0.001
Total facility Medicaid discharges	Skilled nursing care	-0.091*	-0.006***	-	0.001	0.000	-0.006	0.005
	Acute long term care	0.006	-0.024***	-	0.000	0.001	-0.008	0.009
	Other long-term care	-0.120	-0.007***	-	0.000	0.000	-0.009	0.008
	Home health services	-0.121**	0.002	-	-0.001	0.001	-0.004	0.007
	Hospital-based outpatient care center/services	-0.034	0.006***	-	0.000	0.001	-0.004	0.007
	Telehealth	0.031	0.010***	-	0.000	0.000	-0.004	0.004
	Case management	-0.142	-0.006	-	0.004	-0.003	-0.034	0.034
	Health screenings	0.098*	-0.015***	-	-0.002	0.003	-0.003	0.011
	Immunization program	0.061	0.034***	-	0.002	-0.001	-0.008	0.004
	Transportation to health services	-0.017	0.002*	-	0.000	0.001	-0.004	0.005
	Computerized system to compare medication lists	0.029	0.009***	-	0.000	0.000	-0.003	0.004
	Computerized system to update medication list at discharge	0.037*	0.009***	-	0.000	0.000	-0.003	0.004
	None	-	-	0.001***	-	-	0.000	0.001
Total emergency room visits	Skilled nursing care	-0.091*	0.005***	-	0.000	0.001	-0.004	0.006
	Acute long term care	0.006	0.018***	-	0.000	0.001	-0.006	0.008
	Other long-term care	-0.120	0.005***	-	-0.001	0.002	-0.009	0.015
	Home health services	-0.121**	-0.008***	-	0.002	-0.001	-0.005	0.004
	Hospital-based outpatient care center/services	-0.034	0.048***	-	-0.001	0.002	-0.006	0.008
	Telehealth	0.031	-0.002***	-	0.000	0.001	-0.001	0.004
	Case management	-0.142	-0.037***	-	0.006	-0.005	-0.024	0.031
	Health screenings	0.098*	0.016***	-	0.001	0.000	-0.005	0.004

	Immunization program	0.061	0.018***	-	0.001	0.000	-0.003	0.007
	Transportation to health services	-0.017	-0.001**	-	0.000	0.001	-0.002	0.004
	Computerized system to compare medication lists	0.029	0.013***	-	0.000	0.001	-0.002	0.003
	Computerized system to update medication list at discharge	0.037*	0.013***	-	0.000	0.001	-0.002	0.003
	None	-	-	0.001***	-	-	0.001	0.001
Total outpatient visits	Skilled nursing care	-0.091*	-0.019***	-	0.001	-0.001	-0.010	0.005
	Acute long term care	0.006	-0.004***	-	0.000	0.000	-0.006	0.007
	Other long-term care	-0.120	0.039***	-	-0.005	0.005	-0.005	0.018
	Home health services	-0.121**	0.016***	-	-0.001	0.001	-0.006	0.008
	Hospital-based outpatient care center/services	-0.034	0.041***	-	-0.001	0.001	-0.006	0.010
	Telehealth	0.031	0.014***	-	0.000	0.000	-0.004	0.004
	Case management	-0.142	-0.038***	-	0.006	-0.006	-0.059	0.006
	Health screenings	0.098*	0.038***	-	0.003	-0.003	-0.016	0.003
	Immunization program	0.061	0.035***	-	0.001	-0.001	-0.007	0.004
	Transportation to health services	-0.017	0.043***	-	-0.001	0.001	-0.007	0.011
	Computerized system to compare medication lists	0.029	0.014***	-	0.000	0.000	-0.005	0.004
	Computerized system to update medication list at discharge	0.037*	0.009***	-	0.000	0.000	-0.004	0.004
	None	-	-	0.000	-	-	0.000	0.000

Note: * p<0.05; ** p<0.01; *** p<0.001. Additional covariates included hospital factors (ownership, accreditation, teaching status, critical access hospital, hospital beds, staffing FTE, CT scanners, MRI, EHR) and environmental factors (Herfindahl-Hirschman Index, HMOs, PPOs, and employer contracts).

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Chapter 5. CONCLUSION

5.1 SUMMARY

This dissertation focused on the organizational factors affecting the success of integration between physician groups and health systems. The objectives were two-fold: 1) to define what success means to different health systems, and 2) to answer the overarching research question: How is the success of an integrated delivery system affected by the degree and nature of physician-system integration? The first objective was met through Aims 1 and 2 and the second objective through Aim 3.

