

HORIZONTAL AND VERTICAL INTEGRATION OF PHYSICIANS: A TALE OF TWO TAILS

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ABSTRACT

Purpose Researchers recommend a reorganization of the medical profession into larger groups with a multispecialty mix. We analyze whether there is evidence for the superiority of these models and if this organizational transformation is underway.

Design/methodology approach We summarize the evidence on scale and scope economies in physician group practice, and then review the trends in physician group size and specialty mix to conduct survivorship tests of the most efficient models.

Findings The distribution of physician groups exhibits two interesting tails. In the lower tail, a large percentage of physicians continue to practice in small, physician-owned practices. In the upper tail, there is a small but rapidly growing percentage of large groups that have been organized primarily by non-physician owners.

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Research limitations While our analysis includes no original data, it does collate all known surveys of physician practice characteristics and group practice formation to provide a consistent picture of physician organization.

Research implications Our review suggests that scale and scope economies in physician practice are limited. This may explain why most physicians have retained their small practices.

Practical implications Larger, multispecialty groups have been primarily organized by non-physician owners in vertically integrated arrangements. There is little evidence supporting the efficiencies of such models and some concern they may pose anticompetitive threats.

Originality/value This is the first comprehensive review of the scale and scope economies of physician practice in nearly two decades. The research results do not appear to have changed much; nor has much changed in physician practice organization.

Keywords: Physicians; group practice; horizontal integration; vertical integration

INTRODUCTION

As the United States (US) moves to implement health care reform, providers, policy-makers, and researchers are focusing on achieving structural change in health services, both to moderate cost increases and improve quality. Federal policymakers hope that the cost of extending insurance coverage under the Patient Protection and Affordable Care Act (PPACA, 2010) might be partially offset by departing from traditional forms of physician organization and payment. Organizational models that might achieve these changes include horizontal integration of physicians into group practices (multispecialty, single specialty), vertical integration of physicians into hospitals or health plans via salaried employment, and “virtual” integration via contractually based physician-hospital organizations (PHOs), independent practitioner associations (IPAs), and quasi-risk arrangements such as accountable care organizations (ACOs).

The context for discussing integrated care has changed markedly since 2000. While discussions of integration in the 1990s focused on hospital systems (e.g.,

Shortell, Gillies, Anderson, Erickson, & Mitchell, 1996), more recent discussion has been extended to include the role of physician organizations (Solberg et al., 2009). There has been a groundswell of interest in large, integrated multispecialty medical groups particularly those sponsoring health plans or engaged in risk contracting as solutions to the problems of low-quality, high-cost, and uncoordinated care (Crosson, 2005; Miller & Bovbjerg, 2002; Shortell & Schmittdiel, 2004).

There is also growing interest in the medical community regarding the future organization of medical practice. Over the past 2 years, researchers and consultants have issued several reports on the practice options for the medical profession (Goldsmith, 2012; Isaacs & Jellinek, 2012; Kirchhoff, 2013). All of the reports discuss the increased financial pressures on private physician practice and the relative merits of various integration strategies. Some portend the accelerating collapse of private practice (Isaacs & Jellinek, 2012).

Those advocating change in physician organization need to confront several inconvenient truths. First, despite repeated calls to do so, hundreds of thousands of physicians have so far declined to organize themselves into larger economic units that may be better able to achieve coordinated, highvalue care. Surveys indicate that roughly two-thirds of US office-based physicians continue to practice in solo settings, two-person partnerships, and small (mostly single specialty) groups with five or fewer physicians, and that nearly four-fifths of all organized groups have fewer than 10 physicians. Such observations fly in the face of repeated forecasts of physician consolidation into larger scale, multispecialty entities (e.g., Bailey, 1968; Bellows, McMenamin, & Halpin, 2010; Shih et al., 2008).

In addition to the mass of physicians in very small settings, however, there is a growing percentage of office-based physicians practicing in groups of 11 or more doctors, including a rapidly growing number of very large practices. These practices are noteworthy in at least two respects: they have been assembled by hospitals and other (e.g., corporate) owners, not physicians themselves, and they still contain a little more than one-third of all group physicians (and somewhat less than 20% of all practicing physicians).

This suggests that any analysis of physician practice organization needs to explain this strange two-tailed distribution of physician practices: a mass of small group practices, primarily in single specialties, and large groups of physicians, often in multispecialty practices, that are inside or tightly affiliated with other health care organizations such as hospitals or health plans. There is also a growing

hybrid form: large single-specialty groups of hospital-based practitioners consolidated by equity capital firms.

Second, the presumed inevitability of large multispecialty groups flies in face of an economic record devoid of evidence of measurably superior performance (Tollen, 2008). Part of the problem is that the evidence cited in favor of their performance advantage comes from studies of a handful of mature prepaid multispecialty group practices, such as Kaiser's Permanente Medical Groups. Such research suffers from what evaluation researchers call "multiple treatment interference": they combine multiple financial and organizational models (group practice, multispecialty mix, scale, and prepayment) whose effects are virtually impossible to disentangle. As a result, studies documenting their effects may reflect health maintenance organization (HMO) (e.g., financing model) performance rather than group and scale (care delivery) performance.

Indeed, the evidence of scale economies (defined as the ability of groups to take advantage of technical indivisibilities such as investments in technology and staffing to achieve production-based efficiencies), scope economies (defined as the ability of groups to leverage the presence of diverse specialists or shared resources to efficiently produce multiple patient services), or quality performance advantages has been strikingly thin, in some cases for decades.

These findings should not be surprising. The initial volume of this publication included a review of the options for physicians as they confronted a consolidating landscape (Burns & Wholey, 2000). These options included partnering with other physicians (e.g., group practice, virtual networks using IPAs, national federations), partnering with Wall Street (e.g., physician practice management firms), partnering with hospitals and health systems, and partnering with organized labor (e.g., efforts to legalize unions of community-based physicians).

The available evidence then, as well as the subsequent decade of experience, has suggested that there is no one best option with a demonstrated competitive advantage. Rather, the different models presented a menu from which physicians could choose depending, for example, on their desire for professional autonomy versus economic security.

We have been asked to revisit this topic, assess what has changed, and discuss how the conclusions reached in the earlier review might be altered. The chapter is organized into the following sections. We first discuss the history of physician practice organization and then analyze the size and specialty distribution of group practices over time to see what has changed. We then summarize the existing evidence on the effects of physician group size and type of integration (horizontal, vertical, and virtual) on quality, cost, efficiency, and productivity/profitability.

We also summarize the findings from three sets of field investigations of organized physician groups to distill additional insights on their functioning and performance. We then turn our attention to two areas where practice consolidation is taking place on a massive scale: employment of physicians by hospitals and other firms and the formation of (largely equity-based) single specialty networks. We conclude by discussing the future trajectory of physician organizations and their ability to deliver on the policy aims sought in the PPACA.

EARLY HISTORY OF GROUP PRACTICE IN THE US

Historians commonly point to the establishment of the Mayo Clinic in 1892 by a family of surgeons (father and two sons) along with an invited fourth partner as the beginning of group practice and the rise of private medical clinics. In actuality, groupings of collaborating physicians had existed for decades in a variety of part-time or short-lived arrangements, such as military medicine, industrial medical worksites, public dispensaries, hospital outpatient departments, and hospital medical staffs (combining medical faculty and residents) (Madison, 1990; Madison & Konrad, 1988). As a result, the storyline is somewhat more complex.

Historians of group practice also point to the important role played by military medicine (both prior to, but especially during World War I) in fostering the initial growth of this organizational form (Madison & Konrad, 1988). Wartime practice exposed enlisted physicians to structured practice arrangements, cooperative relationships with specialists, ease of consultation, and efficiency of care. Reluctant to forego the advantages afforded by army field hospitals, many surgeons returned home to establish structured groups with the same benefits of collaboration and standardization they enjoyed during wartime practice. Such was the origin of the Cleveland Clinic, founded in 1921 by three wartime surgeons (who invited in a fourth physician, an internist, to form a multispecialty practice).

After World War I, the number of such clinics grew rapidly. There were 125 groups by 1926, and 220 by 1932 (Shouldice & Shouldice, 1978). The first national survey of physician groups (1930) uncovered 13 such clinics with more than 15 doctors (though only 4 had more than 25 doctors). The Mayo Clinic was the outlier, with a staff of 200 physicians; the next largest clinic had only 40. Two surveys conducted by the American Medical Association (AMA, 1933, 1940) downplayed the growth of group practices in part because the AMA's own published principles espoused solo practice, fee-for-service medicine. These

principles were directly challenged by the ongoing rise of private clinics, contract medicine (sponsored by mutual benefit societies, lodges, and employers), corporate practice of medicine (e.g., employment by mining companies, hospitals), the growth of medical school faculty practice plans, and the emergence of group or staff model prepaid insurance plans (Havlicek, 1990; Starr, 1982). They also gave rise to state laws explicitly prohibiting the corporate practice of medicine.

The growth of the medical profession and the rise of specialty boards during the 1930s provided further impetus to group formation (Stevens, 1971). Physicians sought out settings where they could practice with their professional colleagues (often in the same specialty) and make use of specialized equipment and diagnostic technologies. Some sought settings where they could access colleagues in other specialties.

The advent of World War II provided additional stimulus to the growth of private clinics and larger-sized group practices. While the number of clinics with more than 15 physicians remained in the teens up to World War II, the number increased after the war to 31 (1946) and then to 128 (1959), when the AMA softened its opposition to group practice. The number of groups with 16+ doctors then mushroomed to 180 (1965) and then to 301 (1969); the number of groups with 100+ physicians (like the Mayo Clinic) remained in the single digits. Overall, the number of groups climbed from 1,546 in 1959 to 6,371 by 1969. Nevertheless, as a percentage of all physicians, group practice accounted for only 10% of US physicians in 1965 (Smart, 2004).

LONGITUDINAL ANALYSES OF THE SIZE DISTRIBUTION OF PHYSICIAN PRACTICES

Researchers commonly argue there has been an ongoing trend toward larger physician practices. Such a postulated trend is consistent with hypothesized scale economies in medical practice. Long ago, Stigler (1958) observed that a good measure of effective scale economies in a given industry can be found by examining the change in the size distribution of firms in that industry and the share of the market each size category controls. This observation has been formalized as the “survivorship principle”: over time, market forces lead firms to change their scale of operations, with the most efficient sized firm emerging from

industry market dynamics. Is it really true there is a trend toward larger-scale practice consistent with this scale hypothesis?

Given there is no data gold standard on physician organizations over time, we collated the results from multiple surveys of physician practices to answer this question. To test the survivorship principle, we examined four different measures utilized in the various surveys: the percentage of physician groups falling into defined size categories, the percentage of group practice positions falling into these size categories, the percentage of physicians practicing in settings of different sizes, and the percentage of office visits to practices of different sizes. These surveys are reviewed below and compared for consistency in the trend data they report.

Survey Data from the AMA

The AMA defines group practice as “the application of medical service by three or more physicians formally organized to provide medical care, consultation, diagnosis, and/or treatment through the joint use of equipment, records, and personnel, and with income from medical practice distributed according to some prearranged plan” (Havlicek, 1990). This definition has been consistently applied in the AMA’s census surveys of physician groups since 1964. It includes groups of different ownership models (physician, hospital, staff model health plans) as well as groups that contract with hospitals to provide specific services (e.g., radiology, emergency care), but it does not include the hospitals that directly employ physicians.

The AMA has provided two independent series of reports on the size distribution of physician practices. The first is a survey of physician groups conducted periodically over time (published under the name *Medical Group Practices in the US*); the second is a periodic survey of a sample of physicians in the AMA Masterfile regarding the practice arrangements of patient care physicians (published under the title *Physician Marketplace Report*).

The *Medical Group Practices in the US* reports provide survey data on the prevalence of physician groups over the longest time frame (e.g., Havlicek, 1990, 1993, 1996, 1999; Smart, 2004, 2005, 2006). Most recently, these data have been incorporated into another AMA publication (Smart, 2013). Since 1969, the number of groups has grown from 6,371 to over 29,000 in 2011. This growth has come in spurts: steady growth to 15,485 groups from 1969 to 1984, low growth to 16,576 groups from 1984 to 1991, followed by a rise to 19,787 groups by 1995,

where the number remained stable over the next 10 years, and finally rising substantially to 29,612 groups between 2005 and 2011.

Despite the growth in the number of groups, the size distribution has changed only modestly. Between 1988 and 2011, the percentage of groups smaller than five physicians declined from 50.3% to 41.9%, while the percentage of groups with 59 physicians changed from 33.4% to 37.3%. The data also reveal an increase in the percentages of groups with 1049 physicians (from 14.4% to 18.3%) and groups with 50+ doctors (from 1.9% to 2.4%). The fastest rate of growth occurred among groups in the upper tail of the size distribution (100+ physicians), although their prevalence is low (see Fig. 1).

As an alternative test of the survivorship principle, Table 1 shows the distribution of group positions across practices of different sizes. Similar to the distribution of groups, the distribution of group positions shows a decline in the percentage of positions among groups with 34 physicians (from 18.1% to 12.5%). Unlike the distribution of groups, the data in Table 2 show little change in the percentage of positions among groups of 59 physicians (from 21.5% to 20.7%), groups of 1049 physicians (from 27.0% to 27.6%), and groups of 5099 physicians (from 8.5% to 7.7%).

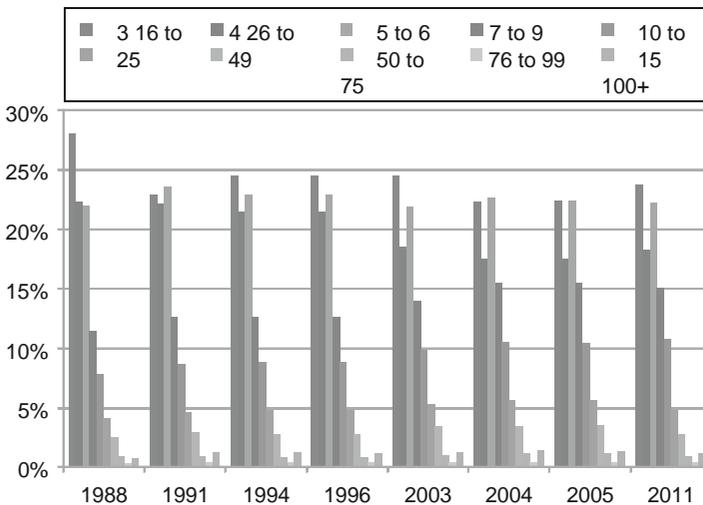


Fig. 1. Physician Group Practice Size Distribution. Source: American Medical Association (Havlicek, 1990, 1993, 1996, 1999; Smart, 2004, 2005, 2006, 2013).

Table 1. Physician Group Practice Positions: Percent by Size Category.

Size	1988	1991	1994	1996	2003	2004	2005	2011
3	8.8	6.0	6.8	6.9	6.4	5.5	5.6	6.2
4	9.3	7.7	7.9	8.1	6.4	5.8	5.8	6.3
56	12.3	11.0	11.4	11.7	10.4	10.1	10.1	10.5
79	9.2	8.5	9.0	9.2	9.5	9.9	9.9	10.2
1015	9.7	8.9	9.6	9.9	10.2	10.3	10.3	11.2
1625	8.4	8.0	8.8	8.9	9.1	9.1	9.0	7.9
2649	8.9	8.7	8.8	9.1	10.2	9.8	9.9	8.5
5075	5.7	4.7	4.4	4.6	5.2	5.3	5.4	5.0
76+99	2.8	3.1	2.8	2.9	3.0	2.7	2.7	2.7
100	24.8	33.3	30.7	28.7	29.5	31.6	31.4	31.5

Source: American Medical Association (Havlicek, 1990, 1993, 1996, 1999; Smart, 2004, 2005, 2006, 2013).

The most remarkable change occurred in the percentage of positions in large-sized groups (100+ physicians) from 24.8% to 31.8% (percentage stable since 2004).¹

Fig. 2 indicates that the percentage of US physicians practicing in groups of three or more (as opposed to solo and two-partner offices) has remained fairly stable since 1995 at roughly one-third. The stability in the percentage of group physicians in the face of a growing number of groups is explained by the increase in the physician population. The latter rose from 467,679 in 1980 to 1,004,635 by 2011, while the number of patient care physicians rose from 376,512 to 767,782. This stability may come to an end with the retirement of baby boomer physicians, however.

The Physician Marketplace Report provides somewhat comparable data on the percentage of nonfederal physicians in practices of different sizes; solo practice, practices of 24 physicians (which include 2-physician partnerships), groups of 59, 1049, and 50+ physicians, and physicians working in other settings (Kane, 2004a, 2004b, 2009). Trend data between 1999 and 2007/2008 reveal a slight drop in the percentage of physicians in solo practice (from 26.6% to 24.6%) and small increases in the percentage of physicians in group practices of 24 physicians (from 18.0% to 21.4%), 59 physicians (from 10.9% to 12.9%), and 1049 physicians (from 10.7% to 12.1%). The only sizeable increase is the percentage of physicians working in hospital settings (more than double from 7.7% to 16.3%) a topic covered more fully later on. The percentage of physicians practicing in groups of

five or more doctors increased slightly between 1999 and 2001 but has remained constant at 2930% from 2001 to 2008.

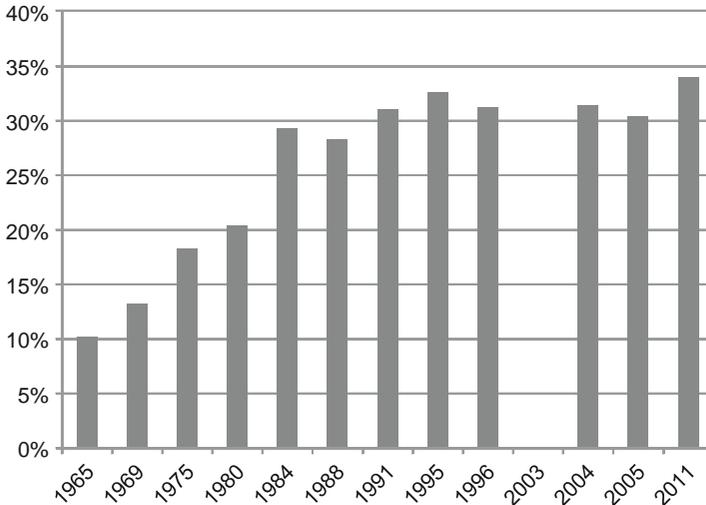


Fig. 2. Percentage of Physicians in Groups. Source: American Medical Association (Havlicek, 1990, 1993, 1996, 1999; Smart, 2004, 2005, 2006, 2013).

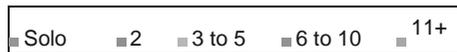
Data from the Center for Studying Health System Change/Community Tracking Study

Casalino, Devers, Lake, Reed, & Stoddard (2003) present data from a survey of 6,000 practicing physicians, conducted as part of the Community Tracking Study (CTS) by the Center for Studying Health System Change (CSHSC). CSHSC has tracked the changing market conditions in 12 US metropolitan health care markets over time. The survey depicts trends in the practice size distribution of office-based physicians between 1997 and 2001. This survey shows a drop between 1997 and 2001 in the percentage of physicians in very small practices of 12 doctors (from 54% to 47%) and small increases in the percentage of physicians in practices of 39 doctors (from 30.5% to 34.9%), 1019 doctors (from 6.3% to 8.5%), and 2049 doctors (from 4.3% to 4.7%). There is no change evident at that time in the percentage of physicians in practices of 50+ doctors.

