

Effects of Integrated Delivery System on Cost and Quality

Wenke Hwang, PhD; Jongwha Chang, PhD; Michelle LaClair, MPH;
and Harold Paz, MD, MS

The US healthcare system has long been characterized as complex, fragmented, costly, and with significant variation in quality of care. During the health reform debate, many health policy experts have called for the country to reorganize healthcare providers and delivery systems through organizational or virtual integration. The concept of integrated healthcare delivery systems (IDSs) has gained considerable interest. Such systems have been viewed as a better approach to addressing the issues of quality and cost. Indeed, some IDSs are frequently portrayed not just in academic and medical circles but in the popular media as examples of the best, most effective healthcare in this country. However, the evidence used to support such assertions may not have been systematically evaluated. Now that healthcare reform has been enacted and accountable care organizations (ACOs), which have many organizational features similar to those of IDSs, are rapidly being developed and implemented, what do we know about how this approach to organizing healthcare impacts the key factors of quality and cost of care? Do IDSs truly do a better job of providing high-quality care while holding down costs? A comprehensive review of the existing literature that assesses the relationship between IDSs and cost/quality is critically needed.

INTEGRATED DELIVERY SYSTEM

Much of the recent innovation in US health policy has been based upon a fundamental belief that a higher level of integration will yield a more efficient healthcare delivery system. An IDS presumably provides higher quality and more patient-centric care at lower costs. However, there is no clear definition of what constitutes an IDS. Recently reorganized healthcare delivery systems (eg, ACOs) come in all sizes and shapes, and span a wide spectrum of types and levels of integration. Inconsistency in concept and vague definitions can pose significant challenges as policy makers strive to design policy tools to steer the current healthcare away from uncoordinated and fragmented health systems.

Integrated healthcare is complex and has been categorized conceptually in 2 ways: (1) an organized structure that is managed by a financial entity (eg, a financial group that manages different facilities within a healthcare system) or (2) an organized healthcare delivery system that coordinates care and has

Objectives: To perform a systematic review of the current literature to assess the association between integrated healthcare delivery systems and changes in cost and quality.

Methods: Medline, Embase, Cochrane Reviews, Academic Search Premier, and reference lists were used to retrieve peer-reviewed articles reporting outcomes (cost and quality) related to integrated delivery systems. A general Internet search and reference lists were used to retrieve non-peer reviewed publications meeting the same criteria. Included peer and non-peer reviewed publications were based in the United States and were published between the years 2000 and 2011.

Results: A total of 21 peer-reviewed articles and 4 non-peer reviewed manuscripts met the inclusion criteria. Twenty studies showed an association between increased integration in healthcare delivery and an increase in the quality of care. One study reported no changes in quality indicators associated with increased integration. None of these studies measured cost reduction directly, but used reduction in utilization of services instead. Four studies associated decreases in the utilization of services with increases in integration.

Conclusions: The vast majority of studies we reviewed have shown that integrated delivery systems have positive effects on quality of care. Few studies linked use of an integrated delivery system to lower health service utilization. Only 1 study reported some small cost savings.

Am J Manag Care. 2013;19(5):e175-e184

In this article
Take-Away Points / e176
Published as a Web exclusive
www.ajmc.com

**For author information and disclosures,
see end of text.**

Take-Away Points

Recent discussion of health reform has placed much emphasis on integrating healthcare delivery systems. Do integrated healthcare systems truly do a better job of providing high-quality care while holding down costs? Very few studies have provided empirical evidence.

- We conducted a systematic literature review (2000-present) including peer-reviewed and non-peer reviewed studies, and analyzed 25 eligible studies that examined integrated delivery systems on the topics of cost and quality.
- The majority of these studies reported positive correlation between health system integration and quality of care.
- The evidence on reducing cost of care, however, is rather weak.

synchronized functioning.¹ An IDS may encompass providers belonging to multiple facilities who are responsible for providing quality patient care rather than providers from a single facility like a hospital or general practice.^{2,3}

Integrated healthcare has numerous definitions.⁴ The World Health Organization defines integrated delivery as “the organization and management of health services so that people get the care they need, when they need it, in ways that are user-friendly, achieve the desired results and provide value for money.”^{5(p1)} While this definition is focused on the patient experience of integrated delivery, other definitions focus on the responsibility of the system. One such definition states that organized delivery systems consist of “a network of organizations that provides or arranges to provide a coordinated continuum of services to a defined population and is willing to be held clinically and fiscally accountable for the outcomes and health status of the population served.”^{6(p7)} Finally, other definitions focus on the specific services and features that describe an IDS as “one or more hospitals along with physicians, diagnostic centers, and other components of the supply side of the supply chain strive to share information, minimize duplication, and make treatment decisions based upon the institutional best practices.”^{7(p66)}

The preceding concepts and definitions illustrate the complexity and variation involved when discussing IDSs. However, they also help to determine the commonalities present. All of these concepts and definitions include increased communication and information sharing across the care continuum. There is also a common understanding that integrated care should coordinate patient care in a way that improves the patient experience and the quality of the care received.