In Aim 1, we identified 29 empirical articles published in 2005-2016 that examined physician-system integration. Only 38% of the articles used organizational theory to guide their approach, which suggests an imbalance in past analyses and an underutilization of theory in integration research. Of the articles that did apply theory, bargaining-market power theory and transaction cost theory were the predominant ones used. Furthermore, only 24.1% of the articles used care coordination mechanisms, which suggests that more research should be done to define standard care coordination metrics. Through the review and cluster analysis, we identified 48 organizational factors that comprise the landscape of physician-system integration.

In Aim 2, we interviewed 25 health executives across eight health systems in Washington State. Executives cited 47 out of the 48 (98%) of the organizational factors in our base conceptual model and four factors not present in the model. Factors that made physician-system integration successful included: payment reform (how to compensate for care coordination activities), alignment between physician groups and hospitals (culture and leadership), and the establishment of more care coordination mechanisms (pre-service, point-of-service, and after-service). While all executives were proponents of increased integration, most stressed the importance of cultural and

leadership alignment. We concluded that the landscape of physician-system integration incorporates a complex array of 51 factors of the environment, physician group, hospital, care coordination, and integration success.

In Aim 3, we found trends of increased physician-system integration, FY06-15. We also found that tighter integration structures were associated with higher total facility expenses, with hospitals spending $675,000 to $833,000 for each "level" increase in integration. The trend was consistent with previous literature. However, we found that expenses were attenuated when care coordination mechanisms were considered as a mediator. This poses an opportunity for health systems to offset costs by strengthening care coordination. Executives were aware of integration costs and care coordination deficits but will continue to invest, seeking long-term reward.

Through the three Aims, we put forth a theory-driven, practice-validated, and empirically-tested conceptual model (Figure 5.1) – the Landscape of Physician-System Integration (LOPSI) model. Our work indicates that physician-system integration incorporates an amalgam of 52 factors of the internal and external environment, further highlighting the important mediating role of care coordination in integration success.

5.2 Implications for Policy & Practice

As trends continue toward increased physician-system integration, our findings have the potential to inform regulatory policy on physician group and health system mergers and to guide health systems in improving their performance and selecting their integration partners. Underlying physician integration has been shown to help drive formation of ACOs (Auerbach, Liu, Hussey, Lau, & Mehrotra, 2013), making this body of research pertinent to the problems faced by health systems today. The identification of best integration practices can guide health systems in forming strategies that will improve their overall performance, resulting in improved efficiency and quality

of care for the communities they serve.

First, it is very easy for hospitals and health systems to concentrate solely on business goals, especially given that physician-system integration typically begins with a financial transaction. To achieve population health, policymakers and practitioners who holistically consider the external and internal environments of physician-system integration are better positioned to attain success and survive pressures to integrate. The LOPSI model aims to serve as a tool for facilitating this holistic evaluation.

Second, integration should aim for sustainability, rather than a set goal integrating structure. We found that in both the qualitative and quantitative data, there is no true "optimal" physician-system integrating structure. Consistent with prior literature (Baker, Bundorf, & Kessler, 2014; Cuellar & Gertler, 2006; Madison, 2004), in Aim 3, we found that tighter integrating structures were in fact linked to increased costs to the health system. As health systems continue to head toward increased integration, our work indicates that cultural and leadership alignment should be prioritized over an "ideal" integrating structure, as a mix of integration contracts may be preferred (Aim 2).

Third, integration should aim for shared accountability between the physician group and the health system. Accountability could be facilitated by dyadic leadership (i.e., partnering a physician leader with an administrative leader) and shared governance (Aim 2) and manifest itself as mutual care coordination goals, given that care coordination is a mediator to health system success (Aim 3). The latter suggests that integration efforts may have an opportunity to offset costs through the strengthening of care coordination mechanisms. Special attention may be given to skilled nursing care, home health services, health screenings, and computerized system to update medication list at discharge – which were care coordination mechanisms shown to be mediators in

this study. Aims 1 and 2 present comprehensive lists of how care coordination has been defined and operationalized in research and practice.

5.3 Implications for Research

We contributed to the literature and theory on physician-system integration through the creation of a theory-driven, practice-validated, and empirically-tested conceptual model. The LOPSI model (Figure 5.1) integrates open systems theory (Von Bertalanffy, 1968) and Porter's Value Chain (Porter & Teisberg, 2006) to demonstrate ways in which physician groups and hospitals are continuously interacting with one another and the environment, as well as ways in which integration adds value to the health system.