CSHSC researchers provide additional data on the distribution of physicians in a wider variety of practice settings (including hospitals) over a longer time period 1996-2008 (Boukus, Cassil, & O'Malley, 2009; Liebhaber & Grossman, 2007).² These data show a roughly 20% decline between 1996-1997 and 2008 in physicians in practices of 12 doctors (from 40.7% to 32%), small growth among groups of 35 doctors (from 12.2% to 15.0%), but larger growth among groups of 650 practitioners (from 13.1% to 19%). There is also a sizeable increase in the prevalence of groups of 50+ doctors, which doubled between 1996-1997 and 2008 (from 2.9% to 6.0%). In 2008, group practices accounted for roughly 40% of physicians, followed by solo practitioners and two-person partnerships (32%), and other settings (28%).

Panel Data from the National Ambulatory Medical Care Survey

More recent trend data on office-based physician practices come from the National Ambulatory Medical Care Survey (NAMCS). The survey, conducted by the Centers for Disease Control and Prevention and the US Bureau of the Census, includes a representative sample of ambulatory care visits to physician offices and gathers statistics on the physician's practice (CDC, 2007a, 2007b, 2008a, 2008b, 2010a, 2010b). This source yields data on the distribution of physicians across practices of different sizes from 2007 to 2011.³ According to Fig. 3, there have been small decreases in doctors in solo practice (from 30.7% to 28.4%), two-physician partnerships



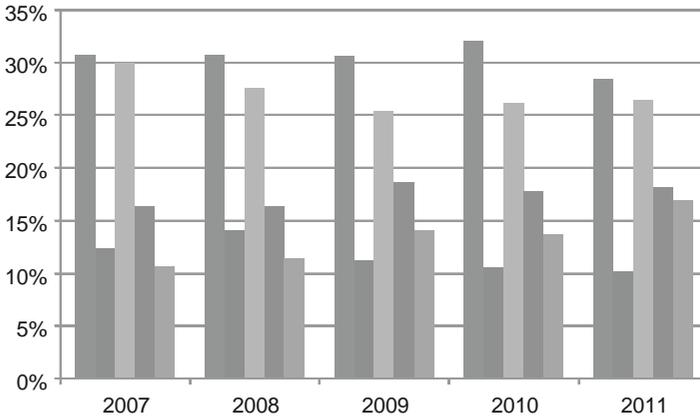


Fig. 3. Distribution of Office-Based Physicians by Practice Size. Source: National Ambulatory Medical Care Survey (CDC, 2007a, 2007b, 2008a, 2008b, 2010a, 2010b). (from 12.3% to 10.2%), and in practices of three to five physicians (from 29.9% to 26.4%). There has been an increase in physicians practicing in groups of 6 to 10 doctors (from 16.4% to 18.2%) and an even bigger increase in physicians practicing in groups of 11+ doctors (from 10.6% to 16.8%).

Fig. 4 shows the distribution of office visits across these different sized practice settings over a slightly different period (2005-2010). The data suggest that solo practitioners still command the largest market share (nearly one-third) of patient visits, although their share has declined a bit, while visits to small partnerships and groups of three to five physicians have remained steady. By contrast, a growing percentage of patient visits occurred in the larger group practice settings of 6 to 10 physicians (from 14.1% in 2005 to 17.9% in 2010) and a sizeable increase in visits to groups of 11+ doctors (from 9.5% to 14.1%).

These data mirror the distribution of groups across size categories above. The smaller practice settings (solo practitioners, two-person partnerships) and smaller groups (three to five physicians) account for two-thirds of physician office visits. While their share of groups and office visits has declined from nearly three-quarters to two-thirds, the bottom tail of the distribution has shown remarkable persistence. If there is a survivorship advantage to scale, it is not apparent in the recent past. The analysis also shows rapid growth in visits to doctors in the upper tail.

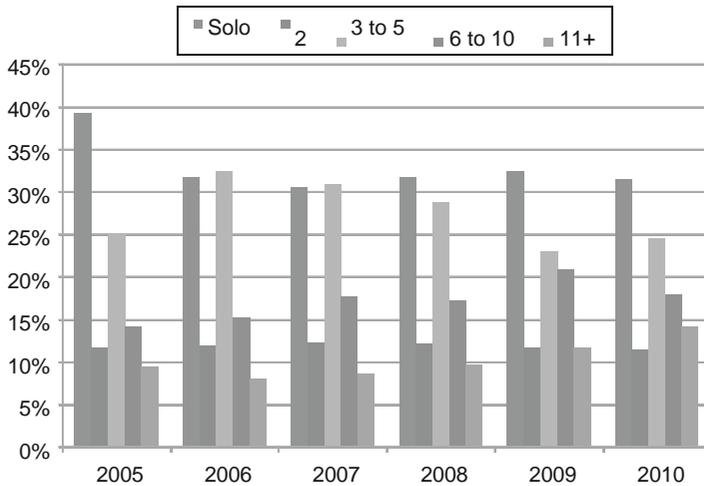


Fig. 4. Distribution of Physician Office Visits by Practice Size. Source: National Ambulatory Medical Care Survey (CDC, 2007a, 2007b, 2008a, 2008b, 2010a, 2010b). Industry Data from the Medical Group Management Association

A prominent industry trade group, the Medical Group Management Association (MGMA), surveys the group size of their members. Fig. 5 shows the change in the size distribution of MGMA member groups between 2004 and 2012. The majority of groups have 10 or fewer physicians. Nevertheless, the data reveal changes at the extremes: a drop in groups of 10 or fewer physicians from 63% to 54%, a 1% increase in groups of 1125, 2650, 5175, and 76150 physicians, and a 4% increase in the number of large groups of 151+ physicians.⁴

The MGMA membership is quite diverse, and includes groups that are owned by physicians, hospitals, universities/medical schools, payers, and “others” (foundations, integrated delivery networks (IDNs), equity investors). All need to be dues paying members to be counted in the MGMA database, however. The latter ownership categories have groups of much larger size. MGMA data suggest that the biggest change in the size distribution of its member groups has occurred not among the physician-owned practices but among practices owned by outside organizations. We will revisit this topic later on in our discussion of vertical integration.

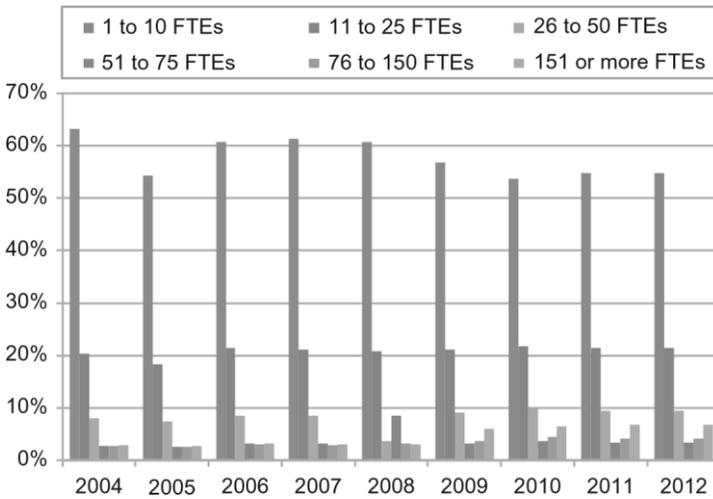


Fig. 5. MGMA Medical Groups by Size. Source: David Gans, Medical Group Management Association.
Industry Data from Pharmaceutical Marketing Firms

The most recent data has been collected by a pharmaceutical services firm Cegedim Dendrite. Their data suggest there may be as many as 53,000 medical groups in the US as of 2012. We analyzed the trend in the size distribution of groups between 2010 and 2012 using different categorizations of group size to facilitate comparison with the prior surveys presented above. Regardless of which categorization is analyzed, the data suggest remarkably little change in the distribution. Similar to the AMA data, the Cegedim Dendrite statistics suggest that the vast majority of groups are small: 51.2% have 34 physicians, another 31.3% have

59 physicians, 15.7% have 1049 physicians, and 1.7% have 50+ physicians.

Summary of Trend Data on Physician Practice Size Distribution

The various data sources reviewed above are fairly consistent in the historical trend they depict. Contrary to the assumptions of many researchers, there has been no seismic shift to larger-sized physician practices. The majority of physicians

have continued to practice in small settings, including solo practice. Much of the shift in practice organization has been from really small practices (from one, to three to four doctors) to slightly larger practices (from five to nine or more doctors).

Consistent with Newhouse's (1973) observation, many physicians still favor a cottage industry model of practice organization. As some recent observers have noticed, the death of private and small practice is exaggerated (Joszt, 2013). Large groups with 50 or more doctors are still a small, though rapidly growing, proportion of the group population.⁵

Despite relative stability in the distribution of practices of various sizes, the upper tail accounts for a larger percentage of practicing physicians and the most rapid growth in total physicians and physician visit volumes. Moreover, the average size of these large groups (mostly hospital sponsored) appears to have increased much more than the smaller, physician-owned groups, both in absolute and percentage terms. Such changes within the largest sized groups are masked by the size distributions reported in the figures above. These differences have enormous implications that we shall consider below in our discussion of vertical integration.

LONGITUDINAL ANALYSES OF THE SPECIALTY MIX AMONG PHYSICIAN PRACTICES

While there are several surveys that speak to the size distribution of physician groups, only a handful describe the changes in their specialty distribution. Using such trend data we attempt a second survivor analysis regarding specialty mix that may speak to the issue of scope economies. Here too, the story is one of persistence, not of massive change.

Industry Data from the AMA

The AMA reports on Medical Group Practices in the US indicate growth in the number of both single-specialty and multispecialty group practices between 1984 and 1997, with only slight change in the percentage mix between the two. Single-specialty practices comprised 70.71% of all groups throughout the period; multispecialty groups, on the other hand, rose from 18% of groups to 22% by 1997. The residual consisted of small groups of family practitioners, which decreased slightly. There was little change in the average size of the single-specialty groups (5.86.4 doctors) and multispecialty groups (23.426.6). These

statistics do not suggest any widespread shift to multispecialty practice as the prior millennium came to a close.

Data from the Center for Studying Health System Change/Community Tracking Study

CSHSC researchers suggest that the prominence of single-specialty groups may have grown in the new millennium. Between Round 2 (1998-1999) and Round 3 (2000-2001) of the CTS, the proportion of physicians in large multispecialty groups fell markedly: the percentage in groups of 50+ doctors dropped from 46.4% to 27.4%, while the proportion in groups of 20-49 decreased from 25.2% to 18.8%. Smaller multispecialty groups increased, on the other hand. The researchers note that not a single large multispecialty group was created in any of the 12 CTS sites during the interval, and that several actually disbanded (Casalino, Pham, & Bazzoli, 2004). In California, for example, nearly 150 physician organizations closed or went bankrupt between 1998 and 2002 (Kirchhoff, 2013), possibly reflecting collateral damage from the managed care backlash and the triumph of health plans based on broad physician networks over closed panel models. The shrinkage of large multispecialty groups could also have resulted from the collapse of the large physician practice management firms (PPMs) like Phycor and MedPartners, which concentrated their development activities on large groups.

Subsequent CTS reports suggest that physicians were increasingly gravitating to mid-sized single-specialty groups (6-50 doctors), with no parallel movement toward multispecialty practice (Liebhaber & Grossman, 2007). This may have reflected an effort by specialists to achieve scale for bargaining leverage with health plans in their communities. The percentage of physicians in multispecialty groups dropped from 30.9% to 27.5% between 1998-1999 and 2004-2005, again perhaps due to the collapse of PPMs built on the roll-up of multispecialty practices.

Physician interviews suggest several advantages of single-specialty groups that may explain their growth: simpler governance and operational issues (due to the absence of cross-subsidies to primary care practitioners in the group), ability to gain bargaining leverage with payers, greater profitability or higher earnings per physician due to the absence of money-losing primary care physicians (PCPs), and, crucially, the ability to bill for technical fees through captive imaging and surgical facilities.

Summarizing the Historical Trend Evidence

The analyses above cast doubt on the presumed production efficiency benefits of larger scale and multispecialty practice. Physician-owned groups have displayed no massive long-term movement toward such settings. Instead, they have persisted in traditional arrangements of solo/small groups and single-specialty practices, where they still account for a majority (albeit falling) of physicians and patient visits. Groups owned by outside organizations (hospitals, health plans, equity investors) have developed much larger scale, however, and may also have more specialties represented. This suggests there may be two stories at work in physician organization: one characterizing a large number of groups at the bottom tail of the size distribution featuring a traditional, highly fragmented small scale of practice, and one characterizing a much smaller number of very large and growing groups with non-physician sponsorship at the upper end of the size distribution. These two stories are summarized here as a “tale of two tails.”

One possible explanation for the first tail is that a sizeable fraction of physicians believe there are limited advantages to scale and scope, and therefore have voted with their feet to retain small, single-specialty practices.⁶ Patients may likewise prefer doctors in smaller settings, which may have helped to sustain them. To test this explanation, the next section analyzes the academic argument for horizontal integration among physicians and the research evidence for scale and scope economies. One possible explanation for the second tail is that, like the IDNs and the hospital system formations of the 1990s, groups of large scale have been assembled (primarily by outside parties in vertically integrated arrangements) to develop market power, contracting leverage over payers, influence referral patterns for lucrative inpatient and outpatient hospital services, and diversify revenue streams. To test this explanation, the following sections analyze the academic arguments for vertical (and virtual) integration and the research evidence.

HORIZONTAL INTEGRATION: ORGANIZATIONAL SCALE AND SCOPE IN MEDICAL PRACTICE

Rationale for Horizontal Integration

Physician groups can be formed either organically as physicians join one another in same-site and multi-site group practices or via mergers with other groups. Both

represent forms of horizontal integration. As noted above, physician groups can also be assembled by hospitals, universities/ medical schools, foundations, and health plans; such instances of vertical integration are analyzed in subsequent sections. Before examining the evidence on horizontal integration among physicians, it is important to discuss the theoretical rationales for such integration. Such a discussion not only serves to highlight the hypotheses that are tested in group practice analysis but also discerns whether rationales for horizontal integration among providers are similar to those posited in the economics and strategy literature in other economic sectors.

Academic Theory

Academic theory posits several potential motivations for horizontal integration. These include scale economies, synergies, enhanced market power, expedited market entry, market entry without adding a new competitor, capital raising potential, and better use of a target firm's assets. Some sources of scale economies are based in production efficiencies; others are based in marketing efficiencies and bargaining leverage with suppliers or financing sources. For publicly traded firms, there can be the additional benefits of expected stock price increases from an accretive merger, using stock rather than cash in a market upswing to finance the merger, and the opportunity to discipline the managers of the target firm (Besanko, Dranove, & Shandley, 2000).

Provider Rationales

Over time, health care providers have enunciated their own rationales for horizontal integration. Some of these coincide with industrial organization theory: scale economies, reductions in excess capacity, market power (e.g., increased negotiating leverage with suppliers or purchasers), increased access to capital, and geographic expansion of their product distribution networks. Other rationales for horizontal integration in health care, however, seem unrelated to conventional academic theory: preparation for managing capitated risk contracts, and alignment of strategic purposes among operating units (Burns & Pauly, 2002).

The enunciated rationales for physician group development include creating modern practice infrastructure such as information technology (IT) and revenue cycle enhancement, enhancing operating efficiency, creating negotiating leverage, relieving physicians of administrative duties, income preservation, improving quality, increasing scale to manage risk contracts, improving the ability to coordinate care and referrals, positioning to serve as an ACO under health reform, fostering physician leadership, supporting population health, and

improved ability to manage an uncertain and turbulent environment (Crosson, 2005; Goldstein, 1996; Krohn, 1998; Shortell & Schmittiel, 2004).

There is thus only partial overlap in the rationales for horizontal integration in industry and in physician practice. This suggests that group practice formation may achieve some benefits of larger scale, but might also serve broader strategic aims of a sponsoring organization. It also suggests that the logistical complexities of medical practice may vitiate scale benefits that might otherwise accrue from horizontal integration in a less complex economic activity.

Economies of Scale in Physician Practices

Newhouse (1973, p. 51) long ago observed that economies of scale in physician practice are often just assumed to be true. The same can be said for scale economies in other health care organizations. Potential scale economies can include shared fixed costs, specialization of labor inputs (e.g., use of non-physician personnel), internalization of referrals, exploitation of reputational economies, bulk purchasing, use of internal quality monitoring, and extended patient coverage (Pope & Burge, 1992). At the same time, physician practices can suffer from several types of inefficiencies including inefficient scale (number of physicians, use of non-physicians, and ancillary services), scale diseconomies due to free riding and higher patient travel costs, excessive use of inputs, excessive administrative costs, and failure to use a cost-minimizing mix of inputs and outputs (Pope & Burge, 1992).

What does the evidence say? There are two main lessons from the literature on economies of scale in physician practices. First, group practices appear to be more productive and efficient than solo practices in terms of number of patient visits or gross revenues per physician (Boan, 1966; Bradford, 1995; Bradford & Martin, 2000; Brown, 1988; Frech & Ginsburg, 1974; Gaynor, 1989; Gaynor & Pauly, 1990; Kimball & Lorant, 1977; Lee, 1990; MGMA, 1998; Newhouse, 1973; Reinhardt, 1972; Sarma, Devlin, & Hogg, 2010). Nevertheless, the evidence is far from absolute. Defelice and Bradford (1997), for example, find no consistent differences between PCPs in solo versus group practices in terms of their utilization of physician hours, clinical and clerical staff time, and laboratory and diagnostic equipment.

Group practice has the potential to offer a number of benefits, relative to solo practice, including leverage with health plans and hospitals (Casalino, 2003; Haas-Wilson & Gaynor, 1998a; Robinson & Casalino, 1995), profit from ancillary services (e.g., imaging, diagnostic testing), and improved lifestyle for

physicians (Casalino et al., 2003). In addition, group practice has the potential to improve quality as well as contain costs through centralized administration, purchasing, and investments in IT (Greenfield et al., 1992; Ketcham, Baker, & MacIsaac, 2007; Kralewski, Wingert, Knutson, & Johnson, 1999; Kralewski et al., 2000; Weeks et al., 2010).

Second, however, contrary to the conventional wisdom about scale, small groups tend to be more productive than large groups, with much of the limited evidence suggesting an optimal size of no more than 710 physicians (Bailey, 1968; Getzen, 1984; Ketcham, 2001; Weil, 2002; Wheelan, 2009). Ketcham (2001) found a decrease in the ratio of operating costs to relative value units (RVUs, a measure of productivity) as group size increased. However, this effect plateaued once group size reached 416 physicians (49,00063,000 RVUs), after which costs began to increase relative to unit production. Weil (2002) found that a practice size of 10 provided the maximum scale economies based on RVUs; multispecialty practices with 50+ physicians actually exhibited diseconomies of scale, potentially due to care delivery at multiple sites, a higher percentage of managed care patients, and less effective control of time and resources. A practice size of 510 may be optimal in terms of taking advantage of scale economies and decision-making without having to delegate to semi-corporate structures such as a board (Hough, 2002).

