An Empirical Assessment of High-Performing Medical Groups: Results from a National Study

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The performance of medical groups is receiving increased attention. Relatively little conceptual or empirical work exists that examines the various dimensions of medical group performance. Using a national database of 693 medical groups, this article develops a scorecard approach to assessing group performance and presents a theory-driven framework for differentiating between high-performing versus low-performing medical groups. The clinical quality of care, financial performance, and organizational learning capability of medical groups are assessed in relation to environmental forces, resource acquisition and resource deployment factors, and a quality-centered culture. Findings support the utility of the performance scorecard approach and identification of a number

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of key factors differentiating high-performing from low-performing groups including, in particular, the importance of a quality-centered culture and the requirement of outside reporting from third party organizations. The findings hold a number of important implications for policy and practice, and the framework presented provides a foundation for future research.

Keywords: *medical groups; performance; chronic care management; quality of care; quality culture*

INTRODUCTION AND BACKGROUND

The profession of medicine has been well studied (e.g., Freidson 1970a, 1970b; Stevens 1971; Starr 1982; Robinson 1999). Factors influencing physician decision making and individual clinical behavior have also received attention (e.g., Eisenberg 1986, 2002; Greco and Eisenberg 1993; Cabana et al. 1999; Hadley et al. 1999). But between the individual physician and the profession of medicine lies the *organization* in which physicians work, and there is a relative dearth of research that examines the *physician organization*. The need for more systematic knowledge of physician organizational performance is growing with the increase in chronic illness (Partnership for Solutions 2002), the growth of outpatient care of all forms, the demand for greater accountability for quality as well as cost of care (Institute of Medicine 2001), and the growing dissatisfaction of many physicians with the practice of medicine (Grumbach and Bodenheimer 2002; Hadley et al. 1999; Hadley and Mitchell 1997; Landon et al. 2002). This article responds to the call for a more theory-driven approach to examining the performance of physician organizations across the United States (Main 2002). On the basis of existing theory, it outlines a multidimensional framework for performance measurement, and it develops a set of predictors for differentiating high-performing from poor-performing medical groups. The findings that emerge suggest a number of important public policy and practice implications.

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Aside from the early work of Wolinsky and Marder (1985), much of the existing knowledge of physician organizations and their performance comes from American Medical Association (AMA) surveys (Havlicek 1999) and, generally, relatively small sample studies. These have focused primarily on cost, efficiency, payment, and productivity issues (e.g., Flood et al. 1998; Kralewski et al. 1996, 1999, 2000; Greene et al. 2002; Gaynor and Pauly 1990; Gaynor and Gertler 1995; Conrad et al. 2002; Robinson 2001; Rosenthal et al. 2002). There is a dearth of information on quality and outcomes of care. A framework is needed that addresses the multiple dimensions of physician organizational performance and for understanding the variability in performance across physician organizations in general and medical groups in particular (Fernandopulle et al. 2003). This need is particularly urgent given the growing documentation of variations in clinical practice (Fisher et al. 2003a, 2003b; Casalino et al. 2003; McGlynn et al. 2003) and the call for increased accountability on the part of all health care organizations (Institute of Medicine 1999, 2001, 2002).

NEW CONTRIBUTION

This article makes three distinct contributions. First, a framework for assessing medical group performance is presented based on four domains: quality performance, patient satisfaction, organizational learning, and financial performance. Second, a theory-driven set of predictors of variation in performance within and across the four domains is developed. These drivers fall into four areas: environmental forces, resource acquisition factors, resource deployment factors, and having a quality-centered culture. Finally, the utility of the framework in identifying high-performing versus low-performing physician organizations is examined in a large-scale universe study of 693 medical groups across the United States having 20 or more practicing physicians. Findings have important implications for policy and practice, and the overall contribution provides a foundation for further conceptual and empirical work on physician organizations.

CONCEPTUAL FRAMEWORK—FOUR DOMAINS

On the basis, partly, of the "balanced scorecard" approach of Kaplan and Norton (1992, 1996) and its applications in some hospital settings (Oliveira 2001; Pink et al. 2001; Griffith, Alexander, and Jelinek 2002), we suggest four major domains of medical group performance, as shown in Figure 1, along with examples of specific measures. The four domains—clinical quality performance, patient satisfaction, organizational learning, and financial

performance—address the needs of both internal (e.g., providers) and external (e.g., patients, payers, and accrediting bodies) stakeholders. The quality of care provided is an obvious domain of measurement for medical groups. Current efforts to reduce the unwarranted variation in clinical quality of care and increase public accountability for results are making the quality domain particularly important (Institute of Medicine 2001; Lansky 2002; National Committee on Quality Assurance 2004; National Quality Forum 2004; Integrated Healthcare Association 2004; Robert Wood Johnson Foundation 2004). Patient satisfaction is also an obvious domain to consider when evaluating the performance of medical groups. Measures developed for the Consumer Assessment of Health Plans (CAHPs) can be applied to medical groups in a standardized way that permits valid comparisons from group to group (Hibbard, Berkman, and McCormack 2002). Financial performance is a third obvious domain for measuring medical group performance. Without sufficient revenues to cover expenses and residual earnings to reinvest in the practice, medical groups fail. The fourth domain, organizational learning, is a less obvious area for measuring medical group performance. But as Kaplan and Norton (1996) noted, it is often critical for achieving high performance in the other domains. It involves the organization's collective ability to incorporate new knowledge and practices. A medical group scoring high on this domain is "skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights" (Garvin 1993). Such organizations promote communication and collaboration so that everyone is engaged in identifying and solving problems, thereby enabling the organization to continuously improve and increase its capability. The characteristics of learning organizations typically include dense communication patterns among members, open access to information, little hierarchical structure, and a culture that encourages adaptability and participation. To the extent that these characteristics contribute to the accumulative knowledge and experience for the organization and facilitate a good match between the demands of the environment and the internal capabilities of the organization, they help the organization to attain and maintain its best performance (Teece 1984; McGivern and Tvorik 1997). Collectively, these four domains provide a portfolio or performance profile assessment as a framework for policy makers, payers, providers, and consumers to examine medical group performance on multiple dimensions that influence each other. The framework can be used, for example, to assess the implications of changes in benefit packages, financial incentives to pay for higher quality, introduction of new medical and information technologies, public reporting of quality results, and related initiatives.