Jonas and Kovner's Health Care Delivery in the United States includes the various forms of IDSs under the umbrella of organized healthcare delivery. This book defines organized healthcare delivery as a situation where “Care providers have established relationships and mechanisms for communicating and working to coordinate patient care across health conditions, services, and care settings over time.”^{8(p206)} This definition is broad enough to capture many different system structures, while still including the essential functions that

an IDS must possess. Hence, for this systematic review, we include broader definitions of IDS that focus on care coordination and system integration.

METHODS

Literature Search Strategy and Inclusion Criteria

This systematic literature review provides a comprehensive look at the current peer-reviewed literature on IDSs. It also includes a review of other non-peer reviewed publications on the subject, including white papers and reports from nonprofit and industry organizations. Although these documents have not been independently evaluated through peer-review processes, we believe that these sources can provide valuable insights. Due to the fact that these documents are not required to go through a lengthy review process required for publication in a peer-reviewed journal, they are often the first to report on emerging topics and issues.

For peer-reviewed articles, a systematic literature search was performed in 2012 using Medline, Embase, Cochrane Reviews, and Academic Search Premier, as well as the follow-up references in retrieved articles for outcomes (cost and quality) of IDSs from 2000 to 2011. Search terms included *integrated delivery system*, *integrated care*, *integrated service network*, *continuity of care*, *chains of care*, *care coordination*, *coordinated care*, *provider system integration*, and *vertical integration*.

While the literature search for non-peer reviewed articles was not as systematic as that for the peer-reviewed literature, it was conducted through a similar process. A general Internet search engine was used to find white papers, case studies, and reports from various organizations. Several peer-reviewed publications cited such documents as well, leading to several more studies for consideration. The content of these documents was then assessed to determine the applicability of each paper to this review.

Articles were included if they evaluated outcomes (cost and quality) of IDSs. We excluded theory-based articles, articles not specific to the US health system, and articles published before 2000.

RESULTS

Numerous publications on IDSs were available. However, the majority of this material focused on the key elements required to successfully adapt current health systems to IDSs.⁹⁻¹¹ In this review we were interested in articles and papers pertaining to the cost of care associated with IDSs and the quality of

care they provide. Previous literature reviews have addressed the issue of how to define and measure integrated healthcare delivery^{12,13} but did not link integration with outcomes.

After the initial literature search, we identified 168 peer-reviewed articles. We excluded 78 based on title and abstract review. A total of 90 full-text articles were assessed for eligibility, 69 of which were not eligible, for a final sample of 21 articles. All 21 articles evaluated some measures of quality of care and correlated these measures with health system integration; 6 of these articles also assessed the impacts on cost of care.

The initial search of the non-peer reviewed literature generated 27 white papers, reports, and case studies for consideration. Of these studies, 13 were excluded based on abstract review. The remaining 14 studies were read in their entirety to assess their eligibility for this review. Those that did not pertain to information on cost or quality outcomes were excluded. This resulted in a final sample of 4 non-peer reviewed publications (Figure).

To synthesize our literature review findings, we abstracted study settings and key findings from all selected papers into 3 domains: health system focus, outcome measures, and conclusion.

Peer-Reviewed Publications

Quality. Enhancing care continuity and coordination are 2 important components of IDSs. With more stringent guideline- or protocol-based care, integrated healthcare systems seemed to provide better quality of care in our systematic review. Out of 21 studies, 19 showed improvement in quality of care with respect to clinical effectiveness,¹⁴⁻²² lengths of stay,^{23,24} medication errors,^{21,25,26} and number of office visits.²⁷⁻³² Compared with non-IDSs, several studies have found more favorable outcomes for patients treated in IDSs for chronic diseases such as diabetes, hypertension, depression, congestive heart failure, and asthma.³³ There is evidence of some improvement in the care delivery process as a result of IDSs, which when quantified ranged from 10 to 25 percentage points.³⁰ For example, 4 studies found that IDSs improved patient medication adherence and decreased medication error rates.^{15,25,26,34}

Focusing on outpatient primary care, 1 study evaluated the association between organizational structure of physician groups and healthcare quality to determine whether IDSs provided higher-quality care.¹⁵ These researchers found that integrated medical groups performed better on 4 Healthcare Effectiveness Data and Information Set (HEDIS) measures related to preventive health screenings; although on 2 measures related to management of chronic disease, there was no statistically significant improvement.

One study found that there was a correlation between integration and the presence of practice systems for chronic care management.³³ Functional integration was much more significant than merely structural or financial integration as a determinant of chronic care systems. Similarly, another study found that large physician groups and those owned by a hospital or health plan were more likely than smaller groups to use evidence-based care management processes.¹⁶

Four studies looked at the impact of electronic medical record/health information technology in IDSs and found that introducing health information technology creates operational efficiencies and patient-centered care^{25,29,30,32} (Table 1¹⁴⁻³³).