Two studies suggest that the relationship between group size and cost has an inverted U-shape, with smaller groups and extremely large groups being more efficient (Frech & Ginsburg, 1974; Marder & Zuckerman, 1985). Efficiencies in large groups were confined to multispecialty practices, and did not extend to single-specialty or family practices; large concentrations of physicians in a single specialty likely require longer patient travel times that, in turn, may dampen patient volume. Large group efficiencies were also more likely among prepaid than fee-for-service practices, suggesting a confounding of practice size and payment method. Large group efficiency stems from using different forms of physician remuneration (e.g., salaries) and spreading the costs of management investments. This conclusion about the efficiency of large-sized groups is based on survivor analyses of AMA groups between 1965-1969 and 1969-1980. Data presented in Table 1 suggests that such efficiencies in large groups are no longer evident after 1991, when the percentage of physicians practicing in large groups plateaued.

What explains the apparent limited scale economies in physician practice? As the size of the practice grows, it is possible that monitoring of physician productivity, cost discipline, and coordination of practitioners become

increasingly challenging, thus threatening the quality of patient care (although this latter effect has not been rigorously analyzed). Some research suggests that as group size increases, group culture can become less collegial and cohesive, resulting in less organizational trust and focus on quality (Curoe, Kralewski, & Kaissi, 2003). According to Wheelan (2009), increased group size is associated with decreases in intimacy, cohesion, communication, participation, trust, and satisfaction, and with increases in conflict, argumentation, and competition among physicians. This suggests that the associated adverse consequences may offset benefits of larger group size.

Newhouse (1973) argued that the combination of revenue sharing and the diffusion of accountability for managing costs led to reductions in hours worked and inefficiency in resource utilization, whose joint effects overwhelmed any potential scale economies. Newhouse concluded that “the cottage industry [of physicians] may not be so bad after all” (1973, p. 39). Subsequently, researchers concluded that there may be scale economies that are reached pretty early with increased group size, after which there may be diseconomies (Pope & Burge, 1996).

There is some recent evidence that scale economies disappear entirely when data on physician groups are disaggregated. Hough, Liu, and Gans (2013) found increasing returns to scale (measured by total gross charges per full-time equivalent (FTE) physician) in a sample that collapsed groups of different single specialties; however, returns to scale were constant when each specialty was considered separately. Returns to scale were also constant for multispecialty groups. The authors conclude there are few advantages to practice size. Similarly, Escarce and Pauly (1998) find no significant impact of practice size on per-unit practice costs.

More generally, Hough et al. (2013) show that the structure and production functions of physician practices differ substantially across specialties. Not only are multispecialty and single-specialty practices different, but also does one single-specialty practice differ from another. Size has different implications for different types of practices in terms of how they generate efficiencies, and may be constrained by local market or cultural factors. They concluded that either physicians have personal preferences for smaller practices (that may/may not sacrifice some efficiencies) or larger size is not rewarded in the market but requires external subsidy by a sponsoring organization. We return to the latter point in the section on vertical integration.

In the same vein, Kimball and Lorant (1977) considered two possible sources of higher group productivity: scale economies resulting from the technical

combination of resources, and a mix of organizational and environmental factors (e.g., incentives, administration, physician and patient characteristics). For example, physician age exhibited an inverse U-shaped relationship with productivity. The age of the group was also negatively associated with productivity. The presence of a full-time group manager, the current value of the practice's assets, and the percentage of patients referred inside the group were positively associated with productivity; the percentage of physician visits to see hospitalized patients, the percentage of patient visits that were initial visits, the percentage of patients referred outside, and the age of the office and its equipment were all negatively associated with productivity. Their research highlights an important point made long ago by Bailey (1968) and most recently by Hough et al. (2013) that there may be no one optimal size group, since different groups can utilize different resources, inputs, and product mixes to their advantage. This suggests the important role of management effectiveness, rather than scale, in group performance (Goldsmith, 2012).

Economies of Scope in Physician Practice

Another potential dimension that affects physician group performance is the practice's scope of services for example, multispecialty or single specialty. The potential benefits of multispecialty group practice are mainly derived from opportunities to improve coordination and quality of patient care, keep referrals in-house, and capture high-revenue services such as outpatient surgeries and imaging services. The empirical evidence on economies of scope, however, is very limited and mixed (Pauly, 1996). Some researchers have found large multispecialty groups to be the most efficient type of practice (Frech & Ginsburg, 1974; Lee, 1990; Marder & Zuckerman, 1985). However, the researchers note that large groups may suffer cost disadvantages if there are multiple sites of care; for example, overhead costs and the challenges of monitoring physician performance increase with practice size and geographic separation.

Two other studies report positive evidence for scope economies. Hillson, Feldman, and Wingert (1990) reported strong scope economies (in terms of the amount of physician-reported work and time, similar to RVUs) in the provision of different professional services during a patient office visit within the same group, although their results are based on patient vignettes examined by physicians in two large multispecialty practices in one city. Weeks et al. (2010) found that patients treated in large multispecialty group practices received higher-quality, lower-cost care compared to Medicare beneficiaries treated in other types of practices. However, their results are limited to fee-for-service beneficiaries and

a sample of 20 multispecialty groups that self-selected to participate in a council focused on accountability for costs and quality of care. Their study also notes the importance of favorable selection of patients into the multispecialty groups.

There are also three negative studies. Kimball and Lorant (1977) found no evidence for scale economies among multispecialty groups: physician productivity (measured in terms of net income per doctor or annual visits per doctor) declined monotonically with size, or exhibited a shallow U-shaped association with productivity (gross revenue per doctor). Rosenman and Friesner (2004) found that single-specialty groups were more efficient than multispecialty practices. Their evidence also suggested that single-specialty primary care groups had the highest levels of allocative efficiency (use of input resources) and scale efficiency. The researchers conclude that large multispecialty practices could improve their efficiency by dissolving their combination of specialists and family/general practitioners and becoming single-specialty practices. In this way, the dissolution of multispecialty groups may contribute to the growth in single-specialty groups. Finally, Sarma et al. (2010) find that combining family practitioners with specialists fails to improve office productivity.

Indeed, as noted earlier, physician efforts to develop large multispecialty groups had ceased by 2001 in all 12 CTS sites (Casalino et al., 2003). Casalino et al. (2004) suggest that the formation of large multispecialty groups has been retarded by the decline in HMOs, in whose panels multispecialty groups played a pivotal role, as well as the decline of capitated contracting generally.

Conversely, other factors have fueled the increase in single-specialty groups: capital and scale economies to invest in equipment and facilities to provide imaging and surgical services, negotiating leverage with payers, reputation as a high-quality group, professional management to deal with the regulatory environment, and lifestyle benefits due to the presence of colleagues and shared call (Casalino et al., 2004).⁷ Given limited evidence of their economic efficiency, Pauly (1996) suggests that the primary competitive advantage of multispecialty group practices may be based in coordinating processes of care (e.g., to execute managed care risk contracts) as opposed to any inherent economies of scale or scope.

Additional Evidence on Scale and Scope: Results from Three Field Investigations of Physician Group Practices

Three field investigations of group practices provide additional evidence regarding the effects of group size and specialty mix, although such effects were not the major questions of interest. We briefly summarize these studies and cull their findings relating to size and specialty mix; a detailed summary of the three investigations is available from the lead author.

Center for Organized Delivery Systems/Center for Health Management Research Between 1996 and 1999, a large research team from the Center for Organized Delivery Systems (CODS) and the Center for Health Management Research (CHMR) combined forces to study 61 physician organizations associated with 14 organized delivery systems. The study sought to identify the factors associated with physician alignment with hospital systems and the implications of such alignment for implementing evidence-based care management practices (CMPs). The study also analyzed the facilitators and barriers to achieving this alignment.

Shortell et al. (2001) found that the size and specialty mix of the group exhibited no association with an index of care management protocol use. Waters et al. (2001) likewise reported no impact of size on receptiveness to CMPs and participation in care management activities. Primary care groups were more comfortable with CMPs than were either single- or multispecialty groups, likely because they were perceived as less disruptive to their practices. Group size and structure bore little relationship with doctor attitudes toward CMPs.

National Study of Physician Organizations

Researchers at the University of California Berkeley (and their colleagues) have conducted three surveys over time of large physician organizations: groups of 20+ doctors and IPAs. The surveys were conducted in 2000/2001, 2006/2007, and (most recently) 2011/2012. The surveys have addressed a host of research issues and uncovered many important findings. Many of these deal with the implementation of CMPs, as studied in the CODS/CHMR project, and extend the earlier research considerably. Other findings deal with the impact of size and specialty mix and are thus quite germane to this review. At present, only data from the first two survey waves have been analyzed and published. Below, we consider the results that pertain to CMPs and group structure emanating from the two waves of data.

In the first wave of the National Survey of Physician Organizations (NSPO), researchers found that CMP use was associated with larger group size but not with the group's specialty mix (Casalino et al., 2003). An additional set of studies found positive effects of group size on a host of measures (CMP use, chronic care model use, Electronic Medical Record (EMR) adoption, use of disease registries

and health risk appraisals, etc.), but the effects were small in magnitude; again, multispecialty practice did not exhibit any consistent relationship. Similarly, Shortell et al. (2005) found that high-performing groups on an overall dimension of quality were likely to be larger in size, although the effect size was weak and the relationship did not hold up for two of the quality measures that comprised the overall dimension. Larger size also distinguished groups with higher profitability. Multispecialty groups, on the other hand, were not distinguished as high performing groups in terms of clinical quality or financial performance. Rittenhouse and Robinson (2006) found only inconsistent evidence on the relationship between group size and quality. Finally, CMP use was no more pronounced in nine of the largest physician groups in the US compared to the wider sample of groups studied (Rundall et al., 2002).

Results from the second wave of NSPO parallel those of the first. CMP use was associated with group size, but only in really large practices (threshold effects evident only in groups with more than 440 doctors); CMP use was not associated with multispecialty practice (Rittenhouse et al., 2010). CMP use was much lower in practices with fewer than 20 physicians (Alexander, Maeng, Casalino, & Rittenhouse, 2012). High threshold effects of group size were also evident in patterns of clinical IT capabilities such as computerized physician order entry (CPOE) and electronic registries (Robinson et al., 2009) and patient-centered medical home and care coordination activity (Rittenhouse, Casalino, Gillies, Shortell, & Lau, 2008). Longitudinal analyses revealed, however, that changes in size and CMP usage were not associated (Shortell et al., 2009). Finally, size was associated with the percentage of time recommended care was delivered or outcomes were achieved (Damberg et al., 2010).

University of Minnesota

Studies of physician group practices by Krlewski and colleagues differ from the above field investigations in several important respects. First, they analyzed groups for far longer, beginning in the mid-1980s. Second, each analysis encompassed different numbers and types of groups, leading to greater diversity in the populations studied. Third, they analyzed not only CMPs and quality programs but also group structure (bureaucracy, staffing mix) and culture, as well as outcomes such as cost, efficiency, and quality. Fourth, their studies usually focused on groups practicing in Minnesota and the Upper Midwest.

Krlewski, Pitt, and Shatin (1985) documented that multispecialty groups are the most bureaucratically complex form of group practice, followed by family/general practice and then single-specialty groups. Two studies (Curoe et

al., 2003; Kralewski, Dowd, Kaissi, Curoe, & Rockwood, 2005) found that larger-sized and multispecialty groups exhibited lower scores on most dimensions of group practice culture (e.g., quality emphasis via peer control).

Subsequent studies found that group size was associated with employment of physician extenders (Kaissi, Kralewski, & Dowd, 2003), adoption of electronic health records, and the percentage of prescriptions sent electronically (Kralewski et al., 2008). Multispecialty practice was associated with e-prescriptions but not with use of extenders.

With regard to quality and cost, the researchers found no evidence that group size or specialty mix was associated with prescribing errors (Kralewski, Dowd, Heaton, & Kaissi, 2005). Larger groups had higher costs per episode in one study (Kralewski et al., 1999), but equivalent levels of resource use in two others (Kralewski et al., 2000; Kralewski, Dowd, Xu, & Knutson, 2011). Multispecialty practice was associated with higher cost.

Summary of Findings from Field Investigations

Overall, the three investigations point to only limited benefits of group size. Any size effects that exist may occur only at high threshold levels of group size and may therefore be weak or non-existent in the vast majority of smaller groups. There also do not appear to be any consistent benefits to multispecialty practice. Indeed, the investigations support earlier conjectures that large multispecialty practices may incur bureaucratic and coordination costs that vitiate any benefits of scope. These findings are generally consistent with other research evidence that finds no effect of group size (Pham, Schrag, Hargraves, & Bach, 2005) and that structural characteristics of physician practices explain little variation in quality of care (Keating et al., 2004) and exert few consistent relationships (Greenfield, Rogers, Mangotich, Carney, & Tarlov, 1995).

Summary: Scale and Scope Economies in Physician Practice

The literature reviewed finds limited evidence of scale and scope economies in physician practice. First, scale economies appear to be quickly reached by groups of 10 or so physicians; second, scope economies do not appear to exist or are weak at best. These findings suggest why there is a thick tail at the lower end of the size distribution of physician groups and why there has been no change in group specialty mix over time. This reinforces the survivorship hypothesis: if there were measureable advantages to scale and scope in physician practice, the physician

practice landscape would have consolidated at the large end, and be dominated by large multispecialty physician groups. Rather, it appears that smaller and single-specialty practices dominate the medical group landscape because they are equally or more efficient than larger multispecialty groups. Moreover, like the distributions of practice size reviewed above, the results pertaining to physician scale and scope efficiencies appear fairly stable over time.⁸

The next section explores the benefits of vertical integration and the consequences of physician alignment with outside partners (e.g., hospitals, universities/medical schools, foundations, health plans). The analysis here shifts to groups occupying the upper tail of the size distribution.

VERTICAL INTEGRATION

Types of Vertical Integration

Physicians occupy a central position in the health care value chain that links payers, providers, and producers (Burns & Wholey, 2000, Figure 1). Several researchers have noted that physicians control (directly or indirectly) 80% or more of all health care spending via their decisions regarding inpatient admissions, specialist referrals, surgical procedures, diagnostic testing, and drug prescribing (Eisenberg, 2002; Sager & Socolar, 2005; Sirovich, Gallagher, Wennberg, & Fisher, 2008). They are also central because physicians are targets of marketing efforts undertaken by many players in the value chain (e.g., pharmaceutical, medical device, capital equipment firms). Finally, they are central to the provision of primary care, and are for most patients the initial point of contact with the health care system. Physicians thus serve as the air traffic controller directing the patient's flight plan across various delivery settings. (Though, to extend the metaphor, sometimes they monitor and guide the takeoff but delegate the landing to the family in the post-discharge, post-acute realm). This makes them ideal partners for employers, hospitals, and insurers in developing more economic care trajectories.

It is thus not surprising that many of these value chain participants might be tempted formally to incorporate physicians into their organizations to guide the flow of clinical resources. Physicians can be salaried and/or employed by hospitals, insurers, and employers, or they can be enmeshed in a rich matrix of subsidies, such as call pay, directorships, service contracts, incentive payments, gain sharing and the like that one might term "partial integration." The sections below explore some of the rationales for these various relationships.

History of PhysicianHospital Integration

The physicianhospital relationship has had a fascinating and turbulent history (Burns, Goldsmith, & Muller, 2010). Yet federal health payment reforms over the past three decades have placed an increasing premium upon their closer collaboration. During the early 1980s, passage of the Medicare Prospective Payment System shifted hospital inpatient payment away from an a'la carte toward a prix fixe model, but left physician fee-forservice payment intact. This divergence in payment methods (now referred to as a lack of financial alignment) led to increased hospital interest in partnering with their medical staffs. Nevertheless, such interest was typically confined to joint ventures and PHOs (Shortell, 1991); the 1980s saw little hospital movement toward physician employment. According to the AMA's Socioeconomic Monitoring System (SMS) Survey of a physician random sample, as of 1988, hospital employment of physicians was minimal (3.4% of non-federal patient care physicians), as was employment by universities/medical schools (4.7%). The most typical employer of a physician was another physician (Marder, Emmons, Kletke, & Willke, 1988).

During the early 1990s, the proposed Clinton health reforms called for the development of "accountable health plans" that were composed of providers (both hospitals and physicians) that were to contract on an at-risk basis with proposed new regional health alliances (formerly known as health insurance purchasing cooperatives) (Enthoven, 1993). The intention was to foster the creation of Kaiser-like group or staff model integrated health care enterprises that accepted what is now called global risk contracts. The prospect of this contracting model, which never came to fruition, stimulated a market panic in provider communities, and led to a proliferation of hospitalphysician economic relationships: PHOs, management services organizations (MSOs) to provide services to independent physicians, hospital-sponsored or hospital-affiliated IPAs, group practices without walls, and direct hospital employment.⁹ With the exception of the salaried model, the other models of physician hospital collaboration rose and then declined during that decade (Fig. 6).

As a consequence of the PPACA 2010, there has been renewed focus on vertical integration between physicians and hospitals. All of the economic models initially developed during the 1990s can support the physician infrastructure for ACOs: PHOs, MSOs, IPAs, salaried employment, as well as so-called "clinically integrated networks" of affiliated primary care and multispecialty group practices. Thus, there has been reversal of the downward trends observed in Fig. 6 going forward.

Rationale for Vertical Integration

Academic Theory

Academic theory suggests several rationales for vertical integration in industry. These include minimizing the sum of production and transactions costs, for example, by fostering closer collaboration between adjacent stages in the value chain when the gains from their coordination under a

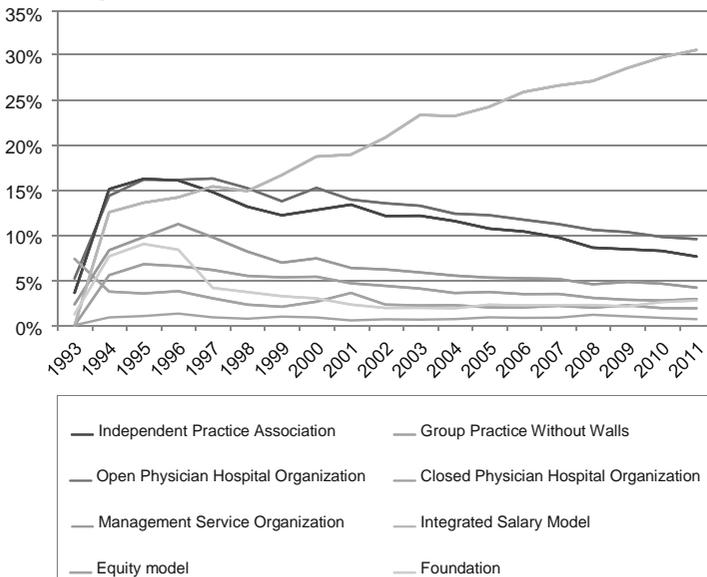


Fig. 6. Physician Hospital Arrangements 1993-2011. Source: Peter Kralovec, Health Forum, American Hospital Association.

common hierarchy exceed the loss of scale economies from market-based transactions. Other rationales include reducing the threat of opportunistic behavior by trading partners, securing stable distribution systems for finished products, pooling of complementary assets, ensuring access to needed inputs (and blocking competitor access to those same inputs), and creating market power over buyers and suppliers (Besanko et al., 2000). In the health care instance, hospital-physician integration can theoretically lead to efficiency gains by lowering transaction costs and improving efforts to monitor, manage, and coordinate patient care.