The framework also provides a potential strategic roadmap for leaders of medical groups interested in improving the performance and competitive

Clinical Quality Performance • Use of evidence-based care management processes • Use of recommended disease prevention and health promotion practices • HDL and Hg1AC screening rates[a] • HDL and Hg1AC levels[a] Appropriate antibiotic use[a] Etc.	Patient Satisfaction[a] • With information provided • With technical quality of care • With overall experience • With access to specialty care • With follow-up care • Percentage same day appointments – open access scheduling • Patient turnover Etc.
Organizational Learning • Availability of clinical information technology • Knowledge transfer processes[a] • Use of participatory decision making processes[a] • Open communication across roles[a] • Culture that encourages adaptability[a] • Provider turnover Etc.	Financial Performance • Profitability (net income, return on assets, cash flow) • Productivity (case mix adjusted visits per FTE provider)[a] • Liquidity (ratio of current assets to current liabilities)[a] Etc.

FIGURE 1 Proposed Four Domains of Physician Organization Performance—Examples of Measures

Note: FTE = full-time equivalent.

a. Unavailable in current study but candidates for future research.

position of their practices. For example, efforts to improve a medical group's ability to learn (e.g., through the use of electronic clinical information systems) may be expected to improve patient satisfaction and quality of care, which in turn can have a positive impact on the financial performance of the practice. Also, the ability to earn higher payments under various pay-for-performance initiatives means that additional resources are available for reinvestment in information technology and related practice infrastructure that can lead to continued improvements in quality and greater patient satisfaction.

Three important questions might be asked of the four-quadrant framework. First, can a national profile of medical group performance be developed using the framework? Second, to what extent do medical groups vary in their performance across the four domains? For example, how many organizations are "high performers" across all domains? And, third, what variables might account for the variation in medical group performance either on a given domain or across domains? In brief, is it possible to identify variables that differentiate the high-performing groups from the low-performing groups?

DRIVERS OF PERFORMANCE

Drawing largely on organization theory, we suggest that there are four major factors or vectors of variables that influence the performance of physician organizations generically and medical groups specifically: (1) the environment in which the organization operates—environmental forces, (2) the organization's ability to acquire resources—resource acquisition, (3) its ability to use or deploy resources—resource deployment, and (4) its commitment to a quality-centered culture.

The environment has long been recognized to have a profound influence on organizations (Lawrence and Lorsch 1967; Aldrich 1979). Health care organizations, including medical groups, operate under intense normative expectations and regulatory demands (Scott et al. 2003). At the same time, limited resources in the environment require exchange and dependency relationships that introduce uncertainties and constraints on the organization (Pfeffer and Salancik 1978; Thompson 1967). Both types of environmental forces influence the organizations' strategies, behavior, and performance (Alexander, Morrisey, and Shortell 1986; Alexander and D'Aunno 2003; Cook et al. 1983; Scott et al. 2000). In general, we expect that medical groups in environments that demand greater accountability and reporting of results will have a positive association with performance. Conversely, we expect that environments that provide fewer resources to physician organizations will have a negative association with medical group performance.

The ability to acquire resources has also been recognized to be a key determinant of organizational success (Pfeffer and Salancik 1978; Levine and White 1961; Aldrich 1979); particularly in competitive environments. With increasingly competitive markets and constrained reimbursements, medical groups must strive to acquire necessary resources while managing their dependence relationships with health plans, hospitals, unions, and others (Aldrich 1979; Alexander and Morrissey 1989; Zinn, Weech, and Brannon 1998). Those organizations with a greater ability to obtain resources should exhibit better performance.

The ability to deploy the resources once obtained is also a key determinant of an organization's performance. Resource deployment is a process involving strategic decisions of how organizational resources are invested over time (McGivern and Tvorik 1997). Key competencies in organizations that are strong on resource deployment include the ability of decision makers to perceive and correctly interpret the environment and the ability of managers to use tangible (e.g., supplies, people) and intangible (e.g., knowledge, corporate culture) resources in daily organizational activities to achieve superior performance (Daft 2001; Russo and Fouts 1997). Thus, factors enhancing the organization's

decision-making experience and managerial expertise are expected to lead to effective resource deployment, which should improve performance over time. On a broad level, studies have shown that factors such as an organization's size, experience, and infrastructure lead to deployment decisions that can affect organizational performance (Aiken, Sochalski, and Lake 1997; Flood 1994; Flood and Fennell 1995; Flood and Scott 1987; Miller and Luft 1994). Larger and more experienced organizations, for example, may be better able to invest in human resource training and take advantage of economies of scale (Hannan and Freeman 1984).