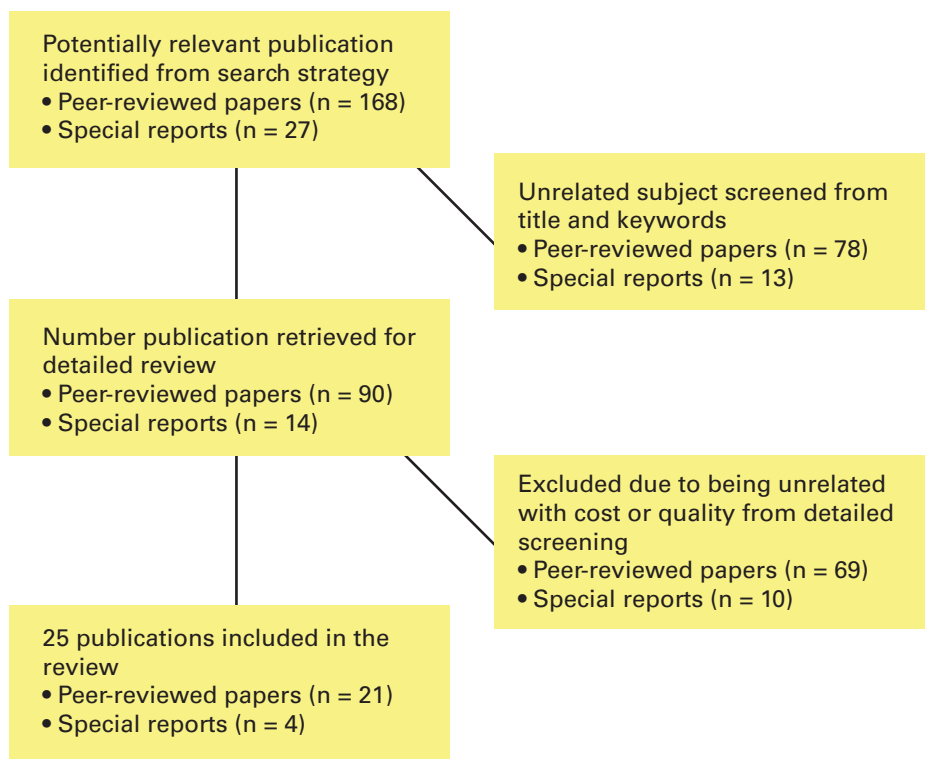
Cost. Few studies examined the impact of IDSs on cost of care. Only 5 peer-reviewed papers in our systematic review looked at healthcare cost.^{18,23,24,26,29} Of those, most studies provided evidence about the differences in utilization of services for patients treated in IDSs versus non-IDSs. In other words, the level of service utilization per patient was used as a proxy measure for cost of care. Using this measure, 4 out of 5 papers reported that IDSs were associated with lower cost of care. Two studies found that clinical service integration in various forms of ACOs and large multispecialty group practices would lower cost of care.^{18,29} One study examined the medication treatment management program within an IDS and concluded that the program generated cost savings related to medication use.²⁶ One study discussed the cost related to the level of service integration within the hospital for patients with heart failure, but found no significant relationship between integration of services and economic outcomes.²³

Non-Peer Reviewed Publications

The studies selected for this review consist of 2 monographs^{35,36} and 2 white papers^{37,38} on the topic of IDSs.

Quality. Of the 4 selected non-peer reviewed publications, 3 reported that improvements in quality of care were associated with health systems' clinical service integration. All 3 reports showed improvement in HEDIS measures.³⁵⁻³⁷ Among the 17 different health systems these reports examined, IDSs were associated with a lower hospital admission rate per patient, a shorter length of stay per hospital admission, and an overall lower rate of adverse health outcomes. With IDSs, there also were increases in the use of evidence-based practices by physicians in various fields.³⁵ Many IDSs also saw improvements in preventive care (eg, increased vaccination rates).³⁵⁻³⁷ Although these studies appear to indicate a positive correlation between integration and quality of care, 1 report found that expected quality improvements were not present. They also found that patients participating in multi-

■ **Figure.** Consort Diagram of Search Strategy



year wellness and prevention programs in 1 IDS showed little to no health improvement³⁸ (Table 2³⁵⁻³⁸).

Cost. Of the 4 non-peer reviewed publications selected for this systematic review, 3 examined cost of care. All 3 publications reported that cost savings were seen in health systems that had various features of clinical integration. Of these 3 reports, 2 found that there were substantial improvements in quality-of-care measures that the researchers assumed led to indirect cost savings for the system. These reports also noted that substantial cost savings were associated with electronic prescribing implementation due to a tandem generic medication prescription initiative within the IDS involved.^{35,37} While these reports indicate positive results, 1 report using data from several IDSs across the country found that, among the systems observed, there was very little cost difference, and that when cost differences were observed they were much smaller than what was expected.³⁸

DISCUSSION

A variety of emerging concepts describe IDSs. Most of the studies are theory based, yet the tenets of the theories have not been tested empirically to evaluate the relationship between the level of integration and either cost or quality

outcomes. Earlier work by Shortell and colleagues¹⁷ suggests that it is not size or structure per se, but rather an organizational commitment to, and culture of, continuous quality improvement that is most closely linked to better performance as measured by clinical quality, patient satisfaction, organizational learning, and financial performance. However, relatively few medical groups were high performers in all performance categories. In many cases, a medical group's performance varied considerably within the domain of clinical quality; for example, a medical group that performed well in chronic disease management might be average or below in health promotion. Furthermore, the same study by Shortell and colleagues showed no correlation between high performance on quality measures and financial performance, calling into question the assumption that IDSs are inherently better at both improving quality and controlling costs. The researchers did find some positive correlation between high performance on quality measures and certain indicators of integration (eg, larger practice size, affiliation of the medical group with a hospital, health system, or health plan), yet affiliated practices were actually less likely to be high performers on financial measures.