Provider Rationales

Rationales for vertical integration in health services diverge somewhat from those offered by academic theory. During the 1990s, a period of frenzied vertical integration activity, the rationales included preparing for global risk contracting or capitation (e.g., by incorporating PCPs into hospital networks), increasing network size and geographic coverage to handle risk contracting, taking responsibility for the health status of the local population, offering a seamless continuum of care, responding to federal and state health reform legislation, and protecting and expanding the supply of physicians (Burns & Pauly, 2002). During the 2000s, some additional rationales were added: mitigating competition between hospitals and their medical staffs, sharing the cost of clinical IT with physicians, helping physicians stabilize their incomes and supporting malpractice expenses, increasing the predictability of the physician's caseload with a desire to improve care, developing regional service lines, creating entry barriers to key clinical services, helping hospitals deal with physician shortages and recruitment needs, developing a branding and differentiation strategy, enhancing clinical quality, leveraging payers, and preparing for ACOs and the "triple aim" (Goldstein, 2005).

Hospital versus Physician Perspectives

Moreover, the vertical integration rationales offered by hospitals and by physicians have often differed from one another (Burns & Muller, 2008). Hospital goals have centered on capturing outpatient market share, increasing hospital revenues and margins, increasing hospital leverage over pricing, improving care processes and outcomes, addressing pathologies in the traditional medical staff by "aligning incentives," increasing physician loyalty, and increasing physicians' incomes. For their part, physicians have sought increased access to capital and technology, greater physician influence (*vis-a-vis* payers), greater physician satisfaction, increased patient service quality, and increased incomes with reduced business risk. The overlap in the two sets of rationales seems to be limited to enhanced quality and increasing physician incomes.

Benefits to Hospitals. From the hospital's perspective, physician alliances can generate increased inpatient admissions and outpatient visits, as well as consultations with hospital specialists through referrals. Many hospitals have utilized acquired physicians to build up outpatient volumes and revenues in the face of flat inpatient business. Medicare has reimbursed hospitalbased outpatient care at much higher rates than similar care provided in the community: evaluation and management (E&M) visits were priced 80% higher, ambulatory surgical

services were priced 74% higher, and outpatient imaging tests were priced 141% higher (MedPAC, 2012; Regents Health Resources, 2011). Commercial insurers may also face higher rates charged by hospital-acquired practices (Advisory Board, 2012). The result has been faster rates of growth in Medicare fee-for-service outpatient spending (37.0% during 2005-2010) compared to inpatient spending (9.4%), where admission rates have been flat.

Vertical integration with physicians can also theoretically improve hospitals' bargaining positions in the face of increasing HMO/managed care presence. Research from the 1990s showed that the presence of any hospital-physician contractual model, and especially tighter linkages such as employment, was associated with a higher percentage of hospital revenue from MCOs (Morrissey, Alexander, Burns, & Johnson 1996). Integration can also potentially help hospitals to succeed under pay-for-performance and shared savings models by improving cost control and quality of care; for example, physician employment might allow for greater collaboration, improved monitoring of quality of both physician and hospital treatment, and improved CMPs (Budetti et al., 2002; Madison, 2004; MedPAC, 2008).

In the absence of affiliation with local physicians, a hospital may be concerned that these physicians will affiliate with another hospital, develop their own risk contracting capacity through IPAs, or invest in physician-owned competitors such as ambulatory surgery centers or specialty hospitals which could divert patients and revenues, especially in competitive markets (Casalino & Robinson, 2003; MedPAC, 2008). Physician acquisitions can help hospitals deal with shortages of both primary care and (some) specialist physicians, as well as with decreased availability of physicians due to the historical trend among younger doctors to work fewer hours and decreased willingness to take call and work in the emergency room (Kirchhoff, 2013; Staiger, Auerbach, & Buerhaus, 2010). Acquisitions can thus facilitate the hospital's physician recruitment and medical staff planning strategies. Similarly, physician employment may allow hospitals flexibility to deal with either a continued fee-for-service environment or a possible shift to more risk-based contracting (Kocher & Sahni, 2011).

Benefits to Physicians. From the physician's perspective, vertical integration with a hospital may lead to additional income (e.g., through ancillary services, higher professional fees in hospital outpatient settings, or billable technical fees for hospital-based providers under Medicare), better access to insurers' networks and better payment rates, and improved lifestyle (MedPAC, 2008). The potential for

gains from hospital/physician integration, however, is counterbalanced by the challenges of aligning the two parties' interests and incentives (Budetti et al., 2002). Many physicians may seek employment to limit their business risk, pay down their debts, or bridge to a planned near-term retirement on the hospital's salary guarantee. Many hospital CEOs report a marked fall-off in physicians' productivity as they transition from private practice to hospital employment. They report some younger physicians choosing hospital employment solely for lifestyle reasons.

Physicians might also seek employment by hospitals to avoid bearing the costs of compliance with the HITECH Act (2009) requirement to demonstrate meaningful use of electronic medical records. In addition, employment may enable physicians to expand their group to afford new equipment and services, prepare for risk contracting, and seek safety from the impact of reform.

Potential for Anticompetitive Effects

Hospitals formed IDNs with physicians during the 1990s to garner risk contracts and leverage insurers for higher reimbursement. The former strategy met with limited success; the latter strategy met with little in that decade. There is concern today that the main motivation behind hospitals' development of ACOs and acquisition of physicians isn't saving Medicare money, but generating more fee-for-service income. Academic researchers recognize that vertical integration can have significant anticompetitive effects (Gal-Or, 1999; Gaynor, 2006; Haas-Wilson & Gaynor, 1998a; Simpson & Coate, 1998). For example, if a hospital controls a large number of physicians in a region, this could limit the access of both health insurers and other hospitals to physician services and/or reduce acquisition opportunities for competitors or outside firms in the physician services market.

Such vertical integration and resultant market leverage might well be used by the hospital to increase the prices paid to its integrated physicians and hospital services by threatening not to contract with one or more local health plans; here, a competitive physician market is rendered less competitive through integration. In these cases, integration might lead to higher prices of hospital/physicians services and potential price discrimination (Simpson & Coate, 1998).

It is also possible that vertical integration does not have anti-competitive effects, if health plans and consumers have multiple choices of competing integrated networks in a given market. Vertical integration might promote

competition when competing hospitalphysician networks coordinate patient care to lower costs and improve quality, reduce their transactions costs, and pass along the savings to payers, forcing their competitors to match their efforts. This was the core thesis behind the “managed competition” model advocated by Enthoven (1993). The extent to which this happens is a vitally important research issue going forward.

We suspect that the current flurry of vertical integration activity will have a net anti-competitive and thus cost-increasing effect. First, as reviewed below, vertical integration in health services has been shown to lead to higher prices rather than lower prices. Second, there is a chorus of allegations about the anticompetitive nature of hospitals’ efforts to acquire and employ physicians. These complaints are voiced by competitor hospitals, independent physicians, and commercial health plans (Advisory Board, 2013; Creswell & Abelson, 2012; Indest, n.d.). Such complaints (typically by insurers) often prompt Federal Trade Commission (FTC) or Justice Department investigations of anticompetitive conduct by physicianhospital combinations.

Prevalence of the Physician Employment Model in Hospitals

There are multiple data sources on the level and diffusion of physicianhospital employment as well as non-employment integration strategies. Some of these data sources describe the models utilized by hospitals to align with their physicians. Fig. 6 depicts the rise and fall of most contracting vehicles (e.g., PHOs, MSOs, IPAs) during the 1990s and 2000s; the only model that has increased in prevalence is salaried employment by hospitals. This model has thus become the focus of interest to both providers and researchers.¹⁰

In addition to salaried employment of physicians, the AHA also tracks the prevalence of hospital systems that have integrated both physician and insurance components (cf. Bazzoli, Shortell, Ciliberto, Kralovec, & Dubbs, 2001; Bazzoli, Shortell, Dubbs, Chan, & Kralovec, 1999). The number of such systems nationally has consistently hovered around 40 despite the increase in systems from 325 in 2000 to 427 in 2010 (Burns, Wholey, McCullough, Kralovec, & Muller, 2012). We can find no research on the physician groups that comprise these systems; they are likely captured by the “other” ownership category in the MGMA database. Thus, even as systems have grown as a share of total hospital

owners, the proportion of them participating directly in health insurance markets is falling.

Prevalence of Employed Physicians

These surveys describe the percentage of US hospitals with the employed model, not how many physicians are involved. Estimates of the number and percentage of employed physicians vary widely. According to the AHA, the 2000-2011 period saw a 57% rise in physician employment. The number of employed doctors (FTEs, part-time equivalents, and a small number of dentists) rose from 79,330 to 125,087. If one weights part-time physicians as half of full-time physicians, the number of employed doctors rose from 70,987 to 111,741. As a percentage of total US patient care physicians, the ranks of physicians employed by hospitals grew from 11.0% to 14.6%. The trend data on hospital employment of physicians are presented in Table 2.

Other trend data suggest similar sharp increases in the percentages of physicians employed by hospitals. Data from the AMA's Physician Marketplace Report reveals that the percentage of all physicians employed by hospitals rose from 7.7% in 1999 to 16.4% by 2007-2008 (Kane, 2004a, 2009). Based on periodic community surveys, CSHSC researchers reported a rise in physicians working as hospital employees in the 12 markets they track from 10.7% (1996-1997) to 12.0% (2004-2005) (Liebhaber & Grossman, 2007).

A portion of these employed physicians are hospitalists. There are no definitive data on the total number of hospitalists or the percentage employed by hospitals; some are employed by physician groups. A 2009 survey conducted by the Association of American Medical Colleges

Table 2. Physicians Employed by Hospitals (1998-2011).

Year	Full-Time MDs and DDs	Part-Time MDs and DDs	Total Part- and Full-Time	Total FTE ^a MDs and DDs	Total FTE Residents
1998	62,152	15,837	77,989	70,074	78,345
1999	62,570	17,484	80,054	71,302	77,796
2000	62,697	16,633	79,330	70,987	77,411
2001	61,972	16,734	78,706	70,324	77,731
2002	63,845	17,939	81,784	72,823	78,715
2003	61,956	18,752	80,708	71,335	77,813
2004	64,392	19,514	83,906	74,148	84,628

2005	67,792	20,592	88,384	78,096	83,823
2006	71,277	21,943	93,220	82,249	85,320
2007	76,785	23,875	100,660	88,681	92,311
2008	83,495	23,850	107,345	95,400	90,543
2009	85,634	26,412	112,046	98,840	94,729
2010	91,282	24,139	115,421	103,332	95,270
2011	98,323	26,734	125,057	111,741	99,458

^aComputed by adding Full-time MDs & DDs to one-half of the part-time MDs and DDs at hospital level. M.D.=Doctor of Medicine; D.D.=Doctor of Dentistry.

Source: Peter Kralovec, Health Forum, American Hospital Association.

(AAMC) suggests that hospitalists comprise 9% (21,100/22,900) of PCPs and 4% (27,600/29,700) of physicians overall (Harbuck, Follmer, Dill, & Erikson, 2012). This total figure corresponds with the reported 2009 membership (28,177) of the Society of Hospital Medicine (SHM); by 2011, membership had reached 34,411 physicians.¹¹ Additional SHM data for 2000-2006 suggest that hospitals employed roughly one-third (33.34%) of all hospitalists, while physician groups employed another 14.24%. (The HealthLeaders survey similarly reported that 38% of hospitalists were hospital employees.) Applying this one-third statistic to the 2009 AAMC survey figures provides a point estimate of 9,209,900 hospitalists employed by hospitals in 2009. Between 2003 and 2009, the percentage of hospitals with a hospitalist group rose from 29% to 58%; the SHM now estimates that as many as 57% of hospitalists are now employed by IDNs.¹²

Prevalence of Employed/Owned Physician Groups

Trend data (2003-2012) provided by MGMA, presented in Fig. 7, indicate a decline in the percentage of groups owned by physicians (from 83.2% to 72.5%), and a rise in the percentage owned by hospitals (from 8.3% to

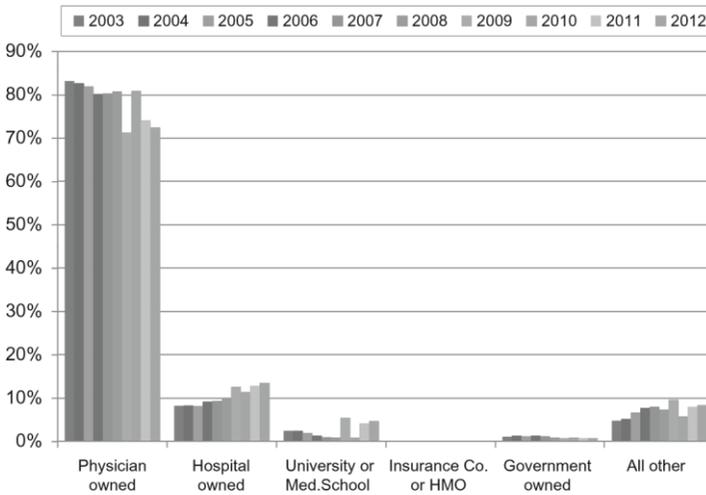


Fig. 7. MGMA-ACMPE Medical Groups by Ownership. Source: David Gans, Medical Group Management Association.

13.6%), universities/medical schools (from 2.5% to 4.7%), and other owners (from 4.1% to 7.4%). Trend data from the NAMCS, depicted in Fig. 8, show the changes in the distribution of practice ownership over the recent period (2008-2011). The major change has been the marked decline in physician ownership and the rise of hospital ownership (approaching 30% of practices in 2011).¹³

While the share of medical groups employed by non-physician firms (e.g., hospitals, payers, PPMs) in the MGMA database is small, their share of the MGMA member physicians has grown much more. As noted above, between 2003 and 2012 the percentage of hospital-owned groups increased from 8.3% to 13.6%; their share of MGMA physicians increased more substantially from 17.0% to 33.8%. This is because hospital-owned groups are much larger than the physician-owned groups. In fact, while the average sized physician-owned group in the MGMA database increased from 16.4 to 21.3 doctors (2003-2012), the average sized hospital-owned group nearly doubled from 64.3 to 120.6 physicians.¹⁴ The average size of university/medical school-owned groups rose from 258.0 to 406.4, although their share of MGMA doctors remained flat (20.7% in 2003, 19.3% in 2012). Physician groups owned by “other” firms increased from



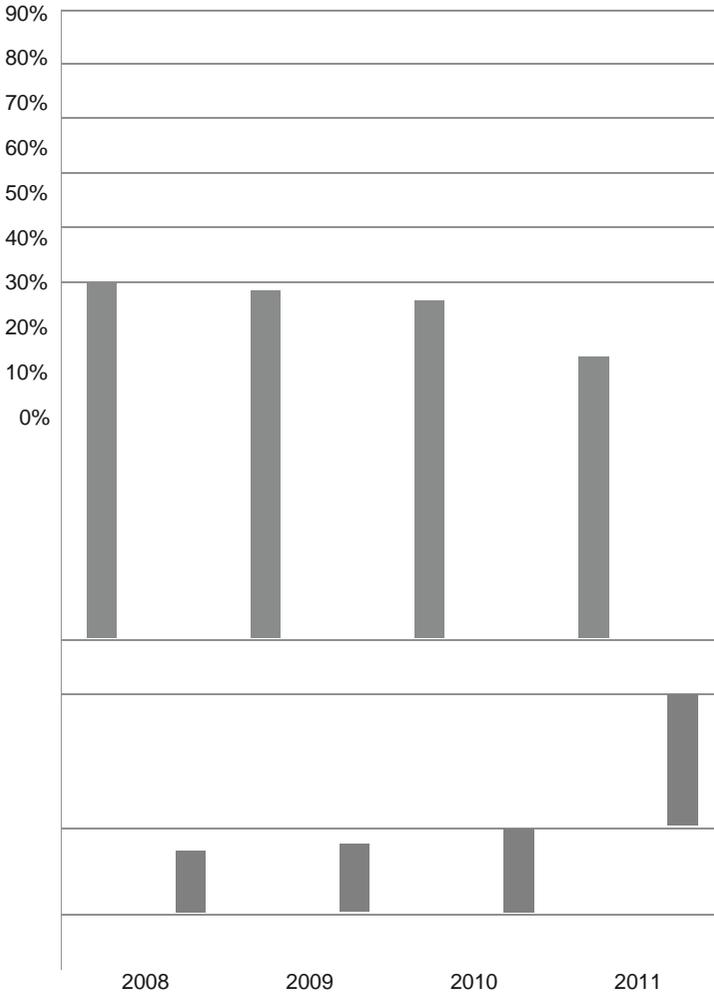


Fig. 8. Distribution of Office-Based Physicians by Practice Ownership. Source: National Ambulatory Medical Care Survey (CDC, 2007a, 2007b, 2008a, 2008b, 2010a, 2010b).

6.1% to 19.3% of the total; their average size skyrocketed from 46.1 to 143.8 physicians.

MGMA data further reveal that the increase in the right-hand tail of the size distribution of medical groups (groups with greater than 150 physicians) comes primarily from those formed by hospitals, universities/medical schools, and other

firms. Between 2005 and 2012, there was a net gain of 236 groups with more than 150 physicians (from 199 to 435). As a percentage of all MGMA member groups, this represented an increase from 3% to 7% (hence, the use of “tail”). Of these 236 groups, 89 were hospital-owned, 95 were university/medical school-owned, 32 were other-owned, and only 31 were physician-owned. While some physician-owned groups experienced organic growth, they lost market share, particularly in the largest-size category.

Performance of Vertically Integrated Arrangements Between Hospitals and Physicians

Empirical Evidence: Impact of Vertical Integration on Prices

The effects of vertical integration on hospital prices are inconsistent. Cuellar and Gertler (2006) found that integration (via PHOs) was associated with an increase in prices for both indemnity and managed care patients; conversely, integration via IPAs and salaried models did not impact price. Ciliberto and Dranove (2006) found that integration of hospital-physician arrangements was not associated with significant changes in hospital prices. These contradictory results may be due to their different settings; Cuellar and Gertler studied integration in Arizona, Florida, and Wisconsin between 1994 and 1998, while Ciliberto and Dranove used data from California between 1994 and 2001 (Gaynor, 2006). Berenson, Ginsburg, and Kemper (2010) note that physician-hospital alliances fostered joint negotiations with payers and higher bargaining power in California.