Finally, there is a growing literature on the importance of organizational culture to performance both in non–health care (Denison 1990; Zammuto and Krakower 1991; Chatman and Cha 2003) and health care settings (Shortell et al. 1995; Shortell et al. 2000; Scott et al. 2003). In particular, a culture that emphasizes continuous quality improvement and patient satisfaction and financially rewards individual physicians for meeting quality objectives might help promote higher performance on quality, patient satisfaction, and organizational learning dimensions (Nelson et al. 1996). Figure 2 summarizes the four drivers of performance in relation to the four domains of the performance scorecard.

METHOD

The National Study of Physician Organizations (NSPO) collected data nationwide for 1,104 physician organizations (738 medical groups and 366 independent practice associations [IPAs]) with 20 or more physicians treating patients with chronic illness (e.g., asthma, congestive heart failure, depression, and diabetes).[1] Using a pretested and close-ended set of questions, data were collected on practice size, ownership, years in existence, type of practice, governance and management, financial management, relationships with health plans, degree of risk assumption, compensation models, external incentives, use of information technology, care management processes, and quality improvement approaches. These data were collected by trained interviewers at the National Opinion Research Center at the University of Chicago in 60-minute structured interviews with the CEOs, presidents, or medical directors of the physician organizations from September 2000 to September 2001.[2] The response rate was 70 percent. Although IPAs were somewhat more likely to respond than were medical groups, respondents and nonrespondents did not differ by size or state where they were located (Casalino et al. 2003; Gillies, Shortell, Casalino, Wang, et al. 2003; Gillies, Shortell, Casalino, Robinson, et al. 2003). Field visits and follow-up phone interviews conducted in 24 practices permitted validation of the self-report data and further insights into

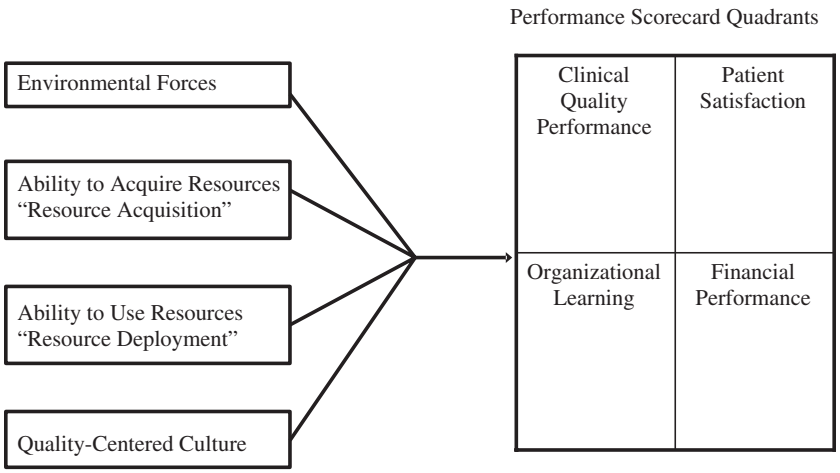

FIGURE 2 Proposed Drivers of Physician Organization Performance

physician organization performance (Rundall et al. 2002; Bodenheimer et al. 2004). The present analysis is restricted to the medical groups given the availability of more complete data on the multiple dimensions of performance examined. Analysis is focused on the 693 medical groups that treated patients in all four chronic illness conditions of interest—asthma, congestive heart failure, depression, and diabetes.

SPECIFIC MEASURES—PERFORMANCE SCORECARD

Using the national data set described above, we measured three of the four performance domains: clinical quality, organizational learning, and financial performance. Since the data collection took place at the level of the physician organization, we did not obtain patient responses of satisfaction, although we did assess whether or not the medical group used patient satisfaction measures as one of the indicators of a quality-centered culture.

Clinical quality performance was measured by the extent to which the medical group used recommended care management processes (CMPs) for managing patients with chronic illness, offered health promotion programs to patients and used reminders for preventive services to patients and their physicians, and received any public recognition for their quality performance. Public recognition was measured by whether the medical group received honors/awards or was listed as a star performer in publicly reported ratings or in