The result of our systematic review provides partial evidence to support the conclusion that IDSs have better quality

Effects of Integrated Delivery System

Table 1. Summary of Peer-Reviewed Articles

Objectives/Health System Focus	Outcomes	Conclusion
<p>To assess the relationship between practice characteristics and healthcare quality¹⁴</p> <p>General internists, most working in small primary care office settings</p>	<p>Physician Practice Connections Readiness Survey score</p>	<p>Physician practice with integration:</p> <ul style="list-style-type: none"> Limited positive associations with measures of healthcare quality^a
<p>To examine whether IMGs provide higher-quality primary care than IPAs among PacifiCare providers¹⁵</p> <p>Physician group</p>	<p>Mammography; pap smear screening; chlamydia screening; diabetic eye exam; asthma controller medication; β-blocker after AMI</p>	<p>IMGs:</p> <ul style="list-style-type: none"> Performed better than IPAs in all preventive screening measures^a This difference was not explained by presence of EMR Indicative of differing practice characteristics influencing better quality of care^a No difference was seen between IMGs and IPAs in the use of asthma control medication or β-blockers after AMI^b
<p>To examine the use of integrated CMPs by POs and to identify factors influencing their use¹⁶</p> <p>POs</p>	<p>The use of CMPs for diabetes, asthma, CHF, and depression</p>	<p>POs:</p> <ul style="list-style-type: none"> Of the POs studied, each adopted only around 50% of recommended CMPs Most commonly used CMPs included disease registries, specially trained patient educators, and performance feedback to physicians POs that were owned by a hospital or HMO had higher CMP use Organizations that were externally evaluated on quality measures used more CMPs than those that were not externally evaluated^a
<p>To assess the performance of medical groups and provide a framework for differentiating between high-performing and low-performing medical groups¹⁷</p> <p>Medical groups</p>	<p>Performance scorecard measures in clinical quality performance, organizational learning, and financial performance</p>	<p>IMGs:</p> <ul style="list-style-type: none"> Only a small percentage of groups were consistently categorized as high performers in multiple performance categories^a A quality-centered culture and outside reporting requirement were the strongest and most consistent indicators of higher performance^a
<p>To examine the costs and quality of care provided to Medicare beneficiaries across the United States by physicians who did and did not work in large multispecialty group practices¹⁸</p> <p>Physician group</p>	<p>Mammography; A1C testing; lipid testing; funduscopy; ambulatory care-sensitive admission rate; cost measures</p>	<p>Large multispecialty groups:</p> <ul style="list-style-type: none"> Physicians provided higher quality care^a Patients had lower healthcare costs^a Measures used to assess quality of care varied by geographic location^a
<p>To assess the quality of care Medicare diabetes patients received in a fee-for-service primary group practice within an IDS in Dallas/Fort Worth, Texas¹⁹</p> <p>Physician group</p>	<p>A1C levels/testing; lipid levels/screening; blood pressure; foot exam; dilated eye exam; nephropathy screening</p>	<p>IDS in Dallas/Fort Worth:</p> <ul style="list-style-type: none"> A1C levels/testing, lipid levels, blood pressure, and dilated eye exam measures were higher than national averages^a Lipid screening, nephropathy screening, and annual foot exam measures were not significantly different compared with national averages^b
<p>To evaluate the effects of service integration and differentiation on outcomes in heart failure rates across Maryland hospital systems and networks²³</p> <p>Hospital systems and networks</p>	<p>Readmission; mortality; length of stay; cost</p>	<p>The level of service integration/differentiation between hospital system and network:</p> <ul style="list-style-type: none"> Not a significant predictor of patient outcomes^b

(Continued)

