

ORIGINAL ARTICLE

A conceptual model for physician-system integration: A scoping review

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ABSTRACT

Despite the widespread pursuit of physician-health system integration, the evidence for factors affecting successful integration is uncertain and inconclusive. We sought to identify and categorize the organizational factors in the current landscape of physician-health system integration. We conducted a scoping review of the empirical literature on this topic, first surveying the theoretical perspectives that have been used in past studies in order to determine how theory has been used to explain and predict changing integration strategies over time. Second, we extracted factors that have been used to define the environment, physician group, hospital, care coordination, and health system success. From the 29 eligible articles, bargaining-market power theory and transaction cost theory were the predominant theories applied. We identified 48 organizational factors that comprise the landscape of physician-system integration. Our findings cumulated in a conceptual model that may help health care executives, policymakers, and researchers more effectively address the complexities of integration.

Key Words: Physician-system integration, Scoping review, Conceptual model

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^[1] and an overabundance of definitions for success.^[2] This article summarizes the findings of a scoping review of the organizational factors affecting the integration of physician groups with hospitals and health systems, herein referred to as “physician-system integration.”

Physician groups, hospitals, and health systems have historically viewed integration as a mutually beneficial relationship. Integration was seen as a means of gaining economic and

operational efficiency, lowering transaction costs,^[3] increasing bargaining power against payers,^[4] improving quality, increasing access, and streamlining care coordination.^[3,5] However, the evidence on the value of integration is mixed. Physician-system integration has been shown to increase physician accountability and satisfaction,^[6] while having a positive or null effect on the financial status of a health system.^[7–10] Other studies, however, have linked integration to no changes in clinical outcomes^[11] and quality,^[12] as well as financial loss.^[11,13–15]

The trend toward integration continues upward regardless of mixed findings, re-fueled by the prospect of risk-based payment approaches^[16,17] and the race to create accountable

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care organizations (ACOs), both of which rely on collaboration between physicians and hospitals. 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.^[12] In 2013, two-thirds of physicians reported that they expected integration to continue to increase.^[18]

1.1 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^[2, 17, 19, 20] 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 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 model that summarizes the past empirical research.

2. METHODS

2.1 Conceptual model

The complexity of management practice often requires explanations that are equally as complex.^[21] The landscape of physician-system integration is no exception. We thus drew upon three organizational theories and frameworks – vertical integration theory, open systems theory, and Porter’s Value Chain – to approach the scoping review and development of the conceptual model.

2.1.1 Vertical integration theory

We employed vertical integration theory, which posits that the key players in integration arrangements are hospitals, physicians, and payers, along with the ways in which they are structurally and/or financially organized (i.e., via an accountable care organization [ACO] and/or health system).^[22] The entities in our model correspond roughly with the key players.

2.1.2 Open systems theory

Next, we considered the external environment by employing open systems theory.^[23] 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. 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.^[3, 22, 24]

2.1.3 Value chain

To operationalize the internal environment, we employed the Value Chain^[25, 26] 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).

Using the three theories and frameworks, we created a primary coding schema 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).

2.2 Qualitative approach

For our scoping review,^[27] we started with the article retention protocol shown in Figure 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.^[28] 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);
- (3) Discusses at least one type of physician integrating structure (i.e., see Appendix A 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^[29] and investigator triangulation, in which two skilled researchers with different disciplinary perspectives examined the same data,^[30] 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.^[31]