information distributed by health plans or employers to patients. CMPs were measured for patients with the four chronic illnesses—asthma, congestive heart failure, depression, and diabetes. These CMPs included the use of disease registries, clinical guidelines, case management systems, feedback to physicians, and patient self-management programs—all important dimensions of recommended chronic care (Wagner, Austin, and Von Korff 1996; Wagner et al. 2001). Research suggests that use of these CMPs is generally associated with better patient outcomes (Weingarten et al. 2002; Bodenheimer, Wagner, and Grumbach 2002; Olivarius et al. 2001; Renders et al. 2001; Grimshaw et al. 2001; Thomson O'Brien et al. 2002; Demakis et al. 2000; Norris, Engelgau, and Narayan 2001; Lorig et al. 2001), although some have found no relationship (e.g., Selby 2003). Health promotion by the physician organization was measured by asking whether the physician organization offered programs to its patients in the following eight areas: nutrition counseling, smoking cessation, weight management, prenatal education, health risk assessment, STDs, stress management, and substance abuse. These types of programs are widely recognized to be an important part of clinical preventive services and to improve the health of patients (Orleans et al. 1991; Pinto et al. 2002; Taplin et al. 1990; Thompson et al. 1995). Reminders for preventive services were measured by the use of patient-level reminders in four key areas: mammogram reminders for women older than 50, flu shot reminders to high-risk patients, eye exam reminders for diabetic patients, and childhood immunization reminders to parents of minors. Reminders to physicians regarding preventive services were measured by asking a physician group if it reminded its physicians about patient preventive services using either chart stickers, checklists, or computer-generated notes. Reminders to patients and physicians regarding clinical preventive services have been shown to increase the use of such services (Dexter et al. 2001; Garr et al. 1993; Ornstein et al. 1991; Ornstein et al. 1995; Stone et al. 2002; RAND Corporation 1999; Task Force on Community Preventive Services 2000). An overall index was constructed based on the number of the above quality process measures used plus whether or not the organization had received public recognition for its quality performance. This summary index ranged from 0 to 30. In the analyses that follow, we also examine separately the subindices related to chronic illness CMPs, and the health promotion and preventive service reminders. It is important to note that these indices represent process measures of quality performance in a physician organization and not patient outcome measures. Collection of outcome data was beyond the resources of the present study. There is continuing need to systematically examine the relationship between quality process measures and patient outcomes of care beyond the evidence in the literature to date.

Organization learning was measured by voluntary physician turnover and the availability of clinical information technology (CIT). We used voluntary physician turnover, or its converse physician stability, as an indicator of practice continuity that increases organizational memory and the ability to transfer knowledge. Turnover disrupts organizational memory and knowledge transfer (Levitt and March 1988). High turnover has been associated with slower organization learning particularly with teams (Carley 1992). This is salient for medical groups since teams are the basic building block for care delivery (Nelson et al. 2002), and integrating clinical expertise and information hand-off across providers is crucial in chronic care management. In the absence of an outcome measure of learning, we used the availability of CIT as a proxy measure reflecting the learning capacity or potential of the physician organization (Institute of Medicine 2001). It was measured by an index (0-6) based on whether the organization had an electronically available standardized problem list, laboratory findings, prescribed medications, radiology findings, medication ordering reminders/drug interaction information, and all physician progress notes. The Institute of Medicine (1999, 2002), among others, has emphasized the importance of standardized electronic medical records for transmitting more accurate information among providers, increasing the opportunity for more rapid learning, reducing errors, and improving quality.

The *financial performance* of the medical group was measured by whether it reported positive net income for the most recent 2 fiscal years (in most cases 2000 and 2001), had positive net income or broke even for at least 1 of the 2 years, or experienced a loss in these 2 consecutive years.

SPECIFIC MEASURES—DRIVERS OF PERFORMANCE

As discussed, we suggest that there are four major drivers of physician organization performance: (1) environmental forces, (2) resource acquisition factors, (3) resource deployment factors, and (4) having a quality-oriented culture.

Environmental forces were measured by the degree of managed care penetration measured at the county level, the degree of delegation of hospital risk (i.e., the extent to which the group was responsible for the costs of hospitalization), and whether or not external reporting of quality measures was required. Managed care penetration, due to its emphasis on cost containment, was viewed as having a negative influence on medical group performance. Being responsible for hospitalization costs was viewed as having a positive influence on the financial performance domain, because it requires the medical group to be held

financially accountable to an external organization (e.g., health plans) for managing patients in the most cost-effective manner. External reporting of quality measures was also viewed as having a potentially positive impact on the quality performance of the group, because participating in external reporting encourages the group to monitor and benchmark its quality performance, relative to others, thus providing a baseline and incentive for improvement.

Resource acquisition was measured by (1) the extent to which the medical group was able to obtain better health plan contracts in terms of payment rates and practice volume, (2) the extent to which it was able to successfully negotiate for additional income based on the organization's quality performance, (3) the percentage of revenue received from Medicare patients, and (4) the amount of capital per physician invested in the practice. Each of these was expected to be positively associated with performance, in all domains.

Resource deployment was assessed by four practice characteristics: (1) practice size measured by the number of physicians; (2) type of practice—multispecialty versus single specialty or primary care only; (3) practice age measured by years in existence; and (4) whether the medical group was owned by, or affiliated with, potentially a more resource rich hospital, health system, or health plan versus owned independently by physicians. It was felt that larger practices would have a greater ability to deploy resources, through the creation of economies of scale. In addition, multispecialty practices, by virtue of being less dependent on outside providers, would eliminate the transaction and coordination costs (Williamson 1981) associated with referrals and, thus, be better able to focus their resources to achieve superior performance. Moreover, practices with more experience working together are expected to have greater ability to deploy resources and thus perform well in all domains. For example, it is argued that young organizations are more likely to fail because they have to learn new roles as social actors and create organizational roles and routines at a time when organizational resources are stretched to the limit (Hannan and Freeman 1984). Last, practices belonging in some way to a hospital, health system, or health plan would have a greater ability to deploy resources because of hospitals', health systems', and health plans' greater managerial and resource planning expertise, relative to that of independent physicians groups (Robinson 1999), and therefore, would have a positive association with performance in all domains.