■ **Table 1. Summary of Peer-Reviewed Articles (Continued)**

Objectives/Health System Focus	Outcomes	Conclusion
<p>To describe key historical and operational elements of change that may assist an organization to develop quality indicators for implementing a strategic plan to improve care, align healthcare improvement efforts with national directions, and examine the types of medication indicators used to assess these changes²⁷</p> <p>Baylor Healthcare System, an integrated healthcare delivery organization</p>	<p>Specific process of care (measures of healthcare underuse, overuse, and misuse)</p>	<p>Integrated Baylor Healthcare System:</p> <ul style="list-style-type: none"> • Improved medication use behaviors^c • Decreased adverse drug events^c • Identified that organizational, compensatory, and cultural commitments may be important for successful implementation of clinical-indicator initiatives • Established the baseline performance • Assessed the effectiveness of proposed quality improvements • Provided quantitative and qualitative means to identify best practices • Disseminated best-care practices
<p>To assess the adequacy of depression care in the VHA using guideline-based process measures derived from administrative and centralized pharmacy records, and to identify patient and provider characteristics associated with adequate depression care³⁴</p> <p>VHA system</p>	<p>Antidepressant dosage and duration adequacy</p>	<p>VHA:</p> <ul style="list-style-type: none"> • 90% of patients received more adequate medication dosage^a • 45% of patients received more adequate duration of antidepressant therapy^a • For certain patient populations, there was sometimes a higher risk of inadequate depression care • Needed more work to align current practice with best-practice guidelines to monitor depression care quality
<p>Implementation of integrated clinical information technology was studied, and its effect on medication errors throughout the medication-use process in a healthcare system was evaluated²⁵</p> <p>Medication safety in a multihospital setting</p>	<p>Medication errors throughout the medication-use process (patient safety)</p>	<p>Integrated clinical information system:</p> <ul style="list-style-type: none"> • Decreased selected types of medication errors^a • Improved therapeutic drug monitoring in patients with renal insufficiency^a
<p>To examine the usefulness of the pediatric and perinatal autopsy in a vertically oriented healthcare system based at a major children's tertiary care hospital²²</p> <p>Hospital was part of a large HMO serving the surrounding urban and rural areas</p>	<p>Percentage of cases with a major or minor diagnostic discrepancy or unexpected pathologic finding using the autopsy as the criterion standard</p>	<p>The IDS hospital with HMO contract:</p> <ul style="list-style-type: none"> • Confirmed the value of the pediatric autopsy in a children's hospital and a vertically integrated healthcare system • Provided important medical and quality assurance procedure to patient outcomes • Assessed the accuracy of diagnoses • Provided feedback regarding therapeutic outcomes • No therapeutic outcomes were reported
<p>To examine compliance with American College of Obstetricians and Gynecologists recommendation that elective deliveries not be performed before 39 weeks of gestation, to minimize prematurity-related neonatal complications²⁴</p> <p>IDS in Utah</p>	<p>The prevalence of elective deliveries; length of stay</p>	<p>Obstetrics and gynecology IDS in Utah:</p> <ul style="list-style-type: none"> • Reduced the incidence of elective deliveries before 39 weeks of gestation^a • Reduced the length of stay in labor and delivery^a
<p>To compare outcomes between lower-extremity amputees who receive and do not receive acute postoperative inpatient rehabilitation within a large integrated VA healthcare delivery system²⁸</p> <p>9 VA Medical Centers</p>	<p>Acute postoperative inpatient rehabilitation; home discharge; prosthetic limb procurement</p>	<p>Integrated VA medical center:</p> <ul style="list-style-type: none"> • Provided a greater likelihood of 1-year survival and home discharge^a

(Continued)

Effects of Integrated Delivery System

Table 1. Summary of Peer-Reviewed Articles (Continued)

Objectives/Health System Focus	Outcomes	Conclusion
<p>To present the clinical, economic, and humanistic outcomes of 10 years of delivering MTM services to patients in a healthcare delivery system²⁶</p> <p>In an integrated healthcare system</p>	<p>Cost saving; patient satisfaction from MTM service</p>	<p>MTM services within a large integrated healthcare system:</p> <ul style="list-style-type: none"> • Associated with improved clinical outcomes and cost savings^c • Provided the level of services with high patient satisfaction^c
<p>To examine whether larger physician group size and affiliation with networks of multiple groups were associated with higher quality of care²⁰</p> <p>Delivery of primary care services in Massachusetts</p>	<p>Performance scores (HEDIS measures)</p>	<p>Physician group affiliation with network of multiple groups:</p> <ul style="list-style-type: none"> • Associated with higher quality of care for diabetes care than smaller physician groups^a
<p>To evaluate the effect of implementing comprehensive, integrated EHR systems on use and quality of ambulatory care²⁹</p>	<p>Total number of office visits; use of primary care, specialty care, clinical laboratory, radiology services, and telephone contact</p>	<p>Hospital with integrated EHR:</p> <ul style="list-style-type: none"> • Reduced use of ambulatory care while maintaining quality^a • Allowed doctors to replace some office visits with telephone contacts • Shift in patterns of use suggest a reduction in inappropriate or marginally productive ambulatory-care visits^a
<p>To examine the impact of implementing an integrated EHR system on ambulatory-care use³⁰</p>	<p>Adjusted total office visit rate; adjusted primary care office visit rate; adjusted specialty care office visit rate; scheduled telephone visits; secure e-mail messaging</p>	<p>Hospital with comprehensive EHR:</p> <ul style="list-style-type: none"> • Created operational efficiencies by offering non-traditional, patient-centered ways of providing care • Increased the number of scheduled telephone visits and secure e-mail messaging^c • Decreased the number of office visits^c
<p>To determine the extent to which POs with 20 or more physicians used CMPs and to identify key factors associated with CMP use for 4 chronic diseases³¹</p> <p>1040 POs</p>	<p>POs' mean use of CMPs</p>	<p>The use of CMPs from 1040 POs:</p> <ul style="list-style-type: none"> • Provided external incentives to POs for improvement of healthcare quality^a • Assisted POs in improving their clinical information technology capability^a • No specific clinical outcomes were reported
<p>To assess the implementation of an EHR system on ambulatory-care use and its evolution from basic HIT at its implementation in 2004 to advanced HIT in 2006³²</p> <p>An integrated delivery system</p>	<p>Office visits whether diagnoses available on same day</p>	<p>Hospital with comprehensive EHR:</p> <ul style="list-style-type: none"> • Associated with dramatic increases in the timely availability of diagnostic information^c • Provided real-time population surveillance, and valuable for routine clinical care
<p>To assess an electronic registry derived from a fully integrated EHR as the cornerstone of an intervention to improve compliance with recommended diabetes performance measures in an integrated practice network²¹</p> <p>Geisinger Health System's network of 38 practice sites providing care to more than 20,000 persons with diabetes located in a 40-county region of central and northeastern Pennsylvania</p>	<p>Glucose control (A1C) and blood pressure control</p>	<p>Hospital with comprehensive EHR:</p> <ul style="list-style-type: none"> • Improved the diabetes care in response to a multifaceted intervention^c • Needed more work to demonstrate the improvements of patient health outcomes