Recent antitrust actions undertaken by the FTC highlight some of the possible issues related to practice acquisition. Along with the Attorney General of Idaho, the FTC has challenged the acquisition of a large primary care group by St. Luke’s Health System in Boise (Federal Trade Commission, 2013). According to the FTC complaint, the acquisition would give the hospital a 60% share of the adult primary care market and lead to several negative downstream consequences. St. Luke’s Health System could induce the newly acquired physicians to shift their admissions and specialty referrals to the hospital system and away from competitors.

It could, in turn, charge higher prices to commercial payers who, facing such a dominant provider, would be unable to find alternative providers and thus be forced to pay quasi-monopoly prices. Such higher prices would ultimately be passed onto employers (in the form of higher premiums) and patients (in the form of higher co-pays for patient visits and ancillary tests), and might lead employers

to reduce health insurance benefits. Conversely, the higher rates charged along with the higher payments the hospital would receive from Medicare for hospital-based ambulatory care would be passed on to the acquired physicians in the form of higher compensation.

The FTC supported these allegations by citing the hospital's history of multiple group acquisitions and the higher prices charged payers in the local market. The FTC also alleged that St. Luke's documents admitted the employment strategy was designed to raise profits, not achieve lower costs. Moreover, by aligning, St. Luke's Health System and the physicians could each seek significant rate increases from payers, knowing the latter must contract with one or the other.

We should note that employment models are not alone in their anticompetitive conduct. Prior FTC investigations of PHO and IPA models also found market foreclosure and resulting higher prices charged to commercial payers (cf. *FTC vs. Piedmont Health Alliance*, *FTC vs. Evanston Northwestern Healthcare Medical Group*).

Empirical Evidence: Impact on Hospital Cost and Quality

Evidence regarding the impact of hospitalphysician integration on cost and quality likewise remains scattered and ambiguous (cf. Burns & Muller, 2008). Cuellar and Gertler found that IPA, PHO, and salaried employment models of integration all failed to lower hospital costs. Madison (2004) found that patients treated in hospitals with salaried employment of physicians received more intense treatment (i.e., higher procedure rates), resulting in higher expenditures. Nevertheless, the effects are small, the results are limited to heart attack patients, and the findings come from the early years of hospitalphysician integration. The Minnesota field investigations likewise found higher resource use and higher costs among vertically integrated groups (Kralewski et al., 2000; Kralewski et al., 2011). To the extent that physician employment/acquisition is driven by the desire to bill at higher rates in hospital outpatient settings, costs to Medicare are bound to rise. Given the 20% cost-sharing that Medicare patients bear, such arrangements also increase the prices to patients (Matthews, 2012).

With regard to quality, Madison found that unlike IPA and PHO models, salaried employment models were associated with lower hospital mortality rates. The NSPO field investigation found that ownership by hospitals and plans was one feature that distinguished medical groups in the top versus the bottom quartile of performance in terms of care management and health promotion. A series of NSPO studies found that group ownership was associated with activities in health promotion, chronic care management, EMR adoption, use of chronic disease

registries and CMPs, and use of patient and physician reminders; the results were oftentimes statistically insignificant, however. Ownership was also associated with an increase in CMP use over time. On the other hand, some NSPO studies found no effect of vertical integration on clinical IT capabilities in the group or the presence of patient-centered medical home processes in large groups. The Minnesota field investigations found higher rates of inappropriate emergency department (ED) visits and avoidable hospitalizations in the acquired groups.

Empirical Evidence: Impact on Productivity and Profitability

Research on the effect of integration on physician productivity and hospital profitability has produced mixed results. On the positive side, Wan, Lin, and Ma (2002) found that the presence of a PHO, MSO, or IPA model was associated with greater hospital efficiency (cost per admission, occupancy). Similarly, Goes and Zhan (1995) found that greater levels of financial integration between hospitals and physicians were associated with lower hospital costs and higher occupancy, but might result in lower operating margins. Integration with a multihospital system was not associated with hospital cost or occupancy, but was positively related to operating margin. By contrast, the NSPO field investigation found that hospital ownership of physician groups was not associated with better group financial performance.

On the negative side, Stensland and Stinson (2002) found that tighter forms of integration (i.e., where the hospital owns or manages the physician practice, similar to the MSO and employment models) in competitive markets resulted in decreased length of stay, inpatient admissions, and net income. In geographically isolated markets, integration decreased length of stay and increased admissions, with no impact on hospital profitability. In a similar vein, Burns, Gimm, and Nicholson (2005) found that hospitals that employed more than 140 physicians in the 1990s experienced significantly lower returns on total assets. Hospitals that invested \$40 million or more in physician integration experienced significantly lower operating margins and return on assets. Hospitals that elected to acquire and salary physicians (as opposed to acquisition only, salary only, or no acquisition/salary) experienced lower total and operating margins and lower returns on assets between 1995 and 1999. Overall investments in integration (physician, hospital, health plan) and investments as a percentage of capital expenditures were likewise significantly associated with declines in operating margins and returns on assets.

During the 1990s, analysts commonly observed that hospitals lost an average of \$100,000 per acquired physician per year (Advisory Board, 1999). Most of

these physicians were PCPs who were offered guaranteed salaried contracts with no performance incentives. Adding some validity to these figures, the bankruptcy proceedings of a large hospital system in the late 1990s revealed that its physician division of 500+ employed doctors lost \$50 million annually. More recent data suggest that hospitals' operating losses on physician practices have widened well beyond inflation. In a survey of 189 hospital-sponsored multispecialty group practices, MGMA researchers found annual average losses of \$189,910 per FTE physician in 2010 (Gans, 2012a); only 13 of the 189 reported that median total net income (excluding financial support per physician) was zero or positive. Conversely, physician-owned groups reported a total net income of \$3,376 per FTE physician, after distributing most of the profit back to physicians as additional compensation (Gans, 2012a, 2012b). MGMA data from 2011 indicate median losses among hospital-owned groups of \$174,430 per FTE physician, compared to a positive net income of \$4,179 among physician-owned groups (Gans, 2012c).

Why have hospital-sponsored groups incurred such large losses compared to physician-owned groups? The answer does not appear to be the different financial environments they face. Recent MGMA survey data indicate that physician-owned and hospital-owned groups identify (a) financial management as their greatest challenge and (b) the same financial issues as most challenging.¹⁵ These include dealing with rising operating costs, preparing for reimbursement models that place a greater share of financial risk on the practice, and managing finances with uncertain Medicare reimbursement. Different sized groups also cite similar financial challenges.

Instead, the answer may lie in the structure of the two sets of group practices and their management. Published 2010 data from the MGMA Cost Survey (2011 Report) reveal the hospital-sponsored groups include a higher percentage of PCPs (58% vs. 51% in physician-owned groups) who generate less revenue than specialists. Such groups also have more Medicaid patients (12.2% vs. 7.4%), slightly more charity care (1.3% vs. 0.3%) and self-pay (4.1% vs. 3.2%) patients, and fewer commercial patients (50.6% vs. 55.5%). Crucially, physicians salaried by hospitals exhibit 1629% lower productivity (RVUs per physician). Collection rates are negligibly lower for employed physicians. This suggests that the reduced income incentives associated with salary guarantees as well as adverse selection of less productive physicians from the broader physician community and larger than normal numbers of young physicians just building their practices may be the culprits.

Finally, the hospital-owned physician groups have much lower revenues from ancillary tests (lab, x-ray) and nonprocedural items (e.g., infused drugs, durable medical equipment) (Gans, 2012a, 2012c). This is because the hospital accounts for those revenues separately. Much of the economic impetus for salaried employment of physicians by hospitals has been to increase these so-called “ancillary revenues,” which generate a significant fraction of hospital profits.

Unpublished 2011 data from the latest MGMA Cost Survey (2012 Report) provides additional insight into the performance differences between physician-owned and hospital-owned groups (Gans & Wolper, 2013). Researchers report that the top quartile of hospital-owned groups (in terms of overall performance) resemble the physician-owned groups in many aspects of their staffing and operations; both differ substantially with the bottom three quartiles of the hospital-owned groups. For example, the lower-performing groups employ fewer support staff (e.g., nurses) per FTE physician, provide less square footage of space per FTE physician, and have more branch clinics (with fewer physicians). Such differences in management and operational efficiency may explain the financial performance differences between hospital-owned and physician-owned groups. Many hospitals actually operate their “groups” as dispersed collections of solo and partnership practices where the only things that really change postacquisition are the nameplates on the door and the source of the physicians’ and office staff’s W-2s.

Another explanation is the possible lack of due diligence by hospitals undertaking rapid practice acquisitions and information asymmetry between buyers and sellers. Some analysts argue that hospitals may lack transparency into the acquired group’s clinical and financial performance due to the lack of robust IT inside the practice. The hospital thus lacks information on physician productivity and billing, and thus cannot accurately forecast cash flows (Baldwin, 2012). Beyond due diligence, hospitals may overpay physicians to avoid losing them to competing hospitals. To secure the transaction, hospitals may also acquiesce to the physicians’ desire to remain in their current locations and retain their current staffing and systems.

This is not meant to imply that all hospitals with employed physicians sustain this level of losses. There are several illustrations (that we are aware of) of hospitals that have eliminated their losses from their PCP divisions. Intermountain Healthcare (IHC), for example, focused on process improvement to solve concrete business problems within its employed practices. It benchmarked accounts receivable, staffing levels, and physician productivity across all medical sites. It thereby increased collected co-pays and appointments kept, and reduced days in

accounts receivable (from 80 to 34; Phil White, personal communication). IHC also ensured that hospital overhead was not transferred to the physician division, that hospital pay scales were not imposed on physician practices, and that the division could develop its own strong clinical leadership and business infrastructure to manage operations.

Empirical Evidence: Impact on Group Culture and Hospital Alignment

The University of Minnesota studies found that hospital/health plan ownership negatively impacted most dimensions of group culture (e.g., collegiality, organizational identity, trust, autonomy). Hospital ownership is correlated with the number of specialties in the groups studied, leading to some multicollinearity between vertical integration and multispecialty mix.

Early research on physician alignment (e.g., trust, commitment) suggested limited and mixed benefits of vertical integration. On the one hand, Dukerich, Golden, and Shortell (2002) and Burns, Shortell, and Andersen (1998) reported that employment exerted an indirect effect on alignment, mediated by the perceived quality of the work relationship. On the other hand, researchers found that salaried roles failed to improve physician satisfaction or reduce physician-hospital conflict (Burns, Andersen, & Shortell, 1990).

A national study of physicians in eight integrated systems in the early 1990s compared the degree of physician-hospital alignment between doctors on the voluntary medical staff, doctors involved in contracting alliances (PHOs, IPAs, MSOs), and doctors in salaried models. The alignment of salaried physicians was significantly higher, due to the large sample size of the study; differences between the three groups of physicians were small, however. Most physicians expressed tepid relationships with their hospitals, regardless of the arrangement (Burns, Alexander, Zuckerman, Andersen, & Torrens, 1995). These data suggest that the different governance models of vertical integration (e.g., salaried models), virtual integration (alliance models such as PHOs and IPAs), and reliance on the traditional medical staff exerted little impact on relationships.

These results were subsequently validated in a study of 14 hospital systems and 61 hospital-sponsored medical groups. Burns et al. (2001) found that membership in a PHO or IPA failed to increase the physician's commitment to the hospital system. By contrast, the salaried model increased the physician's commitment and identification with the system, as well as promoted greater citizenship behaviors. The impacts were statistically significant but small in magnitude, however. Alignment was not affected by the group's size or specialty mix (Alexander et al., 2001a, 2001b).

What explains the historical lack of alignment between physicians and hospitals repeatedly observed? One global reason is the historical tension that has existed between the hospitals and medical communities for nearly a century (Burns et al., 2010). Managers and professionals have profoundly different cultures and norms (Laufer, 2011; Shortell, 1991). Another explanation is the hospital's typical focus on structures to integrate doctors while sometimes ignoring the hospital processes that physicians find most dissatisfying.

As one example, a survey of physicians found that doctors perceive huge customer service gaps in three main areas: variable quality of physicians on the medical staff, adequacy of nursing staff, and efficient and timely scheduling of patients (VHA, 2003). As another example, Shortell (1991) reported the difficulties of developing trust to promote physician-hospital relationships. A third reason is the presence of third parties (e.g., PPMs, medical device firms) that compete with the hospital for the physician's attention, much in the manner of Georg Simmel's notion of *tertius gaudens*: "the enjoying third" (Burns, Nash, & Wholey, 2007). Finally, some research suggests that past hospital efforts to control physicians have spawned a union mentality among the medical staff, whose elected leadership saw its primary role as collectively representing the interests of the medical staff to hospital administration (VHA, 2002).

Most recently, Deloitte surveyed a random sample of 613 primary care and specialist physicians (Keckley, Coughlin, & Stanley, 2013). Regardless of their hospital relationships, physicians were pessimistic about the future of their profession, with 6 in 10 reporting that many of their colleagues will retire earlier than planned in the next 13 years. The three most satisfying attributes of their practices—patient relationships, protecting the health of individuals, and intellectual stimulation—do not seem to be emphasized in integrated models. Two attributes that might accompany such relationships—leading a team of health professionals and administering a complex health care organization—are ranked as the least satisfying. It is hard to imagine how hospitals might develop "alignment" among such a disillusioned group, given the historic lack of trust between the two parties (Burns et al., 2010; Laufer, 2011).

Three reports address the issue of changes in physician alignment that might follow from hospital integration efforts. Earlier surveys of Arizona physicians revealed an increase in physician-hospital conflicts in most areas studied, particularly those concerning nursing, ancillary services, and equipment requests

(Burns, Andersen, & Shortell, 1993). In a second study, researchers tracked the alignment of employed physicians with the Allina Health Care System between 1995 and 1997 (Bunderson, Lofstrom, & Van de Ven, 2000; Van de Ven, Rogers, Bechara, & Sun, 2008). The physicians' commitment to the medical profession increased while their commitment to the hospital system decreased.¹⁶ In a third unpublished study, researchers from the Center for Organized Delivery Systems (CODS) and Center for Health Management Research (CHMR) compared their surveys of physicians at three IDNs conducted at two points in time (1995, 1998) using comparable instruments. The level of alignment fell at each IDN. The researchers repeated the analyses for those physicians who responded to both surveys; the results were identical.

Empirical Evidence: Impact on Clinical Integration

Clinical integration requires structures and systems to coordinate patient care across people, functions, activities, and sites over time. Common activities include population health management, disease and demand management, electronic patient records, common patient identifiers and patient registries, CMPs, clinical service lines, continuous quality improvement, and information systems to track utilization by patient and provider. According to one review, economic integration between physicians and hospitals does not automatically lead to functioning clinical integration (Burns & Muller, 2008).

One explanation may be that clinical integration infrastructure requires (a) substantial time and resource investments to develop and (b) a long time to realize positive gains from these investments. According to the NSPO study, between 2000 and 2006 larger physician groups (20+ doctors) increased their overall use of 17 different CMPs only slightly from 6.25 to 7.67 (Shortell et al., 2009). Ownership by a hospital or HMO was not associated with a scale of 19 clinical IT functions such as electronic registries and CPOE (Robinson et al., 2009). Ownership was associated with the use of CMPs (Shortell et al., 2009) as well as the presence of care coordination and quality/safety processes (Rittenhouse et al., 2011).

Summary: PhysicianHospital Integration and Performance

The evidence base raises major questions about the effectiveness of hospitals' vertical integration strategies, particularly the employment model. Many hospitals have pursued this strategy, and incurred losses on the practices themselves, in order to grow their inpatient and outpatient volumes and revenues (e.g., through higher prices). Past antitrust actions undertaken by the FTC suggest hospitals may have had some success with this strategy. However, there is little evidence that

integration actually improves the value of the health system's "product," for example, that these arrangements improve the quality or lower the cost of services jointly delivered.

There is little evidence to date that integration satisfies another hospital objective: improved alignment between the two parties. Employed physicians express only slightly higher levels of alignment compared to those in strategic alliances and on the medical staff. In hospital administratorspeak, "alignment" is often a code word for control exerted through the employment relationship, not actual improvement in clinical service relationships. Many hospitals have used employment as a quick and easy way to develop closer working relationships with physicians which, in turn, might assist in care coordination efforts that, in turn, might help hospitals to achieve pay-for-performance and shared savings targets. This hypothesized causal chain of aspiration has too many untested and likely weak linkages to bear real fruit.

From their perspective, physicians may have sought employment relationships as an escape from the business risk of independent practice: for example, to avoid capital expenses needed to comply with the HITECH Act of 2009 (and its meaningful use requirements), to surmount the difficulty in renewing their practices with younger colleagues, or to cope with continuing payment reductions or the broader uncertainties posed by health care reform. Integration via employment may have helped physicians gain economic security, better payer contracts, and perceived safety, but at the cost of their clinical autonomy and perhaps some practice attributes they find most satisfying (Keckley et al., 2013). By seeking salaried employment, tens of thousands of physicians have successfully shifted most of their business risk to hospitals. It remains to be seen whether hospitals will generate a sustainable return on their investment in physician practice.

Over the longer term, both hospital and physician partners may find these relationships further strained by a double-whammy: continuing cuts to Medicare and Medicaid payments to providers (price-side effect) but also growing share of admissions accounted for by these public programs (volume-side effect), which generate much lower operating margins. Indeed, between 2001 and 2011, the percentage of the non-elderly population covered by public programs rose from 15% to 22%, while the percentage covered by employers fell from 68% to 58% (Fronstin, 2012).

Nationally, the proportion of national health expenditures paid by the two big public programs Medicare and Medicaid (state and federal combined) accounted for 35.6% by 2011. Given the declining real dollar payment levels from the two

public programs and their lower payment-to-cost ratios (compared to private insurance), hospitals may have difficulty financing their investments in physician practices. Hospitals may be faced with the prospect of unwinding some of these acquisitions, as they did in the late 1990s and early 2000s, or of dramatically restructuring the employment contracts with physicians to reduce operating losses.

In these contract renewals, hospitals could be pressuring their employed physicians both to do more (see more patients per hour, admit more patients from the ED, refer more patients in-network) and to do less (reduce lengths of stays, reduce inpatient costs in bundled payment, and gain-sharing programs). Managing these often conflicting incentives and economic pressures will create yet new strains in the relationship. Under the pressures of health reform, many hospitals may transition from their former role as “physician’s workshop” to a new role as “physician’s sweatshop” (Burns et al., 2010; Creswell & Abelson, 2012; Laufer, 2011).

Integration by Equity Capital: Single-Specialty Networks

Hospitals are not the only economic actor that has sought to acquire and consolidate physician practices. During much of the 1990s, hospitals competed with the investor-owned physician practice management (PPM) firms for such acquisitions. After the collapse of the PPM industry at the end of the 1990s, equity-based physician enterprises fell off the radar screen. However, formidable clinical enterprises, some publicly traded and others privately held, have since arisen to dominate certain singlespecialty markets. These companies have created administrative support and contracting infrastructure around large single-specialty groups with franchises in local markets, and contract exclusively with hospitals to provide specialty coverage in their respective disciplines. Consultants suggest that acquisitions of specialists and private equity investments likely doubled between 2008 and 2012 (Kitchell & Hurst, 2011).