Quality-centered culture was measured by (1) the medical group's involvement in quality improvement programs, based on a 0 to 4 index involving the number of the four chronic conditions (asthma, congestive heart failure, depression, and diabetes) for which the medical group participated in a demon-

stration program or other organized effort to improve the quality of care for patients with that condition; (2) whether the medical group measured patient satisfaction; and (3) whether the group compensated its individual physicians for quality and/or patient satisfaction achievements. The literature suggests that a quality-centered culture should be positively associated with performance (Institute of Medicine 2001).

STATISTICAL METHODS

Multiple logistic regression was used to examine the relationship between the four sets of predictor variables (environment, resource acquisition, resource deployment, and quality-centered culture) and the six outcome measures (overall quality of care index, care management index, health promotion index, M.D. stability, CIT index, and profitability) for the three performance domains. All four sets of performance drivers were examined simultaneously in the models. In each case, the high performers were compared directly with the low performers on each performance dimension.[3] The resulting coefficients and standard errors from these regressions were converted into odds ratios and 95 percent confidence intervals.

Because of missing values on some variables, data were imputed for the performance driver measures in the multiple logistic regressions. Multiple imputation (with SAS v. 8.2 procedures PROC MI and PROC MIANALYZE) was used, a methodology where each missing value is replaced by a set of plausible values (Rubin 1976, 1987). Multiple regressions based on each set of values were computed, and then single estimates for the regression parameters derived. All statistical analyses were performed using SAS v. 8.2.

RESULTS

Descriptive statistics for all medical groups are presented in Table 1. The medical groups that were high performers (top quartile) on the quality performance index had a mean of 19.5 out of 30 possible quality measures; the low performers had a mean of 2.9. The high-performing medical groups on care management processes had a mean of 10.6 on the care management index, while the low performers had a mean of only 1.0 out of a possible score of 16. For the health promotions/disease prevention index, high performers had a mean of 9.8 out of 13 possible points, while low performers had a mean of 1.1. The medical groups that were high performers on physician stability (i.e., low turnover) had a mean of 0.3 percent physician turnover during the previous year, while low-performing organizations had a mean of 15.3 percent turnover. Organizations that were high performers on the CIT index had a mean of

TABLE 1 Univariate Distributions for Medical Groups Characteristics

Performance Scorecard Measures	*Medical Groups (N = 693)* M	SD
Clinical quality performance		
Quality care index (0-30)	11.1	6.6
Care management index (0-16)	5.3	3.8
Health promotion index (0-13)	5.5	3.5
Organizational learning		
Percentage M.D. turnover	6.4	6.9
Clinical information technology index (0-6)	1.7	1.9
Financial performance		
Profit history		
Profitable 2 years in a row (%)	40.4	
Profitable/broke even 1 of 2 years (%)	16.0	
Not profitable 2 years in a row (%)	36.8	
Predictor Measures		
Environment		
Percentage HMO penetration (county level)	31.7	16.5
Required outside data reporting (0-4)	0.78	1.4
Percentage delegation of hospital risk	19.5	29.7
Resource acquisition		
Ability to obtain health plan contracts (%)	23.2	
Ability to negotiate for additional income (%)	43.0	
Percentage of revenue from Medicare	25.6	16.0
Capitalization per M.D. ($)	165,722	441,953
Resource deployment		
Number of M.D.'s	136.2	275.8
Specialty type		
Multispecialty (%)	74.8	
Primary care only (%)	14.9	
Specialty care only (%)	10.4	
Age of organization	33.0	21.9
Practice ownership		
Hospital/health system/health plan/other (%)	57.4	
Physician (%)	42.6	
Quality-centered culture		
Quality improvement involvement index (0-4)	.91	1.2
Compensate individual physicians for quality and/or patient satisfaction and/or service to PO (%)	15.6	
Measures patient satisfaction (%)	80.1	

Note: PO = physician organization.

4.8 out of 6 possible information technology measures; all the low performers (bottom quartile) had none. Medical groups who were high performers on financial performance all reported making a profit 2 years in a row, while the low performers on this dimension all lost money 2 years in a row.[4] Eleven percent of medical groups ($n = 75$) scored in the top quartile on at least four of the six individual performance measures. Nineteen percent ($n = 131$) scored in the top quartile on at least two of the three domains.

Table 2 presents the odds ratios logistic regression results for medical groups for all six of the performance dimensions differentiating the top quartile from the bottom quartile organizations. In all equations, the likelihood ratios are significant. As shown, required outside reporting significantly differentiates the high-performing groups from the low-performing groups on all three of the quality domain measures and on clinical information technology capability. None of the other environmental variables differentiate the high-performing from the low-performing groups.

The ability to secure contracts significantly differentiates the top quartile from the bottom quartile groups on the quality index and care management index and also with lower physician turnover. None of the other resource acquisition variables significantly differentiate the two groups.

Several resource deployment variables serve to differentiate high-performing from low-performing groups. Larger medical groups as measured by number of physicians are significantly more likely to be in the top quartile on the quality index than in the bottom quartile, but the effect size is small. Multispecialty groups are significantly less likely to be in the top quartile in the health promotion index and are also more likely to have high physician turnover. Primary care groups, on the other hand, are significantly less likely to be in the top quartile on the care management index but much more likely to be in the top quartile on the health promotion index. They are also significantly less likely to be in the top quartile on financial profitability. Medical groups that have been in existence longer are more likely to exhibit physician stability and are also more likely to be in the top quartile on CIT capability. Medical groups affiliated with a hospital, health plan, or health system are significantly more likely to be in the top quartile on the care management index and health promotion index but significantly less likely to be in the top quartile on financial performance.