(Continued)

■ **Table 1.** Summary of Peer-Reviewed Articles (*Continued*)

Objectives/Health System Focus	Outcomes	Conclusion
To test the relationship between presence of recommended chronic care model systems and the degree of integration among large medical groups ³³	Medical group's structural, financial, and functional aspects of integrated care, as well as the presence and use of practice systems	Self-reported survey: <ul style="list-style-type: none"> • Large medical groups with integration were positively associated with the presence of practice system components of the chronic care model^a • No specific clinical measures were offered
Cross-sectional survey in 2007 completed by medical directors of medical groups nationally with at least 100 physicians and a range of medical services, who had also participated in the NSPO		
<p>A1C indicates glycosylated hemoglobin; AMI, acute myocardial infarction; CHF, congestive heart failure; CMP, care management process; EHR, electronic health record; HEDIS, Healthcare Effectiveness Data and Information Set; HIT, health information technology; HMO, health maintenance organization; IDS, integrated healthcare delivery system; IMG, integrated medical group; IPA, individual practice association; MTM, medication therapy management; NSPO, National Survey of Physician Organizations; PO, physician organization; VA, Veterans Affairs; VHA, Veterans Health Administration.</p> <p>^aStatistically significant. ^bNot statistically significant. ^cStatistical significance not reported.</p>		

outcomes. The evidence on cost of care, however, is rather weak. No study in our review was able to directly measure the cost savings as a result of integration of a health system. Most studies reported a decrease in healthcare utilization as a result of health system integration but did not assess whether the decrease of service utilization was appropriate. While many of the IDSs involved in these studies had improvements in quality of care with lower service utilization, it is important to note these studies' limitations. First, many of these reports did not include any indication that statistical tests were performed on the data. While the general data trends may have been positive in the areas of cost and quality, significance cannot be assumed. Also, most of the IDSs included in these studies were implementing multiple programs within and outside of their clinical integration initiatives. It is important to note that healthcare systems may operate under different mixes of reimbursement models (eg, managed care contracts). It was not possible for us to take this factor into consideration, as most of the studies included did not report on reimbursement models.

It is also difficult to distinguish the effect of integration per se from the effects of characteristics (eg, larger patient volume, greater use of electronic medical records, systematic quality improvement initiatives) that tend to be associated more frequently with integrated systems. Therefore, larger sample sizes that include various types of IDSs and more consistent outcome measures are needed to gauge the effects of IDSs on the cost and quality of care.

CONCLUSIONS

ACOs and their features involving integrated delivery of healthcare are currently at the forefront of healthcare policy.

The hope for the ACO is that it will reduce healthcare costs and improve the quality of care. However, there are no data to support these assumptions, as these systems have only recently been created. Integrated healthcare delivery systems share with ACOs many of the same organizational features, foremost among them being high levels of organizational and clinical service integration. For this reason, the performance of existing IDSs with respect to quality and cost of care are being assessed to predict how well ACOs will perform in the future US healthcare system.⁹

The vast majority of studies we reviewed showed that IDSs have positive effects on quality of care. A few studies we reviewed also linked IDSs to lower health service utilization. However, each study had a different way of describing and defining IDSs. In order to compare IDSs with respect to their effectiveness in controlling costs and improving quality of care, consistent definitions should be used and components of integration need to be well defined. Due to limited information provided in the literature, we were unable to identify specific features in each health system. Nor were we able to meaningfully group the health systems based on their commonalities into various types of IDSs. As a result, it was difficult to draw definitive conclusions. Moreover, to accurately capture the performance of a health system, established methods that consistently measure cost and quality of care across health systems are needed.

Our study has other limitations. The study lacks generalizability due to the heterogeneous nature of the IDS in the studies we reviewed, the unavailability of effect size calculations, and the absence of systematic working definitions for outcomes. There also may be publication bias since there is a higher probability of peer-reviewed journals publishing stud-