Anesthesiology

Such investments feed on the growing supply challenges and discontentment among several specialties. Anesthesiologists, for example, have suffered declining payment from Medicare, competition from substitutes (certified registered nurse anesthetists, or CRNAs), lack of evidence regarding superior outcomes of anesthesiologist-directed care, the threat of commodification of

anesthesia services, pushback from hospitals on their requests for practice support, targeting of anesthesiologists as the deep pockets in malpractice cases and increased liability costs, medication shortages, and difficulties in demonstrating the value-added of their services.

In response, anesthesiologists have joined one of several equity-backed firms consolidating the specialty. Nearly all of them rely on the scale economies argument to justify their strategy. One of the most successful is Sheridan Healthcare, backed by the private equity firm Hellman and Friedman, which generated \$140 million in operating earnings in 2012. Starting with anesthesiology, Sheridan has diversified into three other hospital-based specialties (emergency medicine, neonatology, radiology) and now employs 1,600+ physicians at 130 sites in 20 states.

Another successful anesthesiology company is Pinnacle Partners in Medicine. Pinnacle offers a network of 770 anesthesia providers and provides coverage at 130 hospitals, ambulatory surgery centers, and medical centers. Pinnacle aspires to be a national physician-owned organization of hospital-based practitioners. Physician members retain local management and control, and enjoy an equity stake in the firm. Pinnacle provides its physicians with back-office functions, large scale to help with contract negotiations with payers, and presumed scale economies.

Another major hospital-based physician company is publicly traded Mednax/Pediatrix. The Pediatrix Medical Group was founded in 1979 as a single entrepreneurial Florida-based neonatology practice. It has employed a similar, exclusive contracting model to operate the neonatal ICUs (NICUs) in over 300 hospitals nationally, and diversified into maternal and fetal medicine by creating a multi-site obstetrical group. In 2009, it merged with a large national anesthesia group similar in structure to Sheridan, and is publicly traded as MedNax with a market capitalization of \$4.4 billion. Mednax employs over 1,675 specialists in neonatology (968 physicians), anesthesiology (308 physicians), maternal/fetal medicine (172 physicians), and pediatric cardiology (104 physicians), as well as 600 nurse practitioners. MedNax hopes to differentiate itself from other PPMs by participating in clinical trials, developing its own EMR and preparing publications from its own clinical information system, developing into a “patient safety organization,” and developing relationships with both hospital and surgeon customers.

Oncology

The field of medical oncology also contains a dominant, investor-financed consolidator. US Oncology was formed through the 1999 merger of two large PPMs with multi-site oncology practices: American Oncology Resources (AOR) and Physicians Reliance Network. US Oncology functions as a classic PPM, operating and providing management services for 83 comprehensive cancer centers, and a national network of independent oncology practices composed of 1,300 physicians. The principal source of profits is physician-directed chemotherapy for cancer care, which accounts for roughly two-thirds of its revenues. US Oncology was taken private by Welsh Carson, a private equity firm in 2006 for \$1.6 billion. In 2012, having grown to \$3.5 billion in revenues, it was acquired by the diversified drug distribution and IT firm McKesson for \$2.2 billion.

Hospital Medicine

The fastest growing clinical specialty of the past 15 years has been hospital medicine. This discipline has also seen the emergence of large corporate actors consolidating the field. Nationally, there are now over 34,000 hospitalists, compared to less than 10,000 in 1995, at least one-third of whom are actually employed by hospitals. The largest consolidator in the hospitalist specialty is IPC The Hospitalist Company, which employs over 1,250 full-time hospitalists. IPC was founded in 1995, and operates 180 medical groups which staff 350 hospitals around the clock, as well as 550 post-acute facilities. IPC is publicly traded on the NASDAQ and has a market capitalization of \$803 million (as of May 13, 2013); its share price has risen 75% since 2010 (\$24.69 on July 26, 2010; \$43.28 on February 21, 2013). Other major actors in this space include Cogent, a privately held company that provides both hospitalist and intensivist staffing services through both Cogent-employed and hospital-employed physicians. Cogent claims to have 1,000 clinicians practicing in over 100 health facilities.

These large entities capitalize on the difficulties that hospitals and small hospital systems have in recruiting and retaining physicians to staff their 24/7 operations. While the groups are independent of hospitals corporately, they could not exist without hospital contracts. Whether through salaried physician groups or contracted physicians, the investor-owned companies are able to recruit from national specialty markets and offer attractive pay and benefits packages. They offer hospitals proprietary care management tools and stability and consistency in staffing, in exchange for significant mark-ups on the professional time and services of their physicians.

Vertical Integration by Health Insurers

History

Another form of vertical integration occurs between health insurers and physicians. One of the oldest and largest insurers in the US is the \$50 billion group Kaiser Health Plan, which integrates physician care with hospital and other medical services for its 9 million members inside an insurance product envelope. Physician care is provided by the enormous multispecialty Permanente Medical Groups, whose leaders effectively control the Plan in each of its regions. Despite this 70 year long success story, however, most competing health plans neither employ nor are tightly linked to physician practices in the same way as Kaiser.

During the 1980s, several large insurers (e.g., PruCare, Aetna, Cigna, FHP) pursued a staff model physician employment strategy within their HMOs. Yet another health insurer, Humana, sprang fully blown from a successful hospital chain. Neither of these strategies worked well, as these insurers divested their physician and hospital assets during the 1990s; Cigna was an exception, retaining its Cigna Medical Group in the Phoenix market. Insurers encountered problems in matching enrollees with their staff model physicians geographically. Former indemnity insurers also had limited experience in managing physician practices and found that enrollees were more loyal to the doctors than the health plans.

During the 1990s, HMO-style plans shifted their physician strategy away from employment (staff model) toward more arms-length, contractual relationships (IPA and group models). Several staff model plans divested those groups during the past 20 years. Group Health Co-operative of Puget Sound spun off its staff model physicians into a Permanente-like medical group in the late 1990s, while Harvard Community Health Plan spun off its staff model physicians into Harvard Vanguard Medical Associates, now part of the Atrius Medical Group, the largest multispecialty medical group in New England. In both cases, the stated purpose of the separation was to encourage the physicians to become a self-governing enterprise with its own P+L and significant operating autonomy. Many physician clinics divested by other insurers, such as PruCare, Cigna, and Aetna, were subsequently acquired by the PPM firms that were ascendant in the early 1990s and went bankrupt by the end of the decade.

The HMO backlash of the late 1990s doomed many provider and insurer efforts to diversify into one another's domain. Since 1996, the managed care marketplace transitioned from primarily HMO models to PPO and point-of-service (POS) plans that relied on broad provider networks. To counter consumer resistance to the narrow networks found in HMOs, some integrated health plans focused on

quality competition and improving patient outcomes, with a particular focus on preventive care. Ho (2009) provides evidence that Kaiser plans have a quality advantage (based on HEDIS scores) compared to local non-integrated plans in areas where Kaiser has expanded successfully. In addition, local competitor plans increased their quality as a result of Kaiser entry. Other physician group and IPAsponsored health plans have taken a similar approach, and a disproportionate number of the health plans with 4.5 or 5.0 Star Medicare ratings are indeed physician sponsored or controlled (IPA or group models).

Even so, successful integrated plans like Kaiser have had difficulty expanding beyond their core markets. Kaiser attempted to enter seven new markets since 1980; by 2001, it had exited four of these (Ho, 2009). Physicianinsurer integration was hindered by physician hostility to prepaid group practice, the absence of two of the three components of the traditional Kaiser model (dedicated medical group and owned hospital) in new markets, the difficulty in ramping up patient enrollment in the short term in order to compete, and, perhaps most critically, employers' preference to contract with a single insurer offering a menu of health plans (Gitterman, Weiner, Domino, McKethan, & Enthoven, 2003; Ho, 2009). Kaiser's plans were also not demonstrably cheaper than the less integrated plans against which they competed, providing no leverage to grow enrollment. In addition, requiring enrollees to switch to a restricted network of physicians proved a major constraint (Ho, 2009).

Current Payer-Led Integration Efforts

In the past few years, in response to health reform, insurers such as Humana, WellPoint, and United Healthcare/Optum have purchased medical groups in efforts to cut costs by managing patient care and physician networks (especially specialist care) more tightly (Weaver, 2011). In December 2010, Humana paid \$790 million to acquire Concentra, a chain of 300 urgent care and occupational medicine clinics in 42 states; in 2011, Humana followed up with additional acquisitions of primary care and occupational medicine clinics (Vesely, 2012). Humana also acquired a home health provider (SeniorBridge) and its 1,500 care managers for \$72 million in 2011 as well as a chain of urgent care centers (NextCare) in 2011.

In August 2011, WellPoint paid \$800 million to acquire the 26 clinics of CareMore in California, Nevada, and Arizona providing care for 54,000 patients, as well as its Medicare Advantage health plan.

In Pennsylvania, Highmark (the state's largest Blue Cross/Blue Shield plan) acquired not only the West Penn Allegheny Health System but also several large

physician practices (Premier Medical Associates, Triangle Urological Group). Unlike the approach taken in hospital acquisitions of physician practices, Highmark reportedly will allow its employed physicians to have control over ancillary care and patient referrals. These acquisitions were intended to protect Highmark members from the possible loss of a contract with the University of Pittsburgh Medical Center, which fields a competing health plan.

In August 2011, United Healthcare's OptumHealth subsidiary acquired Monarch HealthCare (purchase price not disclosed), a multispecialty group practice comprising 2,300 physicians. The Monarch's acquisition precipitated an angry reaction from some of Monarch's other health insurance partners. Following the Monarch deal, Blue Shield of California (BSC) asked arbitrators to award it millions of dollars from Monarch in damages, claiming the group induced its patients to disenroll from BSC and join another insurance plan; Anthem Blue Cross also withdrew from a pilot ACO with Monarch. It was lost on many people that Optum and United Healthcare's insurance businesses are separately managed.

The Collaborative Care division of OptumHealth (which is the controlling owner of the practices) has established multiple integrated delivery models to contain hospital re-admissions, reduce unnecessary admissions, and substitute outpatient for inpatient care.¹⁷ Collaborative Care has developed physician networks beyond those it operates directly to work with multiple payers, particularly Medicare Advantage plans. One network, Lifeprint, serves Medicare Advantage private plans in Arizona. Two other networks, Evercare and Inspiris, take risk for the continuum of post-acute care by focusing on nursing home and home health patients, respectively. Finally, in early 2013, Optum developed a partnership with Cornerstone Health Care, a large multispecialty group with 360 physicians in North Carolina, to create an ACO.

As of 2013, Optum had developed a network of 425 "affiliated" (e.g., employed) physicians (up from 350 in 2011) and 300 nurse practitioners and physician assistants in 90 primary care and urgent care clinics. Optum's network also includes an additional 4,500 "contracted" physicians, up from 1,500 in 2011, which Optum developed following its \$1 billion acquisition of WellMed Medical Management Company which provides management services to 4,000 physicians in Texas and Florida (Pricco, 2013). This twofold network model resembles a staff model organization with a wraparound IPA. The network engages in risk contracts with payers, provides data to the physicians to help them with population health management, and offers higher physician compensation to handle care coordination tasks (Stapleton, 2012).

One exception to the growth trend has been Cigna. By 2011, Cigna had expanded its Phoenix Medical Group operations to 32 locations in the greater metropolitan area and employed over 131 physicians. In contrast, by early 2012, it had cut staffing by 100, including 15 of its physicians, and closed down several of the clinics and specialty services. The insurer reportedly retrenched, offering primary and preventive care services through its captive group, and contracting out for specialty care, in an effort to cut its overhead costs.

Rationale for Payer-Led Integration

There are several rationales behind these acquisitions. First, insurers are positioning themselves for increased Medicare Advantage enrollment, which has been surging and will increase substantially with the retirement of the baby boomers, as well as for increased Medicaid enrollment following PPACA implementation in 2014. These two public programs represent the two biggest growth markets for insurers. The increased number of enrollees may be challenged to find PCPs to treat them, given the nationwide shortage and falling physician participation in both public programs but particularly Medicaid. Physician practice acquisitions may give the insurers an edge in attracting and retaining enrollees.

Second, they are developing networks to help manage the care of the sickest patients such as the chronically ill, the dual eligibles, and those with pre-existing conditions which are the target of several initiatives in the PPACA. Several of these organizations (CareMore, Monarch) have extensive care management expertise geared to high-risk populations (Main & Slywotzky, 2011), and some (e.g., Monarch) have already been selected by the Centers for Medicare and Medicaid Services (CMS) to participate in the Pioneer ACO program. WellPoint may believe it can learn from and export the best practices of the CareMore model to its other markets; other ACOs in the US have tapped the CareMore model. Insurers' seeking out the sickest patients is a profound departure from the traditional risk-underwriting/avoidance strategies pursued prior to the enactment of health reform.

Third, some insurers believe that the only way to manage risk contracts and satisfy the dictates of value-based contracting is by owning the front end of (ambulatory) care and incentivizing their employed physicians to treat enrollees cost-effectively (Weaver, 2011). Insurers who have been engaged in data analytics, population health management, and disease management for several

years may feel that they have an edge over hospital-based networks in delivering on these goals.

Fourth, some insurance executives believe their physician networks will better coordinate information and improve efficiency (Kirk Stapleton, personal communication). Physician employment inside risk-contracting networks can counteract the fragmentation inherent in fee-for-service and improve compliance with clinical protocols. Health plans intend to aggregate data tied to specific patients from their claims systems and present it to the PCP to help them manage the patient end to end. The system also improves measurable performance on quality measures and reduces practice variability, which not only increases efficiency but also positions the provider network to secure bonus payments based on quality metrics or potential shared savings.

Finally, insurers may be threatened by hospital efforts to develop captive physician networks and ACOs which might have as their real goal limiting insurer contracting options and increasing the prices charged them. Insurers may be vertically integrating back into the physician market to develop countervailing power and/or avoid being locked out (Terry, 2012).

Summary

The above review suggests that vertical integration potentially benefits both hospitals and physicians. Physicians gain income security and sometimes increased income and a more satisfying lifestyle as well by shifting their economic risk onto hospital employers. Hospital employment of physicians may provide them market leverage over payers, which in turn generates higher payment rates and possibly increased profits. Recent evidence suggests hospitals invest these profits in technology to attract patients and physicians and to pursue more physician acquisitions. There is thus a positive relationship between integration, market power, and technology (Lake et al., 2003). What the data do not tell us at this point is the level of return on the hospital investment in vertical integration.

On the other hand, there is limited evidence for societal benefits of physicianhospital integration. Studies conducted over the past two decades have investigated multiple outcomes of integration and found few positive results. There are concerns that such integration may lead to higher health costs (Berenson et al., 2010). Evidence on the effects of physician practice acquisition by equity investors and payers is limited; prior efforts in the 1990s failed, while recent

efforts are too new to evaluate. What is clear, however, is that these financial partners have continued to invest heavily and built large provider networks.

FAVORABLE RESULTS FROM HORIZONTAL AND VERTICAL INTEGRATION: SOME EXCEPTIONS

Group Employment Models

This is not to say that large horizontally and vertically integrated physician groups are never successful, however. Prominent multispecialty physician groups such as Kaiser Permanente, Geisinger Clinic, Mayo Clinic, Cleveland Clinic, and others have created high performing organizations and high levels of integration among their physician and hospital administrative personnel. In surveys of two of these institutions, the lead author found unified clinical and administrative cultures. Using an instrument developed earlier (Beach, 1992), physician and administrative personnel were asked to allocate 100 points to a series of enunciated corporate values posted on the group's website in order to describe the group's culture. The value rankings of the medical and administrative hierarchies within each institution were nearly identical.

What explains why these systems are so tightly aligned and apparently effective in their markets? One obvious reason is that they have enjoyed a long history and sufficient time to develop such cultures. Table 3 lists the founding dates of many of these systems. They were typically founded as large multispecialty groups that became the core of their current IDNs, which in turn became physician centric, physician led, and physician dominated.

This suggests that searching for empirical evidence of the positive effects of integration in the more recently formed IDNs may be premature. It may take decades for the potential organizational and societal benefits to be realized.

It is important, however, to point out that in all these mature integrated organizations, the physician group was the core. Hospitals were not (and are not today) major stakeholder and decision-makers in these groups; Table 3. Group Employment Models.

Group Employment Model Organization	Location	Startup
Bassett Healthcare	Cooperstown (NY)	1927
Billings Clinic	Billings (MT)	1911
Cleveland Clinic	Cleveland (OH)	1921

Geisinger Clinic	Danville (PA)	1915
Gunderson Clinic	La Crosse (WI)	1891
Guthrie Clinic	Sayre (PA)	1910
Henry Ford	Detroit (MI)	1915
Kaiser	Mohave Desert (CA)	1932
Lahey Clinic	Burlington (MA)	1939
Marshfield Clinic	Marshfield (WI)	1916
Mayo Clinic	Rochester (MN)	1880
Palo Alto Medical Clinic	Palo Alto (CA)	1930
Permanente Medical Group	Northern California	1945
Scott & White Clinic	Temple (TX)	1897

Source: Minott, Helms, Luft, Guterman, and Weil (2010).

indeed, some like Marshfield do not even own a hospital. Instead, the hospital is a subsidiary of the physician enterprise and, in fee-for-service models and environments, functions as a capital accumulation device that retains earnings (for future investment) and protects surplus capital from being distributed back to physicians at year's end.¹⁸

The key strategic question is whether in the newer integrated delivery enterprises, the sponsoring hospitals will devolve authority and legitimacy to the physician groups they developed, and subordinate the hospitals' role to the professional values and objectives of their physicians. It is not appropriate simply to assume that these hospital founded IDNs will evolve seamlessly over time into Kaiser or Geisinger type enterprises, which are truly physician directed.

Many of these systems also developed in rural areas of Wisconsin, Illinois, Pennsylvania, Texas, where they established dominant market shares and created entry barriers to other clinics as well as hospitals. Many also formed their own health plans, especially in the 1970s and 1980s. Historically, these systems have enjoyed stable and homogeneous leadership.

Finally, there is strong economic interdependence among the three arms of their IDNs: physician group, hospital, and health plan. The dominant physician group plays a major role in the hospital's admissions; the health plan's enrollees serve as the central supply of business to both physicians and the hospital. These economic ties are also often supplemented by (a) a high degree of shared risk, reward, and ownership among the three entities, (b) overlapping boards among the three entities, (c) overlapping medical leadership among the three entities, (d) a common culture (e.g., academic, faith mission), and (e) presentation of a uniform face to the customer and community (Burns, 1999).

There have been at least four studies of employment models that highlight their cost and/or quality advantages. One analysis compared the levels of resource utilization across five “systems of care” combining practice setting, specialty mix, and payment method: solo/single-specialty groups (fee for service), multispecialty groups (fee for service), solo/single-specialty groups (prepaid), multispecialty groups (prepaid), and HMO (Greenfield et al., 1992). The results indicated that prepaid multispecialty groups achieved the lowest hospitalization rates and diagnostic costs per visit; conversely, they had the highest rates of office visits per patient day. The researchers attributed the advantages of such groups to their efficiency in out-of-hospital patient management, including off-hours physician call coverage. However, such groups typically received the lowest patient ratings of the quality of outpatient visits: overall care, technical care, personal care, and office waiting time (Rubin et al., 1993). Newhouse (1973) made the same observation four decades ago.