Involvement in quality improvement initiatives as part of an overall quality-centered culture is a significant differentiator of the top-performing from low-performing groups with regard to the quality index, the care management index, and the health promotion index. Such groups, however, are less likely to be in the top quartile on physician stability. Compensating individual

TABLE 2 Imputed Multivariate Logistic Regressions Comparing Top 25 Percent of Medical Groups to Bottom 25 Percent[a]

	Clinical Quality Performance						*Organizational Learning*				*Financial Performance*	
	Overall Quality Index		*Care Management Index*		*Health Promotion Index*		*MD Stability*[b]		*Clinical Information Technology Index*		*Profitability*	
Environment												
HMO penetration	1.02	(0.99, 1.04)	1.01	(0.99, 1.03)	1.003	(0.98, 1.02)	0.99	(0.98, 1.01)	0.99	(0.98, 1.007)	0.99	(0.98, 1.004)
Outside reporting	1.8	(1.4, 2.4)***	1.6	(1.3, 2.0)***	1.6	(1.3, 2.1)***	0.97	(0.81, 1.2)	1.2	(1.006, 1.4)*	1.09	(0.94, 1.3)
Hospital delegation	1.006	(0.99, 1.02)	1.01	1.004, 1.02)**	1.003	(0.99, 1.01)	1.003	(0.99, 1.01)	0.99	(0.98, 1.005)	1.001	(0.99, 1.007)
Resource acquisition												
Contracts	2.4	(1.1, 5.2)*	2.4	(1.2, 4.6)*	1.2	(0.61, 2.9)	2.0	(1.1, 3.7)*	1.1	(0.66, 1.9)	0.79	(0.49, 1.3)
Additional income	1.2	(0.61, 2.2)	1.3	(0.74, 2.3)	1.02	(0.73, 2.3)	0.81	(0.50, 1.3)	1.03	(0.64, 1.7)	0.74	(0.48, 1.1)
Medicare revenue	0.98	(0.96, 1.01)	0.99	(0.97, 1.02)	0.98	(0.97, 1.01)	0.99	(0.98, 1.01)	1.002	(0.99, 1.02)	0.99	(0.98, 1.01)
Capital/M.D.	1.00	(0.99, 1.001)	1.00	(0.99, 1.001)	1.00	(0.99, 1.001)	1.00	(0.99, 1.001)	1.00	(0.99, 1.001)	1.00	(0.99, 1.001)
Resource deployment												
No. of M.D.'s	1.004	(1.001, 1.006)**	1.001	(0.99, 1.003)	1.001	(0.99, 1.004)	1.001	(0.99, 1.002)	1.001	(0.99, 1.002)	1.001	(1.0005, 1.002)*
Multispecialty[c]	2.8	(0.77, 10.2)	0.16	(0.02, 1.2)	19.0	(4.8, 73.9)***	0.23	(0.09, 0.60)**	0.73	(0.35, 1.5)	0.58	(0.27, 1.3)
Primary care[c]	1.008	(0.24, 4.2)	0.13	(0.02, 0.98)*	9.9	(2.2, 44.5)***	0.26	(0.09, 0.72)*	0.78	(0.34, 1.8)	0.41	(0.17, 0.99)*
Age of organization	1.004	(0.98, 1.02)	0.99	(0.98, 1.01)	1.009	(0.99, 1.01)	1.01	(1.003, 1.01)*	1.02	(1.005, 1.03)**	1.008	(0.99, 1.01)
Hospital/system[d]	1.7	(0.86, 3.2)	2.1	(1.1, 3.7)*	2.0	(1.1, 3.5)*	0.85	(0.52, 1.4)	1.2	(0.72, 1.9)	0.21	(0.14, .34)***
Quality-centered culture												
QI involvement	2.6	1.9, 3.7)***	2.1	(1.6, 2.8)***	2.1	(1.6, 2.7)***	0.72	(0.58, 0.89)**	1.08	(0.88, 1.3)	1.009	(0.83, 1.2)
Compensation for quality/service	1.4	(0.58, 3.2)	1.1	(0.53, 2.6)	1.1	(0.64, 3.1)	2.3	(1.04, 5.0)*	0.95	(0.51, 1.8)	0.77	(0.44, 1.4)
Measures patient satisfaction	2.8	(1.3, 6.2)*	1.6	(0.7, 3.3)	4.9	(2.2, 10.5)***	0.91	(0.52, 1.6)	3.4	(1.7, 6.8)***	0.97	(0.56, 1.7)
Likelihood ratio	203.0		172.4		196.0		45.4		54.8		82.8	

Note: QI = quality improvement.
a. Confidence intervals in parentheses.
b. Excluded category is single specialty.
c. Excluded category is independent medical group.
d. Higher odds ratio means greater stability (i.e., less turnover).
*$p < .05$. **$p < .01$. ***$p < .001$.