■ **Table 2.** Summary of Non–Peer Reviewed Articles

Objectives/Health System Focus	Outcomes	Conclusion ^a
To examine the effects of integration in 15 healthcare systems on various measures of cost and quality of care ³⁵ A range of health systems from whole IDS to physician groups	Disease-specific quality measures; use of preventive care; mortality rates; hospital admissions; e-prescribing/generic prescribing	Results associated with integration: <ul style="list-style-type: none"> • Improved HEDIS measures • Decreased admissions • Decreased length of stay • Increase in the use of preventive and evidence-based care • Cost savings associated with prescription initiatives
To examine the quality innovations implemented by Baylor Healthcare System and any associated changes in patient outcomes ³⁶ Whole IDS	Patient safety; mortality; use of preventive care; disease-specific quality measures; readmissions	Results associated with integration: <ul style="list-style-type: none"> • Decreased mortality rates • Increased delivery of clinical preventive services • Improved certain disease-specific quality measures
To develop an evolutionary process to ACO establishment using Advocate Healthcare as an example, with particular focus on their physician group, Advocate Physician Partners; the effect of integration on Advocate Physician Partners was also examined ³⁷ Whole IDS	Disease-specific quality measures; use of preventive care; use of evidence-based care; e-prescribing/generic prescribing	There were large cost savings and improvements in quality measures for patients in the following programs: <ul style="list-style-type: none"> • Asthma Outcomes Initiative • Generic Prescribing Initiative • Depression screening and treatment for patients with diabetes or heart failure • Diabetic Care Outcomes Initiative • Cardiac Initiative • Vaccination rates much higher than the national average
To examine integrated fixed-fee providers in order to identify critical factors necessary to realistically achieve improvements in cost and quality-of-care measures ³⁸ Whole IDS	Information technology; cost; culture; system structure; level of integration; patient behavior and outcomes	Results associated with integration: <ul style="list-style-type: none"> • There were some cost differences, but they were smaller than expected • Subpopulations participating in multiyear wellness and prevention programs showed little to no health improvement
ACO indicates accountable care organization; HEDIS, Healthcare Effectiveness Data and Information Set; IDS, integrated healthcare delivery system. ^a None of the non–peer reviewed articles reported on the statistical significance of their findings.		

ies with favorable results rather than studies with inconclusive or unexpected results.

As integrated systems become more common, it also is becoming more apparent that despite certain commonalities, these systems vary tremendously in how they operate. The emergence of a growing number of IDSs should allow for more data-driven studies comparing organizational performance on quality, safety, access, and cost metrics, thereby adding more insight into exactly what characteristics of IDSs lead to improvements in each of these areas. The question, perhaps, is not so much whether IDSs are better than other models of delivery, but rather, how to identify specific system features that most effectively improve quality of care while controlling costs.

Author Affiliations: From Department of Public Health Sciences (WH, JC, ML), Department of Medicine and Public Health Sciences (HP), Division of Health Services Research, Penn State University College of Medicine, Hershey, PA.

Funding Source: None.

Author Disclosures: Dr Paz reports board membership with Penn State Hershey Medical Center. The other authors (WH, JC, ML) report no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

Authorship Information: Concept and design (WH, HP); acquisition of data (WH, JC, ML); analysis and interpretation of data (WH, JC, ML, HP); drafting of the manuscript (JC, WH, ML); critical revision of the manuscript for important intellectual content (WH, ML, HP); obtaining funding (WH); administrative, technical, or logistic support (WH, ML); and supervision (WH).

Address correspondence to: Wenke Hwang, PhD, Department of Public Health Sciences, Division of Health Services Research, Penn State University College of Medicine, 600 Centerview Dr, Ste 2200, Hershey, PA 17033. E-mail: WHwang@phs.psu.edu.

REFERENCES

1. Axelsson R, Axelsson SB. Integration and collaboration in public health—a conceptual framework. *Int J Health Plann Manage.* 2006;21(1):75-88.
2. Gulliford M, Naithani S, Morgan M. What is ‘continuity of care’? *J Health Serv Res Policy.* 2006;11(4):248-250.
3. Haggerty JL, Reid RJ, Freeman GK, Starfield BH, Adair CE, McKendry R. Continuity of care: a multidisciplinary review. *BMJ.* 2003;327(7425):1219-1221.