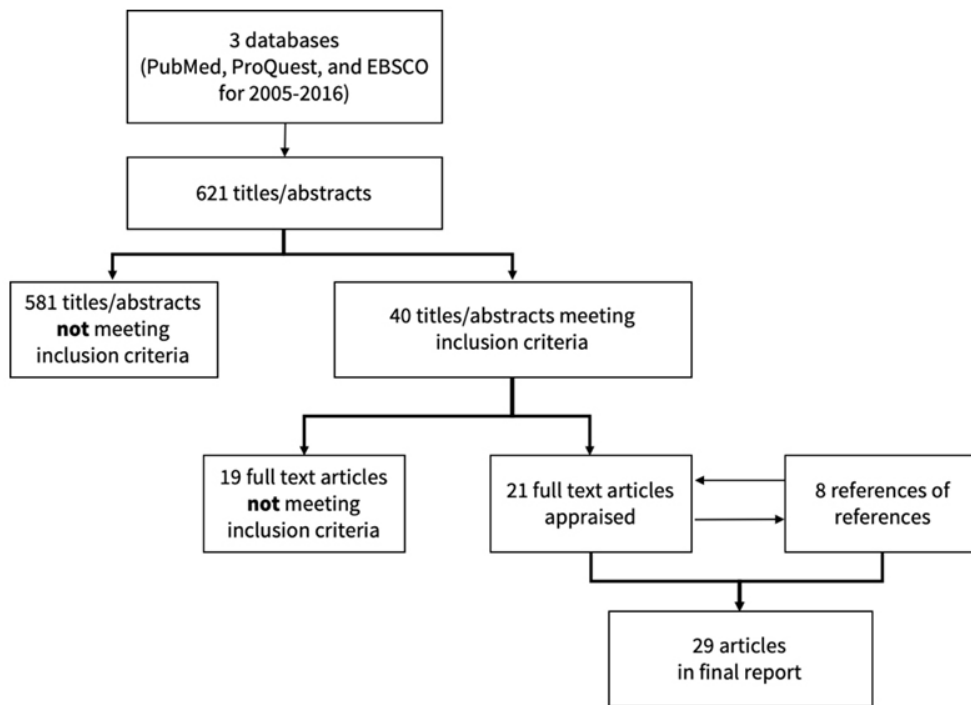


Figure 1. Article retention protocol

2.3 Quantitative approach

Health system success can be defined in many different ways.^[2] Using health system success data from the scoping review, we performed a cluster analysis, an exploratory technique for dividing a multivariate dataset into natural clusters, in order to group the success factors into more meaningful 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 B).

We then conducted a hierarchical cluster analysis to classify

the health system success factors into meaningful clusters.^[32] 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. This type of analysis had been used in other health care studies to form exploratory groups based on organizational dimensions.^[33-35] Quantitative analysis was done using Stata 13.^[36]

3. RESULTS

Appendix C provides a summary of the 29 identified articles' study setting, study period, organizational theories, and organizational factors.

3.1 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^[60,61] and bargaining-market power theory.^[62] 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.^[62] 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.

3.2 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 D gives a breakdown of the number of articles that cited each factor and the average number of factors per article.

3.2.1 Environment

We identified six environmental factors that impacted the entire health system and how each player approached integration: (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.^[17] 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.^[49]

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.^[17,40]

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.^[39] 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 pa-

tients; 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.^[17,39,44] 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.

3.2.2 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 1 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.^[54,58] 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.^[26] Organizational culture was described using the factors: physician culture; mission, vision, and values; and transparency. The reviewed articles sought to find alignment between these factors with their counterparts on the

hospital side.^[46,50] 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,^[17,40,44,49,50] 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.^[26] 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.^[38,43,44]

3.2.3 Hospital

In this study, we were interested in hospitals that are part of health systems. 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 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-available 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.^[13,37,41,47,54,57,58]

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,^[39,43,46,50] which had trickle-down effects on the treatment of patients, treatment of employees, and physician referral patterns.^[46]

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.^[17,39,43] 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 hos-

pital's reach being typically greater than that of a physician group, which they can use to tempt a physician group.