As detailed in each Aim, we identified directions for future research. First, the LOPSI model provides numerous pathways, which, due to limitations of our data, remain unexplored in this dissertation. In particular, the qualitative interviews called to attention the importance of culture and leadership, highlighting a need for a national data source on those topics. Second, our qualitative study was focused on Washington State; there is opportunity for the study design to be applied to other states for regional comparison, as well for an in-depth analysis in which more interviews are conducted within health systems (i.e., to include stakeholders outside of the C-suite). Third, the LOPSI model is designed for the U.S. healthcare landscape; there is opportunity to replicate this study in other countries and contexts to develop other models. Finally, our findings indicate that care coordination mechanisms are active mediators of physician-system integration. Yet, researchers and health executives both recognize an inconsistency in how care coordination is defined and operationalized. Given the important role of care coordination in the transition from value to volume, future research may seek to further investigate the relationships between physician groups, health systems, and care coordination, bringing in new sources of data.

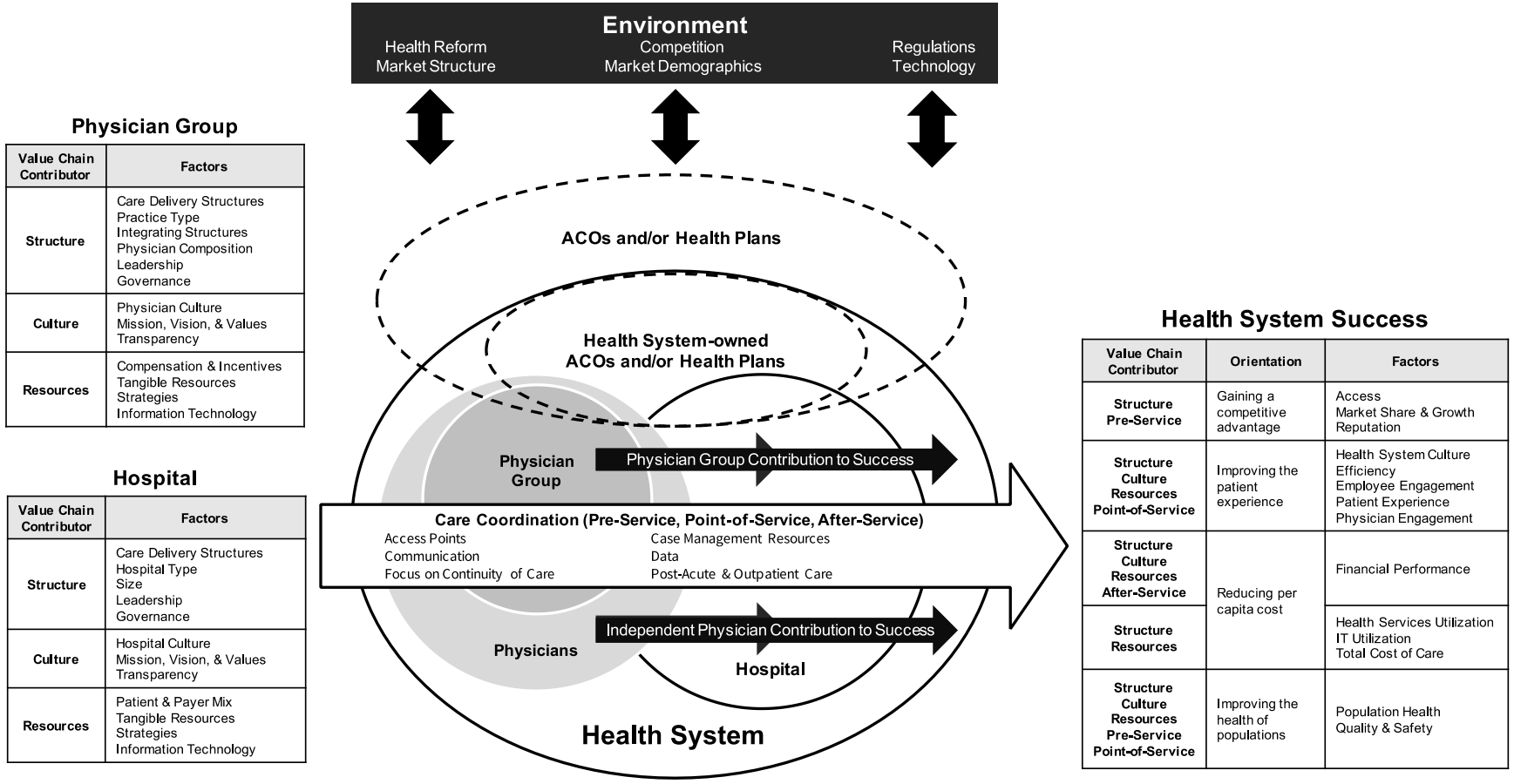

Figure 5.1. Conceptual model of the landscape of physician-system integration (LOPSI), which combines organizational theories, a systematic review of empirical research studies published 2005-2016, and practice perspectives. Dotted lines denote that ACOs and health plans can either be owned by or independent of the health system.

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VITA

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