4. Bodenheimer T. Coordinating care—a perilous journey through the health care system. *N Engl J Med*. 2008;358(10):1064-1071.
5. Waddington C, Egger D. *Integrated Health Services—What and Why?* Geneva, Switzerland: World Health Organization; 2008.
6. Shortell SM, Gillies RR, Anderson D, Erickson K. *Remaking Health Care in America: Building Organized Delivery Systems*. Hoboken, NJ: Jossey-Bass; 1996.
7. Margolis J. *The Healthcare Cure: How Sharing Information Can Make the System Work Better*. Amherst, NY: Prometheus Books; 2011.
8. Kovner AR, Knickman JR, Weisfeld VD, eds. *Jonas and Kovner's Health Care Delivery in the United States*. 10th ed. New York: Springer Publishing Company; 2011.
9. Witt M, Jacobs L. *Physician-Hospital Integration in the Era of Health Reform*. California HealthCare Foundation. <http://www.chcf.org/publications/2010/12/physicianhospital-integration>. Published December 2010. Accessed March 18, 2013.
10. Robinson JC, Dolan EL. *Accountable Care Organizations in California: Lessons for the National Debate on Delivery System Reform*. Oakland, CA: Integrated Healthcare Association; 2010.
11. Robinson JC. *Accountable Care Organization for PPO Patients: Challenge and Opportunity in California*. Oakland, CA: Integrated Healthcare Association; 2011.
12. Strandberg-Larsen M, Krasnik A. Measurement of integrated healthcare delivery: a systematic review of methods and future research directions. *Int J Integr Care*. 2009;9:e01.
13. Singer SJ, Burgers J, Friedberg M, Rosenthal MB, Leape L, Schneider E. Defining and measuring integrated patient care: promoting the next frontier in health care delivery. *Med Care Res Rev*. 2011;68(1):112-127.
14. Holmboe ES, Arnold GK, Weng W, Lipner R. Current yardsticks may be inadequate for measuring quality improvements from the medical home. *Health Aff (Millwood)*. 2010;29(5):859-866.
15. Mehrotra A, Epstein AM, Rosenthal MB. Do integrated medical groups provide higher-quality medical care than individual practice associations? *Ann Intern Med*. 2006;145(11):826-833.
16. Rittenhouse DR, Shortell SM, Gillies RR, et al. Improving chronic illness care: findings from a national study of care management processes in large physician practices. *Med Care Res Rev*. 2010;67(3):301-320.
17. Shortell SM, Schmittiel J, Wang MC, et al. An empirical assessment of high-performing medical groups: results from a national study. *Med Care Res Rev*. 2005;62(4):407-434.
18. Weeks WB, Gottlieb DJ, Nyweide DE, et al. Higher health care quality and bigger savings found at large multispecialty medical groups. *Health Aff (Millwood)*. 2010;29(5):991-997.
19. Hollander P, Nicewander D, Couch C, et al. Quality of care of Medicare patients with diabetes in a metropolitan fee-for-service primary care integrated delivery system. *Am J Med Qual*. 2005;20(6):344-352.
20. Friedberg MW, Coltin KL, Pearson SD, et al. Does affiliation of physician groups with one another produce higher quality primary care? *J Gen Intern Med*. 2007;22(10):1385-1392.
21. Weber V, Bloom F, Pierdon S, Wood C. Employing the electronic health record to improve diabetes care: a multifaceted intervention in an integrated delivery system. *J Gen Intern Med*. 2008;23(4):379-382.
22. Newton D, Coffin CM, Clark EB, Lowichik A. How the pediatric autopsy yields valuable information in a vertically integrated health care system. *Arch Pathol Lab Med*. 2004;128(11):1239-1246.
23. Newhouse RP, Mills ME, Johantgen M, Pronovost PJ. Is there a relationship between service integration and differentiation and patient outcomes? *Int J Integr Care*. 2003;3:e15.
24. Oshiro BT, Henry E, Wilson J, Branch DW, Varner MW; Women and Newborn Clinical Integration Program. Decreasing elective deliveries before 39 weeks of gestation in an integrated health care system. *Obstet Gynecol*. 2009;113(4):804-811.
25. Mahoney CD, Berard-Collins CM, Coleman R, Amaral JF, Cotter CM. Effects of an integrated clinical information system on medication safety in a multi-hospital setting. *Am J Health Syst Pharm*. 2007;64(18):1969-1977.
26. Ramalho de Oliveira D, Brummel AR, Miller DB. Medication therapy management: 10 years of experience in a large integrated health care system. *J Manag Care Pharm*. 2010;16(3):185-195.
27. Ballard DJ. Indicators to improve clinical quality across an integrated health care system. *Int J Qual Health Care*. 2003;15(suppl 1):i13-i23.
28. Stineman MG, Kwong PL, Kurichi JE, et al. The effectiveness of inpatient rehabilitation in the acute postoperative phase of care after transtibial or transfemoral amputation: study of an integrated health care delivery system. *Arch Phys Med Rehabil*. 2008;89(10):1863-1872.
29. Garrido T, Jamieson L, Zhou Y, Wiesenthal A, Liang L. Effect of electronic health records in ambulatory care: retrospective, serial, cross sectional study. *BMJ*. 2005;330(7491):581.
30. Chen C, Garrido T, Chock D, Okawa G, Liang L. The Kaiser Permanente Electronic Health Record: transforming and streamlining modalities of care. *Health Aff (Millwood)*. 2009;28(2):323-333.
31. Casalino L, Gillies RR, Shortell SM, et al. External incentives, information technology, and organized processes to improve health care quality for patients with chronic diseases. *JAMA*. 2003;289(4):434-441.
32. Bardach NS, Huang J, Brand R, Hsu J. Evolving health information technology and the timely availability of visit diagnoses from ambulatory visits: a natural experiment in an integrated delivery system. *BMC Med Inform Decis Mak*. 2009;9:35.
33. Solberg LI, Asche SE, Shortell SM, et al. Is integration in large medical groups associated with quality? *Am J Manag Care*. 2009;15(6):e34-e41.
34. Charbonneau A, Rosen AK, Ash AS, et al. Measuring the quality of depression care in a large integrated health system. *Med Care*. 2003;41(5):669-680.
35. McCarthy D, Mueller K. *Organizing for Higher Performance: Case Studies of Organized Delivery Systems—Series Overview, Findings, and Methods*. New York: The Commonwealth Fund; 2009.
36. Emswiler T, Nichols LM. *Baylor Health Care System: High-Performance Integrated Health Care*. New York: The Commonwealth Fund; 2009.
37. Pizzo JJ, Grube ME. *Getting to There from Here: Evolving to ACOs Through Clinical Integration Programs*. Skokie, IL: Kauffman Hall; 2011.
38. Vijayaraghavan V. *Disruptive Innovation in Integrated Care Delivery Systems*. San Mateo, CA: Innosight Institute; 2011. ■