TABLE 3 Top Medical Group Performers on Four of Six Individual Measures ($N = 75$)

Environment		
HMO penetration	0.99	(0.98, 1.01)
Outside reporting	1.3***	(1.1, 1.6)
Hospital delegation	1.003	(0.99, 1.01)
Resource acquisition		
Contracts	1.1	(0.63, 2.1)
Additional income	0.90	(0.51, 1.6)
Medicare revenue	1.002	(0.98, 1.02)
Capital/M.D.	1.00	(0.99, 1.001)
Resource deployment		
No. of M.D.s	1.0008	(0.99, 1.002)
Multispecialty	1.9	(0.61, 5.9)
Primary care	1.3	(0.34, 5.3)
Age of organization	1.006	(0.99, 1.02)
Hospital/system	1.3	(0.72, 2.3
Quality-centered culture		
QI involvement	1.5***	(1.3, 1.9)
Compensation for quality/service	1.3	(0.64, 2.5)
Measures patient satisfaction	1.4	(0.58, 3.3)
Likelihood ratio	80.1	

Note: Confidence intervals in parentheses. QI = quality improvement.
***$p \leq .001$.

physicians on quality and service criteria is associated with greater stability. Finally, groups that systematically measure patient satisfaction are more likely to be in the top quartile on the quality index, health promotion index, and CIT index.

Tables 3 and 4 show the odds ratio logistic regression results for overall top-performing groups defined two ways: (1) as scoring in the top quartile on at least four of the six individual measures (Table 3) and (2) scoring in the top quartile on at least two of the three overall domains involving quality performance, organizational learning, and financial performance (Table 4). As shown in Table 3, the 75 overall top-performing medical groups on at least four of the six individual performance measures are distinguished from the rest by their involvement in quality improvement initiatives and by required outside reporting. These two variables are also significant in Table 4 for the 131 groups scoring in the top quartile on at least two out of the overall three domains, but, in addition, medical group size, organizational age, and systematic measurement of patient satisfaction make a difference.

TABLE 4 Top Medical Group Performers on Two of Three Domains for Quality Performance, Organizational Learning, Financial Performance (N = 131)

Environment		
HMO penetration	1.008	(0.99, 1.02)
Outside reporting	1.2**	(1.1, 1.4)
Hospital delegation	1.002	(0.99, 1.01)
Resource acquisition		
Contracts	1.05	(0.65, 1.7)
Additional income	0.85	(0.54, 1.3)
Medicare revenue	0.99	(0.98, 1.01)
Capital/M.D.	1.00	(0.99, 1.001)
Resource deployment		
No. of M.D.s	1.001*	(1.0007, 1.002)
Multispecialty	1.02	(0.47, 2.1)
Primary care	1.1	(0.44, 2.8)
Age of organization	1.01*	(1.0003, 1.02)
Hospital/system	0.77	(0.48, 1.2)
Quality-centered culture		
QI involvement	1.3**	(1.1, 1.5)
Compensation for quality/service	0.97	(0.52, 1.8)
Measures patient satisfaction	3.4**	(1.6, 7.5)
Likelihood ratio	68.7	

Note: Confidence intervals in parentheses. QI = quality improvement.
*$p \leq .05$. **$p < .01$.

CONCLUSIONS AND DISCUSSION

Three findings are of particular importance. First, a relatively small percentage of medical groups are high performers on multiple dimensions. Second, a combination of external environmental and internal organizational factors (i.e., resource acquisition, resource deployment, and having a quality-centered culture) are involved in differentiating high from low performers. Finally, having a quality-centered culture and outside reporting of results appear to be the most consistent and strongest differentiators of high-performing versus low-performing medical groups.

The fact that only 11 percent of medical groups of 20 physicians or more in size score in the top quartile on at least four of six specific performance measures and only 19 percent score on two of three selected domain measures suggest both the difficulty and challenge of improving physician organizational performance on multiple dimensions of interest to patients, health plans,

purchasers, regulatory groups, and related stakeholders. Even within the quality performance domain, the results suggest that the high performers on the chronic illness care management index were not the high performers on the health promotion index and vice versa. There was no relationship between high performers on the quality performance domain measures and the high performers on financial performance. There was some relationship between the organizational learning domain measures and the quality performance domain measures, but the correlations were small in the range of .21 to .25. There was no relationship between learning and financial performance. These results underscore the importance of using a performance scorecard approach emphasizing multiple dimensions. They also suggest the need for further research to examine why such variability exists across the various performance domains.

The finding that measures from each of the four sets of predictors were associated with performance differences suggests the potential utility of examining not only external environmental factors but also the ability of the physician organizations to acquire and deploy resources and to develop a culture that emphasizes continuous improvement of the quality of care. For example, those groups able to secure additional contracts were twice as likely to be in the top quartile on the quality index, the care management index, and physician stability. Practice, size, type, age, and affiliation each exert some effect. Primary care groups, for example, were nearly 10 times as likely to be in the upper quartile on the health promotion index than specialty groups. Groups affiliated with a hospital, health plan, or health system were twice as likely to be in the top quartile on the care management index and health promotion index, perhaps reflecting the greater amount of resources and support that such groups receive from being affiliated with a system relative to independent freestanding groups. On the other hand, such organizations were nearly 80 percent less likely to be profitable, perhaps reflecting practice inefficiencies associated with payment arrangements between the medical group and its affiliated system (Greene et al. 2002).