Table 1. 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	<ul style="list-style-type: none"> • Whether call practices differ between physicians and hospitalists • Whether past installation of clinical integration disrupted patient flow
Practice Type	Organizational designation of hospital	<ul style="list-style-type: none"> • Ownership of practice • 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 and fully integrated organizations)
Integrating Structures	Contractual mechanism through which a physician group is aligned with a hospital or health system	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 the direction and strategy of the physician group	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Alignment of interests • Alignment of goals • Alignment of priorities
Transparency	Sharing of information within the group	<ul style="list-style-type: none"> • Quality • Financial performance • Satisfaction • Level of anonymity of data
Strategic Resources		
Compensation & Incentives	Financial drivers of the physician group	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Leverage with payers • Service line branding • Quality improvement
Tangible Resources	Tangible assets used or owned by the physician group	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Presence of an EHR system • Stage of EHR implementation • Cost of EHR implementation

Table 2. 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 the direction and strategy of the hospital	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Financial performance • Cost of care
Strategic Resources		
Patient and Payer Mix	Make-up of patients who have received care from the hospital	<ul style="list-style-type: none"> • Percentage of Medicaid and Medicare discharges
Strategies	Intangible resources that guide the hospital in its decision to integrate a physician group	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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)

3.2.4 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.^[63] 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.^[54]

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^[19,45] and access to care maps.^[50] 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.^[42] 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".^[44]

3.2.5 Health system success

Health system success was measured using thirteen very 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.^[64] The clusters also captured the aspect of physician-system integration where it is a business transaction. A MANOVA test indicated that the five clusters were significantly different overall ($p < .001$). Appendix E provides detailed results of the ANOVA test for significant differences along the factors. In Table 3, 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 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 (Spending). 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^[15]) and indirect measures (i.e., rates of payer discounts^[15,20,44]). 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 (Revenue). Cluster 3 also focused on reducing per capita cost, but contrary to Cluster 3, the factors of Cluster 4 dealt more with revenue 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 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.^[65,66] 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.

Table 3. 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	<ul style="list-style-type: none"> • Shared beliefs • Shared planning • Shared attitudes • Shared assumptions • Shared norms • Shared values
Efficiency	Ability to minimize operational transaction costs	<ul style="list-style-type: none"> • On-time OR starts • Standardized medical devices • Avoidance of wasting supplies
Patient Experience	Patient interaction with the health system	<ul style="list-style-type: none"> • Patient satisfaction • Patient compliance with referring physicians • Care coordination • Patient centeredness
Physician Engagement	Physician interaction with the health system	<ul style="list-style-type: none"> • 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 (Spending)		
Financial Performance	Revenue generated by the health system	<ul style="list-style-type: none"> • 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 (Revenue)		
Health Services Utilization	Patient use of the health system to attain care	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Marketing fees • Administrative fees • Technology fees • Medical claims (per enrollee, per hospital admission, per day)
IT Utilization	Availability of specialized IT applications	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Emergency on-call coverage
Market Share & Growth	Health system’s stake in its market	<ul style="list-style-type: none"> • Number of admissions • Number of diagnostic testing • Number of outpatient services • Internal referral rates
Reputation	Perception of the health system in the community	<ul style="list-style-type: none"> • Level of integration • Level of charity
Total Cost of Integration	Monetary and non-monetary expenses associated with undergoing integration	<ul style="list-style-type: none"> • Cooperation • Coordination • Monitoring

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^[45] and externally,^[39] 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.^[39] The factors in this cluster tended to be associated with the organizational structure and pre-service components of the Value Chain.

3.2.6 Landscape of physician-system integration model

We present the resulting conceptual model – the landscape of physician-system integration (LOPSI) model (see Figure 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.