A group of Harvard researchers compared the quality of primary care rendered by physicians in integrated medical groups versus those in IPAs and in hybrids of the two (Mehrotra, Epstein, & Rosenthal, 2006). Quality measures reflected the quality improvement strategies utilized (e.g., data collection, use of practice guidelines, contact of patients who missed screening), as well as the percentage of patients receiving appropriate screening exams and preventive care. They found a gradient in quality that was highest in the medical groups and lowest in the IPAs. The differences in screening and receipt of preventive care persisted even after controlling for the presence of an electronic medical record and the use of quality improvement strategies. The researchers concluded that physician group models influence quality.

Researchers at the University of California Berkeley similarly compared the level of adoption of clinical IT in organized medical groups with IPAs as part of the NSPO (Robinson et al., 2009). They found significantly higher adoption levels on most measures in groups compared to IPAs. As part of the same project, researchers also found higher levels of adoption of other CMPs.

Finally, the Medicare Physician Group Practice Demonstration analyzed the ability of 10 physician groups (many of them group employment models) to simultaneously achieve quality targets and lower cost growth in order to earn bonus payments from CMS. While most groups achieved their quality targets, few earned the bonuses associated with lower cost growth. The two best performing entities were the Marshfield Clinic (which owns no hospital) and the University of Michigan’s faculty practice plan (where one could plausibly argue that the hospital works for them, rather than the other way around) both operating in high-

utilization/high-cost Medicare markets. Annual savings per Medicare beneficiary were modest at best, and there was great variation in the savings (and losses) across the 10 groups. Most savings occurred in the treatment of dual-eligible patients: high-risk/high-cost Medicare patients too poor to pay their own deductibles and hence enrolled in Medicaid as well (Haywood and Kosel, 2011; Colla et al., 2012).

VIRTUAL INTEGRATION INTO PHYSICIAN NETWORKS

The preceding section finds that the integrated groups often have higher levels of performance on utilization metrics or quality scores compared to IPAs. This is not meant to diminish the accomplishments of the latter, however. IPAs offer many advantages over the freestanding solo practices that they aggregate into physician networks.

Historical Development

In addition to forming actual groups of co-located practitioners, physicians have also formed virtual groups among solo and small practices. Independent practitioner associations (IPAs) are collectivities of doctors that serve as managed care contracting vehicles.¹⁹ IPAs developed in the mid-twentieth century as a competitive reaction of mainstream medicine to the growing threat posed by the nascent prepaid medical groups. One of the very first prepaid medical plans in the US developed in Clackamas County in the State of Oregon in the 1920s around an independent practice association. The California Medical Association encouraged its members to join IPA models of prepaid practice to compete with the Kaiser Permanente Medical Group model (Shouldice & Shouldice, 1978). IPAs were also often established by county medical societies and called Foundations for Medical Care (Starr, 1982). Research documents significant new development of IPAs beginning during the 1970s, reaching 1,500 in 1990, and as many as 4,000 in 1996, with an average of 300 physicians each (Haas-Wilson & Gaynor, 1998b).

Two publications from the NSPO project analyze a sample of 347366 IPAs in 2003. Roughly one-fifth of these IPAs were owned by a hospital and/or an HMO, with higher levels of such ownership in California (Casalino et al., 2003; Gillies et al., 2003). Based on the CTS, the number of IPAs may actually have declined,

evidenced by a drop in the prevalence of hospital-affiliated IPAs from 33% to 20% between 1994 and 2000 (Lake et al., 2003).

IPA Benefits

IPAs are loosely integrated networks of independent physicians and physician groups that organize to accept some form of insurance risk from health plans either professional capitation or full capitation. They provide two potential advantages to physicians: the opportunity to collectively contract with health plans, and an opportunity to gain some of the advantages of group practice shared services while maintaining physician autonomy. This form of “virtual” (contractual) integration has the potential to benefit from centralized administration, risk spreading, and leverage with health plans, while being easier to establish than integrated systems or large multispecialty groups due to lower start-up costs (e.g., physicians remain in their own offices).²⁰ IPAs can also achieve cost and quality improvements in quality through enhanced monitoring, utilization review, and case management, as well as physician incentives to remain productive (Casalino & Robinson, 2003; Haas-Wilson & Gaynor, 1998b; Penner, 1997).

The popularity of IPAs reflects their accommodation to the revealed preferences of employers for broad networks and to physicians’ desire for independence. Because physicians retain their independence, however, IPAs are likely to lack the culture and organizational loyalty that characterize successful integrated systems such as Kaiser or Group Health Co-operative, which, could, in turn, limit their effectiveness (Center for Studying Health System Change, 1999).

IPA Structure and Performance

Physician Selection and Practice Organization

Differences in the organization of medical practice found in IPA, prepaid medical group, and staff models have been documented by many researchers over time (Greenfield et al., 1992; Rosenthal, Frank, Buchanan, & Epstein, 2001; Wholey & Burns, 1993; Wolinsky & Marder, 1985). Wolinsky and Marder used the AMA’s Periodic Survey of Physicians to study active physicians in different office settings (e.g., prepaid group, fee-for-service group, IPA, solo practice). They found that physicians self-selected into different settings based on a host of criteria. Compared to IPA and (especially) solo doctors, prepaid group physicians

(especially those from Kaiser) were more likely to report involvement in “the business side of medical practice” as important in their practice choice; prepaid group and fee-for-service group physicians were also more likely to mention “predictability of practice schedule” in their choice of settings, compared to IPA and solo doctors. Conversely, IPA and solo doctors were more likely to mention “personal autonomy” as important in their choice. They also found that such preferences shaped their practice patterns. For example, doctors who preferred predictable schedules worked fewer hours per week and devoted more time to scheduling routine visits; those who preferred personal autonomy worked more hours per week and devoted less time to scheduling routine visits.

Wolinsky and Marder also investigated the direct effect of the physician’s practice setting on practice patterns. Patients of physicians in prepaid group settings spent more time waiting to schedule routine office visits, compared with patients seen by fee-for-service solo and group physicians; patients of IPA physicians were in between. The opposite pattern held for the length of patient office visits: fee-for-service solo and group doctors met the longest, while prepaid group doctors met the shortest, with IPA physicians in between. Despite these differences, the various practice settings were equivalent in the number of hours worked weekly by their physicians. There were, however, significant differences in utilization. Fee-for-service solo and group doctors had the highest professional expenses, closely followed by the IPA physicians; prepaid group physicians had much lower expenses. Prepaid group physicians also substituted more office visits for hospital visits, compared to other doctors. IPA physicians resembled fee-for-service group physicians in their utilization patterns.

In a similar vein, researchers from the Medical Outcomes Study (MOS) compared five systems of care in the late 1980s (described earlier) (Tarlov et al., 1989). One analysis found that IPAs had higher hospitalization rates than prepaid medical groups, but rates lower than other practice settings (Greenfield et al., 1992). IPAs also exhibited lower office visits per patient day, suggesting they were less capable of substituting outpatient for inpatient care relative to medical groups. Alternatively, they may have been less concerned about resource consumption and more concerned about their lifestyles. IPAs also exhibited the lowest prescribing rates per patient, and incurred higher costs of tests per visit than the prepaid groups. On the other hand, compared to medical groups, IPAs typically received higher ratings by patients in terms of the quality of outpatient visits (Rubin et al., 1993). Finally, Safran, Tarlov, and Rogers (1994) showed that IPAs outperformed prepaid groups in terms of continuity and comprehensiveness of care (but not in terms of coordination). They found few differences between

IPAs and prepaid medical groups in terms of provider's interpersonal accountability, treatment manner, or technical skill.

Wholey and Burns (1993) utilized a different survey database on the four types of prepaid HMO settings (group, staff, network, and IPA) and the physicians within them. Consistent with Wolinsky and Marder, they found that prepaid group models had lower levels of utilization (admissions, inpatient days) than did the IPA models. Prepaid group physicians also had the highest professional satisfaction and the lowest rate of patient complaints. Physician survey data revealed that the IPA doctors had the least interaction with peers and the medical director, and the lowest involvement in decision-making.

Cost and Quality Outcomes

The evidence on IPA performance is mixed. Friedberg et al. (2007) find that networks of physician groups produce higher quality care than nonaffiliated practices. Similarly, Mehrotra et al. (2006) show that integrated medical groups provide higher quality care than IPAs, while the NSPO studies found that IPAs had lower levels of CMP use and less (more) developed IT capabilities for clinical (administrative) tasks. IPAs also scored lower than groups on activities dealing with health promotion, chronic care model implementation, use of health risk appraisals, use of chronic disease registries, and use of patient and physician reminders; many of these differences were not statistically significant. Finally, the NSPO studies found lower levels of clinical performance among the IPAs.

With regard to cost containment, IPAs may be disadvantaged relative to organized groups in managing capitated risk, particularly on the inpatient side where the single largest expenditures are incurred. To be fair, some IPAs may be unable to contract with hospitals on a capitated basis, and thus are restricted to capitation of professional services. Rosenthal et al. (2001) found that organized medical groups are more likely to have affiliations with hospitals or medical foundations (44% vs. 10%), to have a primary or preferred hospital (96% vs. 85%), and to have a smaller number of preferred hospitals (two vs. three) where patients are channeled.

From "Either/Or" to "Both/And"

As Collins and Poras (1994) long ago pointed out, competitive advantage often comes from combining features that are seemingly in conflict, requiring executives to shift mindsets from either/or to both/and. Despite their historical

competition, IPAs are not antithetical to medical groups. During the past few decades, medical groups have often used IPA networks as “wraparounds” for several reasons: to provide additional scale (i.e., more physicians), to provide increased geographic coverage (i.e., more delivery sites), to provide greater flexibility to physician coverage, to channel increased patient volume through a limited number of specialists (and thereby achieve greater coordination, lower transaction costs, and increased group bargaining), and to open new referral channels to the core medical group (Rosenthal et al., 2001). IPA wraparounds may also enable medical groups to keep more patient referrals “in network” and thus promote cost containment in a likely shift to capitated (risk) contracting. In their study of California, Rosenthal et al. (2001) found that wraparound models devote only 10% of professional spending to out-of-group referrals, compared to 18% in stand-alone medical groups. The IPA component absorbed 43% of the total revenues flowing into the core medical group. Large integrated group practices like HealthCare Partners have successfully employed wraparound IPAs to strengthen their bargaining position with payers, in both established and new markets, suggesting they have scale economies based on leverage.

This hybrid model makes sense given the preponderance of IPAs in some large markets, and thus their availability as contracting partners to (relatively) smaller organized groups. Two studies have found that IPAs outnumber medical groups in the State of California (Gillies et al., 2003; Rosenthal et al., 2001). Of the 153 physician organizations surveyed, Rosenthal et al. found that 53% were IPAs, 16% were medical groups, and 31% were hybrids. The IPA and hybrid model they studied were also much larger in size than the core medical groups in mean number of physicians (364 vs. 379 vs. 209), median size (236 vs. 203 vs. 93), and percentage of PCPs (30% vs. 20% vs. 27%). The wraparound model is also consistent with the dominance of IPA and network model HMOs, while staff models have decreased in number.

Illustration of the IPA’s Advantage

The nation’s largest IPA, Hill Physicians Medical Group (HPMG), has been successful in improving patient outcomes and practice efficiency while creating market leverage for their physician membership. The IPA includes over 2,000 physicians in both the San Francisco and Sacramento metropolitan areas, encompassing practices of varying sizes, but predominantly solo and partnership practices. An active physician board oversees HPMG in partnership with a management company that provides administrative coordination, management services, technology infrastructure, claims processing, and negotiation and

utilization management for payer contracts. Hill's physician board has led efforts to improve electronic health records and other IT and put in place innovative care management programs incorporating predictive modeling to identify at-risk patients. Hill also coordinates post-hospital follow-up by nursing case managers to prevent repeat emergency room visits.

HPMG uses financial incentives (pay-for-performance) to reward physicians for resource utilization, clinical performance, and participation in the IPA's initiatives. HPMG's experience suggests that key factors in making the IPA successful included gaining physician trust by demonstrating concern about physician satisfaction and promoting communication and offering upfront monetary support to establish systems such as IT (Emswiler & Nichols, 2009). HPMG has also succeeded in obtaining higher payment rates from payers, which it has used to reward its physicians and maintain their loyalty.

CONCLUSION: A TALE OF TWO TAILS

Looking back to the prior review of physician organizations in this volume (Burns & Wholey, 2000), we can now assess what has remained the same, what has changed, and how the earlier conclusions need to be updated. Three similarities exist between now and then. First, the physician sector still remains the least consolidated portion of the health care value chain; the vast majority of doctors continue to practice in small groups and solo settings. Second, physicians still confront a variety of options for consolidation, including horizontal consolidation with one another and vertical integration with other partners. Third, there continues to be an extremely thin evidentiary basis for recommending any particular approach.

Some major changes are also evident. First, amid signs of stability among the mass of physicians, physician markets are in flux. At the lower end of the distribution of group practice size, there is a long fat tail (composed of a large number of very small groups) that has undergone only modest change. At the other end of the distribution, there is a short skinny tail (composed of a small number of very large groups) that has undergone significant recent growth.

The percentage distributions of physician practice size mask four important features of this tail. First, there are a small number of very large groups. Second, the size of these groups is growing more rapidly than other groups, due primarily to hospital sponsorship. Third, there is an increasing number of these large groups,

reflecting the growth in the total number of group practices in the last few years. Fourth, these groups have grown through the investment by non-physician owners (including private equity firms, health insurers, and others), in contrast to the slower organic growth of the physician owned groups via horizontal integration. This implies that the future shape of this tail may remain dependent on external (e.g., nonphysician services) subsidy flows both for growth and continuing operation.

What can we conclude from these two tails? The persistence of the lower tail may be due to the lack of demonstrable scale and scope economies in physician practice. Or it may simply be that this tail has persisted as the dominant pattern of physician organization in the US, subject to gradual loss of market share and erosion of its economic position. Whether practices in this tail can find the economic resources to renew themselves (e.g., recruit and sustain younger colleagues) remains to be seen. IPAs might have assisted the physicians practicing in this tail in remaining viable in the face of managed care growth, but not given them the resources or leverage to prosper long term. It is entirely possible this tail erodes sharply as the baby boomer doctors who comprise perhaps two-thirds of these smaller practices retire in the next decade.

Likewise, the growth of the upper tail does not appear to be based on measurable economic returns generated within the physician marketplace. There is no evidence these large groups have been able to achieve scale and scope economies from their clinical operations (production-side economies). Rather, we believe they have been formed by hospitals and IDNs for reasons extrinsic to the physician market effects: to build up outpatient hospital utilization or inpatient market share, to leverage insurers for more favorable contracts and rates, or to position the owner for a transition away from fee-for-service payment by Medicare or commercial insurers. Indeed, the Department of Justice has already investigated several of the hospital-formed groups as well as some large single-specialty networks that contain 5070% of all doctors in that specialty in the local/regional market for possible anti-competitive effects.

As our economist colleagues would say, we may have an equilibrium with two very different configurations of firms (and likely of products too) that reflects both demand and supply side differences. On the demand side, perhaps the answer lies in differences in the groups' customers. Some patients may want to coordinate their own care by dealing with separate and smallish practices, while some others want to deal with a large multispecialty practice or health insurer, for that matter, that coordinates care for them (whether they want it or not). There is some

evidence of favorable patient selection into multispecialty groups (Weeks et al., 2010).

Alternatively, on the supply side, there is variation in firm size and managers' ability to run firms of different sizes. This may help to explain why technical economies of scale (where they exist) are not the full story. Or perhaps physicians have preferences regarding group size and what proportion of their relationships with other physicians they want coordinated within the firm or by the market. Or, perhaps doctors respond differently to within-firm incentives: some cease being productive if they get a salary versus productivity-based rewards, whereas others work just as hard and prefer the security of a predetermined salary. Or there may be generational differences in physician needs from various practice settings (need for economic security or work life balance) that predispose physicians to make different choices of practice settings. We need a theory of variation in consumer or physician preferences across different markets and practice settings to test these alternative explanations.

Interestingly, each tail could be (and has been) characterized as the more agile and adaptive to changes in the health care system: the lower end due to small practice sizes and low bureaucratic mass of their practices, the upper end due to the enhanced ability of their practices to organize new service offerings and manage risk. It is not clear at this point how each tail will fare competitively going forward. Practices in the upper tail appear to incur higher operating costs that require some compensating benefits in order to survive and thrive. Such benefits as economies of scale, which are often presumed to exist, do not appear to have been achieved thus far on a consistent basis, even in the medium or long term. If they are achieved, it may be due to management efforts and execution in spite of potential diseconomies of practice scale.

Regardless of whether groups in the upper tail enjoy any scale or scope economies, it is not clear whether they will be able to sustain their recent growth in the absence of external capital. Such capital which is needed to aggregate, integrate, and wire the practices has been supplied by hospitals, insurers, and equity firms. The lesson of the 1990s is that such external capital sources can quickly dry up. Should history repeat itself during this decade, the survivorship principle exhibited by the lower tail of physician groups will be further supported.

Enhanced market power may be another benefit to the vertically integrated physician enterprises that regulators may have trouble confronting across a wide provider landscape. Further research on this question is needed. As long as vertically integrated arrangements are able to charge and receive higher prices, they may be able to continue making the subsidy investments that enabled them

to grow in the first place. However, as the insurance landscape tilts more to public payers and administered pricing, such arrangements will be increasingly challenged to deliver on quality and cost containment metrics that have proved elusive to them in the past.

While integrated systems such as Kaiser, Mayo, and Geisinger remain a “counter-culture” in delivery of health care services (Goldsmith, 2002), huge new physician enterprises are emerging at the upper tail of group size that are major players in rapidly tightening health services markets. Some are backed by powerful, regional hospital systems. Others are backed by private equity investors and are even traded on public stock exchanges. The deeply ingrained history, mission, organization, and culture of the classic integrated care systems make them difficult to replicate in the current setting of small-group practices and fragmented care (Gitterman et al., 2003; Mechanic, 2010). However, the newer organizations appear to be more suited to a changing health care landscape that is consolidating on a large scale and is capable of managing risk.

The implementation of the Affordable Care Act is ushering in a new era that focuses on coordinating care and reducing overutilization. Whether this care coordination will result in new payment paradigms for Medicare or commercial insurance, like ACOs or bundled payment, is unclear. Past experience and the lack of consistent evidence on the impact of various organizational strategies (e.g., horizontal integration, vertical integration) suggest that widespread success in cost containment and quality improvement will be challenging. This point is further emphasized by evidence that the vast majority of the variation in patient costs is due to patient-specific factors, rather than to the delivery system and its organization (Reschovsky, Hadley, Saiontz-Martinez, & Boukus, 2011). Policymakers and providers may likely require a more systematic approach to organizing provider delivery systems and incentives.

NOTES

1. According to Marder and Zuckerman (1985, Table 1), positions in groups of 100+ physicians constituted only 8.6% (1965), 9.7% (1969), 14.1% (1975), and 21.4% (1980) of group practice physicians. According to Table 1, that percentage reached 24.8% by 1988.