Of particular note is the important role played by having a quality-centered culture and required external reporting. Groups involved in formally organized quality improvement initiatives were more than twice as likely to be in the top quartile on all three quality performance dimensions—the overall quality index, the care management index, and the health promotion index. Groups systematically measuring patient satisfaction were nearly three times as likely to be in the top quartile on the quality index, five times as likely on the health promotion index, and more than three times as likely on the CIT index. These findings underscore an emerging body of evidence linking

organizational culture to performance not only in health care settings but other sectors as well (Denison 1990; Shortell et al. 1995; Scott et al. 2003). This is the first evidence, however, linking culture to multiple dimensions of the overall quality performance of physician organizations as opposed to its role in individual interventions designed to improve care for patients with specific clinical conditions. The greater emphasis given to quality improvement activities and patient satisfaction measurement among the top-performing medical groups lends further weight to efforts to spread continuous quality improvement and measurement approaches throughout the health care system (Berwick, Godfrey, and Roessner 1990; Berwick 2003; Ovretveit et al. 2002; Lansky 2002; Becher and Chassin 2001; Ellrodt et al. 1997; Grol 2001; Institute of Medicine 2001, 2002). The fact that participation in quality improvement programs also distinguished the overall top performers (those in the top quartile on two of three domains and at least four of six specific measures) suggests that efforts to differentiate on quality-of-care criteria may be key for driving high performance across multiple dimensions.

The effect sizes for required external reporting were generally less than for a quality-centered culture but just as consistent in differentiating the high-performing from low-performing groups on all three quality performance domain measures as well as on the CIT index. These findings are consistent with recent evidence (Casalino et al. 2003) and Institute of Medicine recommendations (2001, 2002) with regard to the important role that can be played by external incentives for influencing physician organizational performance. The findings also lend credence to initiatives that require public reporting of quality performance data (Robert Wood Johnson Foundation 2004; Integrated Healthcare Association 2004) and the ongoing work of the National Committee on Quality Assurance, the Leapfrog Group, and the National Quality Forum. The findings also support the Centers for Medicare and Medicaid Services' (2004) new initiatives to reward physician organizations for improving the quality of chronic illness care. Interestingly, however, while we found that outside reporting and winning additional contracts did differentiate the high-performing groups from the low-performing groups, we did not find receiving additional income to be a significant differentiator. It could be that the amount of additional income involved was not large enough to be a motivator. But it could also be that in dealing with highly socialized and competitive professionals such as physicians, the motivation to look good in public reports that reflect on one's professional reputation is at least as powerful a motivator if not more so than the promise of financial reward. Many of the current quality improvement demonstrations incorporate both financial incentives and public reporting, and it will be important for researchers to examine the effect

of each individually and in combination (Hibbard et al. 2002; Hibbard, Berkman, and McCormack 2002).

The results must be considered within the context of a number of study limitations. First, as noted, we were unable to directly measure patient satisfaction. This can be done in future work by drawing on various consumer assessment surveys linked to a specific physician organization's patients. As previously noted, there is also a need to measure patient outcomes of care above and beyond the intermediate quality measures used in the current study. Some measures such as LDL levels and HbA1c levels can be obtained from administrative data sets. However, many others will require chart abstraction and patient interviews, which is expensive. Audited financial data on profitability would help to validate self-reported profitability data. Also, a more complete set of financial viability measures involving productivity and liquidity would be useful. Certainly, additional measures of environmental factors, resource acquisition factors, resource deployment factors, and a quality-centered culture could be developed to help validate measures used in the present analysis. The present analysis cannot assess causality. For example, it can be argued that a group's ability to secure additional contracts and income is influenced by its past and current quality performance rather than contracts and additional income representing resources obtained to improve quality. In the absence of experimental data, such issues will need to be sorted out in future research that involves longitudinal panel data or identification of instruments that can be used in instrumental variable analysis (Newhouse and McClellan 1998). Finally, it should be noted that the findings pertain to medical groups of 20 doctors or more and cannot be generalized to smaller physician groups.[5]

Taking the above limitations into account, we believe the proposed four-domain performance scorecard approach provides a useful framework for examining physician organizations (medical groups, independent practice associations, and related forms) in the United States and that the conceptually and theoretically driven empirical analysis differentiating high-performing from low-performing groups is a useful starting point for further work. Policy makers and payers can use the findings to develop new approaches and incentives that encourage improved physician organization performance. Physicians and their organizational leaders can use the results to focus change efforts on those factors most likely to influence performance (Landon et al. 2001). All stakeholders will benefit from the continued development and evolution of a national database on physician organizations that can be used to examine the impact of changes in public policy, reimbursement, and regulation on physician organization performance over time.

NOTES

1. Hospital-based specialty groups such as anesthesiologists, radiologists, pathologists, and emergency room physician groups were excluded from the universe.
2. The study interview instrument is available from the first author.
3. Multivariate analyses were also performed on all the physician organizations in the study, examining each performance dimension as a continuous variable using linear regression. Overall, the findings were similar with a few exceptions such as a quality-centered culture not being significantly associated with physician stability in the overall analysis, while it was a significant differentiator between high-performing and low-performing groups in the logistic regression. This finding underscored the rationale for using logistic regression in that including all organizations sometimes masked the factors that truly separated the high-performing physician organizations from the low performers.
4. Analyses were also conducted using the top 10 percent and bottom 10 percent, but in many cases, the resultant number of cases were insufficient for analysis. Where direct comparisons between the top and bottom 10 percent and top and bottom 25 percent could be made, there were virtually no differences in the predictor variables.
5. Where possible, analyses were also conducted for the independent practice associations (IPAs) with similar results. Also see Gillies, Shortell, Casalino, Robinson, et al. (2003; *Health Affairs* at http://content.healthaffairs.org/cgi/content/full/hlthaff.w3.492v1/DC1).

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