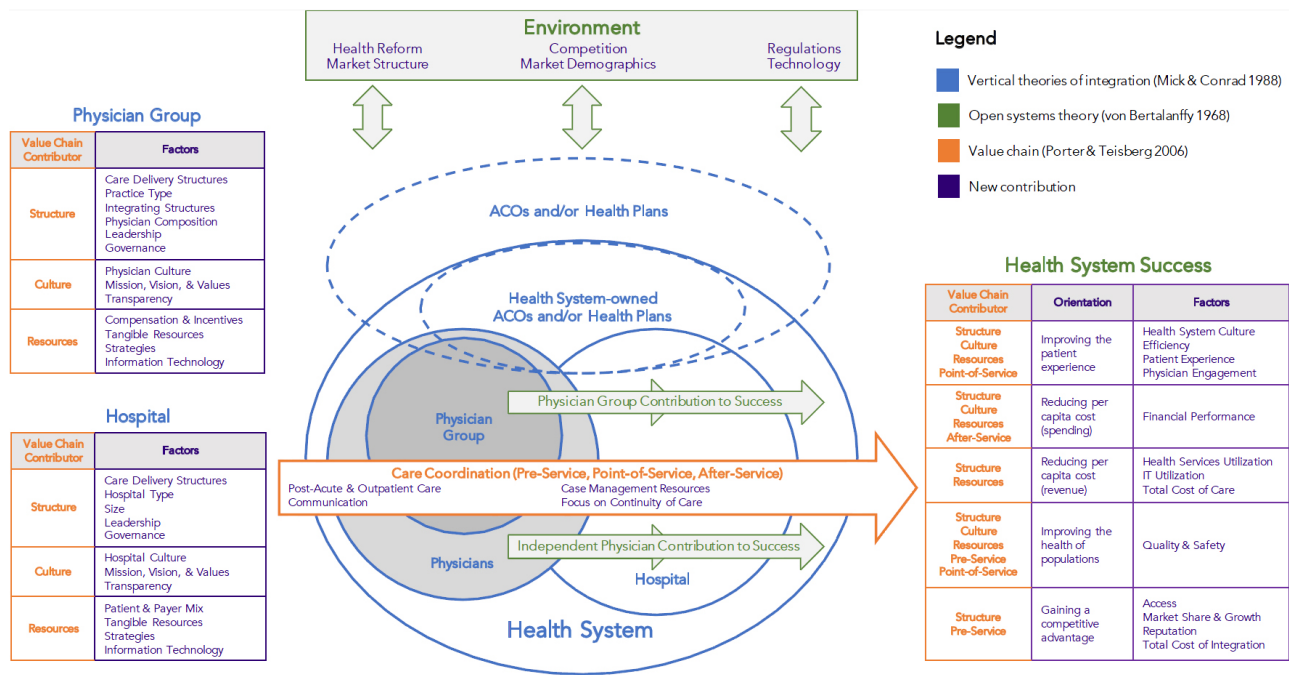


Figure 2. Conceptual model of the landscape of physician-system integration (LOPSI), based on a scoping review and cluster analysis of empirical research studies, 2005-2016. Dotted lines denote that accountable care organizations (ACOs) and health plans can be owned by and/or independent of the health system.

4. DISCUSSION

This scoping review confirmed earlier beliefs that physician-system integration is complex due to its multiple internal and external layers.^[2, 19, 67, 68] 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. The prominent use of

bargaining-market power theory aligned with our application of open systems theory to define the external environment of our conceptual model. Likewise, elements of transaction cost theory aligned with our application of the Value Chain to define the internal environment. In two reviewed articles,^[13, 37] 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 thus consistent with the past literature, however broader. The second potential deficit in the past evidence base is that

process measures (i.e., care coordination mechanisms) were 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 scoping 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.^[69] 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.^[70] Third, cluster analysis, while frequently used in management research since the 1970s, has known problems that stem from the analysis' reliance on researcher judgment.^[71] To maximize value from this technique, we ensured the validity of our clusters by triangulating findings with theory. Triangulation helps apply the strengths of one method to complement the strengths of another, neutralizing some of the latter's weaknesses.^[30] Fourth, in developing our conceptual model, we recognized that this topic requires practice-validation; when have hence tested the model with practitioners in concurrent work (Author, 2019; redacted for peer-review).

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CONFLICTS OF INTEREST DISCLOSURE

The authors declare they have no conflicts of interest.

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