2. Some of the later data are not entirely comparable with the earlier data, so care must be taken in interpreting the trends. Nevertheless, many of the years parallel those reported in the Physician Marketplace Report.

3. NAMCS data are also available for two earlier years (1999, 2002). The CDC reported that some of the statistics did not meet standards of reliability or precision. They are therefore omitted here.

4. The last statistic suggests a near doubling in the prevalence of large groups. MGMA researchers believe the number of very large groups is overstated by approximately 20% due to double counting of some groups (David Gans, personal communication).

5. Some consultants argue that the small size of many practices provides physicians the agility to more easily adapt to market changes due to their simple governance structures, thus explaining their persistence over time (Isaacs & Jellinek, 2012). An alternative explanation, per Balzac, might be that the small are difficult to crush because they lie so flat beneath the foot. In addition to retaining small-sized practices, some physicians have developed “micropractices” with little or no office staff and patient amenities to reduce overhead costs. Others have shifted to concierge practices to avoid third-party payers (see Isaacs & Jellinek, 2012).

6. Alternatively, physicians may be too stubborn to throw in their cards and admit they are losing the game. Many solo practitioners and two-person partnerships persisted after 2008 because they lacked the financial resources to retire, and have remained trapped in the lower tail of the distribution.

7. Not all of these reasons may be true, however. Leaders of single-specialty groups report they have little or no ability to negotiate higher rates from payers (at least in the early 2000s). Moreover, the retreat from HMOs and capitation at the end of the 1990s may have shifted physicians’ organizing efforts away from multispecialty to single-specialty groups for several reasons: there was less of a need to belong to groups with primary care physicians (PCPs) to coordinate care, specialists generate higher revenues than PCPs and thus do not need to share their fees with them, and there are less complex governance mechanisms in single-specialty groups.

8. Recent research to generalize Reinhardt’s (1972) production function for physician services reaches a similar conclusion. Thurston and Libby (2002) find that the technical relationships that describe the production process for physician services (the impact of capital, physician labor, and non-physician labor inputs on patient visit output) are stable over time (1965-1988). This stability holds despite the fact that the external market for physician services changed drastically (e.g., introduction of Medicare, the Prospective Payment System, managed care) during the time interval. The authors conclude that physician practices continued to treat patients in the same way they always had.

9. While the majority of IPAs are physician-owned, roughly one-fifth are hospital-owned (Casalino et al., 2003; Gillies, Shortell, Casalino, Robinson, & Rundall, 2003). We discuss them in greater detail in a later section on virtual integration. In addition to these models, physicians and physician groups can also enter into contracts with hospitals to cover specific clinical service areas such as radiology, anesthesiology, or pathology. Such physicians have traditionally been labeled as hospital-based practitioners. Data from 2010 published by the American Hospital Association (AHA) indicates that 7% of US physicians have individual contracts and another 20% have group contracts with hospitals (American Hospital Association, 2012).

10. The AHA data in Fig. 6 suggest that roughly one-third of hospitals operate an employed model. The one-third estimate seems low compared to much higher prevalence

rates frequently reported in the trade literature. For example, the Community Tracking Study found that 65% of hospitals in the 12 markets they followed owned physician practices in 20002001 (Lake, Devers, Brewster, & Casalino, 2003). According to Peter Kralovec, who maintains the AHA's database, both the percentage of hospitals with the salaried model and the number of physicians in such models have grown only slowly. Conversely, a recent survey by HealthLeaders of medical staff leaders suggests the employed model is now found in most hospitals alongside the traditional voluntary medical staff: 78% of surveyed hospitals offer full employment, 67% offer the traditional voluntary medical staff, 63% offer paid directorships, and 25% offer clinical co-management (Cantlupe, 2010). These findings diverge from the AHA statistics likely due to the small sample size in the HealthLeaders survey and the tendency to respond based on having an employment model.

11. The authors thank Professor Guy David and Mr. Joseph Miller, Senior VicePresident at the Society of Hospital Medicine for supplying these data.

12. The 58% figure is much higher than the AHA's data suggesting one-third of hospitals use an employment model. The discrepancy is likely due to (a) the fact that AHA data on hospitalists do not discriminate whether they are hospital-employed or (b) the possibility that hospitals do not consider them when they report the various physician affiliation models they utilize.

13. The HealthLeaders survey reveals that over 50% of hospitals employ no more than 20% of their physicians, although there is a long tail in the distribution: 6% of hospitals employed no doctors, 46% of hospital medical staffs contained 120% employed doctors, 20% of hospital medical staffs contained 2140% employed doctors, 7% of medical staffs contained 4160% employed doctors, 6% of medical staffs contained 6180% employed doctors, and 15% of medical staffs contained 8110% employed doctors (Cantlupe, 2010).

14. As a percentage of all MGMA members, physician-owned groups dropped from 43.6% to 35.9%. Data collected by the pharmaceutical firm Sanofi (2013) also shows a size advantage for hospital-owned over freestanding medical groups. The former are 50% larger than the latter; the differences are most notable in the largest size category they measure (20+ physicians). Twenty percent of hospital-owned groups have 20 or more doctors; among independent groups, only 9% have 20+ doctors. Hospital-owned groups are more likely to be multispecialty (55%) compared to independent groups (40%). Overall, roughly one-quarter of all medical groups tracked are affiliated with hospital systems. Note: In 2004, Sanofi merged with Aventis, which historically maintained the database.

15. The authors thank Dave Gans for sharing the survey results.

16. These aggregate trends masked some important differences, however. The Allina physicians who joined the employed group and moved through the "grieving process" of losing their autonomy became important contributors to the group and exhibited an increase in organizational commitment; those who joined the group and bemoaned the loss of their autonomy (and thus delayed the grieving process) stalled the integration process and led to a sharp decrease in organizational commitment.

17. The authors thank Chad Peel for verifying the Optum information presented here.

18. It is possible, of course, that more hospital-centric systems that dominate their local markets such as Advocate and Partners Health Care may accumulate wealth over time (extracted from payers), invest it in their owned and affiliated medical groups, and make them just as successful.

19. IPA-model HMOs are not the same as IPA physician organizations. The former developed rapidly in the mid- and late 1980s along with the managed care revolution, and became the dominant physician staffing model for HMOs. The latter arose primarily during the 1990s as one model of integrated delivery network integration between physicians and hospitals.

20. Of course, the high entry rates of IPAs may be matched by high exit rates, which occurred during the 1990s (Haas-Wilson & Gaynor, 1998b; Kirchoff, 2013).

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Horizontal and Vertical Integration of Physicians:

A Tale of Two Tails

APPENDIX

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APPENDIX

Results from Field Investigation Conducted by the Center for
Organized Delivery Systems/ Center for Health Management Research

The physician organizations (POs) studied were primarily organized groups rather than IPAs.

The groups ranged in size from 3 to 958, with an average of 76 physicians and a median size of 25, and were more likely to be multispecialty in terms of physician mix. The 14 systems ranged in size from 1-80 hospitals, with an average (median) of 21 (11) facilities. Alignment and CMPs were assessed using a host of survey instruments completed by physicians and administrators.

Alexander, Waters, Burns et al. (2001) assessed four different dimensions of alignment:

perceived physician-system relationships, loyalty, citizenship, and behavioral commitment. All of these measures were developed from physician questionnaires. None of these measures was associated with group size or specialty mix. Two of the measures are positively associated, however, with managed care pressures (percent of group revenues from HMO and PPO sources), while all four are positively associated with the

percentage of management services provided by the system (versus other sources). Finally, two of the four measures of alignment are positively associated with decentralized decision-making at the group (rather than system) level.

In a companion study, Alexander, Waters, Boykin et al. (2001) examined the effects of risk arrangements on four measures of physician-system alignment: normative commitment, system loyalty, system identification, and group behavioral commitment. While one measure of individual-based risk assumption (e.g., productivity-based models) was negatively associated with alignment, other measures of risk assumption at the individual and group levels were positively associated with alignment. However, larger group size did not foment alignment. Group size was negatively associated with all four measures of alignment, consistent with prior studies of organizational size and employee commitment. Group specialty mix had varying impacts on alignment: physicians in primary care and single specialty groups expressed lower group behavioral commitment relative to those in multispecialty groups, while those in single specialty groups also exhibited lower system identification compared to multispecialty group physicians. Multispecialty group physicians exhibited comparable levels of

alignment with primary and single specialty groups on the other two dimensions.

Shortell, Zazzali, Burns et al. (2001) analyzed two usages of CMPs in the POs: care management “deployment” and “comprehensiveness”. Deployment was measured by the product of the number of care management methods used (0-5: guidelines, protocols, case management, disease management, and demand management) and the number of practice settings in which they were used (0-9: e.g., hospital inpatient, emergency room, hospital clinic, freestanding clinic, rehab center, etc.). Thus, maximum score on the CMP deployment index was $5 \times 9 = 45$.

Comprehensiveness was measured by summing (a) the percentage of conditions/diseases (out of 19) for which protocols were used, (b) the percentage of quality of care data elements (out of 17) reported to the board, and (c) the percentage of quality of care data elements (out of 13) for which benchmarks existed, and dividing the sum by three. Univariate statistics revealed a low degree of deployment (mean = 6.33) and a moderate degree of comprehensiveness (mean = 0.32). External and internal factors to the group shaped the use of CMPs. Externally, the percentage of the medical group’s patients coming from managed care sources (HMO and PPO) was associated with both deployment and comprehensiveness. Internally, the

group's use of multiple incentive/compensation methods was positively associated with CMP comprehensiveness (but not with deployment), while the use of market-based salary grades was associated with both measures. However, group size was not associated with either index of CMP use. Moreover, the group's specialty mix (multispecialty versus primary care / single specialty), the group's culture, and the group's tenure with the system were also not associated with CMP use.

Waters, Budetti, Reynolds et al. (2001) analyzed the determinants of physician attitudes towards and participation in care management at the doctor level within the POs. They found that financial incentives for participation and the presence of a useful management information system were positively associated with physician attitudes and participation. As above, however, group size exerted little impact on CMP receptiveness and participation. With regard to group specialty mix, primary care groups were more comfortable with CMPs than were either single or multi-specialty groups. Overall, group practice size and structure bore little relationship with

CMP attitudes.

Results from Field Investigation Conducted by the National Survey of Physician Organizations

NSPO Wave #1

Casalino, Gillies, Shortell et al. (2003) describe the extent of CMP use in the medical groups and

IPAs surveyed. CMP use is assessed by the “physician organization care management index”

(POCMI, range: 0 -16), which reflects the use of four CMPs (case management, performance feedback, disease registries, practice guidelines) across four chronic conditions (asthma, congestive heart failure, depression, diabetes). The researchers found similar, moderate levels of POCMI scores in medical groups and IPAs (5.0 versus 5.4) and no significant differences by specialty mix. The POCMI was positively associated, however, with group/IPA size, the number of clinical information technology processes used, and external payer incentives for quality improvement.

Rundall, Shortell, Wang et al. (2002) analyzed the extent to which a slightly different set of four CMPs

(case management, practice guidelines, population disease management, health promotion/disease prevention) were applied to the same four chronic conditions in nine of the leading POs in the US (e.g., Mayo Clinic, Cleveland

Clinic, Kaiser Permanente, etc.). They found a similarly low level of CMP deployment: for each disease, fewer than half of the nine groups used all four care management processes. This observation led the researchers to wonder whether this level of CMP use is “as good as it gets?”

The first wave of the NSPO also yielded information on how medical groups and IPAs compare nationally and in California (Gillies, Shortell, Casalino et al., 2003). In their national database of POs, California POs account for 17% of the population. With regard to the group versus IPA comparison, medical groups are much smaller in physician membership, are more likely to be vertically integrated with hospitals or insurers, are less likely to have a high percentage of patients at risk for primary and specialty care, are less likely to have non-physician managers are less likely to have their revenues concentrated among the top three payers, and to have more

(less) developed capabilities for information technology regarding clinical (administrative) tasks.

With regard to the California versus US comparison, California POs are larger in size

(particularly for medical groups), have a heavier representation of IPAs relative to groups, have a greater presence of non-physician managers, have a higher POCMI (6.99 vs. 5.14) and more external incentives to adopt CMPs. There were no differences in the level of clinical IT capabilities.

Shortell, Schmittiel, Wang et al. (2005) investigated the drivers of high performance among the medical groups (IPAs were excluded) treating patients with all four chronic conditions. Four domains of high performance were postulated: clinical quality (the POCMI, an index of health promotion, and a summary measure), patient satisfaction, organizational learning (e.g., physician retention, index of clinical IT), and financial performance (profitability). These four domains roughly map the four dimensions found in the balanced scorecard (Kaplan and Norton, 1992). The researchers operationalized three of the four domains (no data on patient satisfaction) and examined how they were shaped by the impact of environmental pressures (e.g., managed care), resource acquisition, resource deployment, and the presence of a quality-centered culture. Here we focus primarily on the effects of resource deployment, which include group size, specialty mix, practice age, and group ownership.

The researchers then compared the top quartile groups with the bottom quartile groups in terms of each performance dimension. They found that larger group size distinguished the high performers on the overall quality measure, although the effect size was small. Larger groups were not higher performers, however, on either of the two component quality indices. Size

also distinguished groups with greater profitability, but not on either physician stability or an index of clinical IT. With regard to specialty mix, multispecialty groups were less likely to be highperformers on physician retention and were not distinguished in terms of clinical quality or financial performance. Older groups are more likely to have higher physician retention and capabilities in clinical IT, but were not higher performers in the other domains. Finally, those groups that were vertically integrated with hospitals or health plans distinguished the high performers in terms of care management and health promotion, but were less likely to be in the top quartile on financial performance.

The researchers concluded that group performance is a complex mix of internal and external drivers, such as the ability to secure health plan contracts and involvement in quality improvement initiatives. They also find that a relatively small number of groups are high performers on multiple dimensions, and that group performance is hard to improve.

Researchers published a series of other papers from the first wave of the NSPO study that deal primarily with the impact of internal and external group factors on implementation of CMPs (Li,

Simon, Bodenheimer et al., 2004), the chronic care model (Schmittiel, Shortell, Rundall et al.,

2006), EMR adoption (Simon, Rundall, and Shortell, 2005), disease registries (Schmittiel,

Bodenheimer, Solomon et al., 2005), health risk appraisals (Halpin, McMenemy, Schmittiel et al., 2005), and various types of health promotional activity (McMenemy, Schmittiel, Halpin et al., 2004; Schmittiel, McMenemy, Halpin et al., 2004; McMenemy, Schaffler, Shortell et al., 2003). They are too numerous to summarize in detail here. A few findings are worth noting, however. As in the studies reviewed above, external factors such as payer incentives for quality and internal factors such as the use of IT systems are associated with the adoption of CMPs and clinical integration activities. In addition, several studies find positive effects of group model (versus IPA) practice, although they are not always statistically significant. Several studies find positive effects of group size, although the effects are small in magnitude. Multispecialty (versus single specialty or primary care) practice does not exert any consistent effect. Finally, group ownership by a hospital or HMO often exerts a positive impact, but the results are not always statistically significant.

Using the 2006-07 survey data, the researchers found that overall CMP use (mean of 11.1 out of 24) is associated with payer evaluations of provider quality, the use of CMPs by health plans, participation in quality improvement programs, having a patient-centered focus, physician capitation for hospital costs, ownership by a hospital or health plan, and very large size (greater than 440 physicians) (Rittenhouse, Shortell, Gillies, et al., 2010). CMP use was not associated with either the presence of clinical IT or the group's specialty mix. Alexander, Maeng, Casalino et al. (2013) report that use of CMPs is much lower in small and mid-sized physician practices of 1-19 physicians (8.6 versus 11.1).

Robinson, Casalino, Gillies et al. (2009) report that groups have a higher level of clinical IT capabilities than do IPAs, are more likely to have CPOE, and are more likely to use their EMR to measure quality. Size of the group (and, more weakly, the IPA) is positively related to IT implementation; multivariate results, however, show that size exerts a significant effect only among very large groups (more than 440 physicians). IT capability is not associated with either group ownership or group profitability.

Rittenhouse, Casalino, Gillies et al. (2008) studied the presence of patient-centered medical home processes in the medical groups (not IPAs)

of their sample. Roughly one-third used primary care teams. The presence of such a team had a U-shaped association with group size, but was not associated with group ownership. The average group used two of five care coordination domains (EMR, EDI with hospital, EDI with specialists, registries, and nurse case managers). Group size was positively associated with use of such domains, with huge threshold effects for groups with more than 140 physicians; ownership by a hospital or health plan was also associated with the use of these domains. Overall, however, the researchers conclude that large groups have a low level of medical home infrastructure and have “a long way to go” (p. 1257).

In a follow-up article, Rittenhouse, Casalino, Shortell et al. (2011) report that use of primary care teams by small and medium-sized physician practices (1-19 doctors) is slightly lower (28%), as is use of the care coordination practices. Again, group size and hospital/health plan ownership are associated with greater use of medical home processes. The researchers again concluded that “major changes will be required if the patient-centered medical home is to be widely adopted” (p. 1581).

Two of the articles published from the second wave of NSPO describe the changes in CMP adoption that took place between 2000 and 2006. Shortell,

Gillies, Siddique et al. (2009) report that overall CMP use increased from 6.25 to 7.67 (out of 17); such increases were evident in both physician groups and IPAs. Bivariate results showed that changes in the group's size and EMR capability were not associated with CMP use. Groups that were physician-owned showed the smallest increase in CMP use. Factors associated with increased CMP use were the external presence of quality incentives and the change in the group's profitability. These results persisted in the multivariate analyses. In their analysis of health promotion programs, Bellows,

McMenamin, and Halpin (2010) report that the only significant increases occurred in the use of HRAs to contact high-risk patients and reminders for eye exams.

Finally, two NSPO studies look at impacts on quality. Damberg, Shortell, Raube et al. (2010) examined pay-for-performance data on the percentage of the time recommended care was delivered or an outcome was achieved among California groups and IPAs. Clinical performance was associated with medical group (versus IPA), group size, and use of CMPs. Solberg, Asche, Shortell et al. (2009) examined the determinants of group adoption of practice systems to implement the chronic care model. Implementation was more strongly associated with measures of "functional integration" (i.e., group coordinates care across service units in terms of appointment

scheduling, clinical IT, care protocols, service lines, quality improvement) but more weakly associated with “structural integration” (i.e., group provides care services across the continuum). The researchers note that integration requires more than just assembling service components but also coordinating them.

Results from Field Investigation Conducted by the University of Minnesota

With regard to bureaucratization, Kralewski, Pitt, and Shatin (1985) argue that multispecialty groups are the most complex group form due to the presence of physicians with diverse training and interests, and the provision of diverse services; single specialty groups are the least complex form, due to the presence of physicians with similar training and a narrow set of patients. Family/general practice groups occupy an intermediate position, since physicians have similar training but patients are diverse and physicians must maintain complex networks of referrals to specialists to treat them. To validate this, they study 247 groups comprising more than half of the doctors

in the State of Minnesota. As expected, multispecialty groups have more administrative positions and subdivisions (horizontal differentiation), suggesting that product diversification is tied to greater horizontal boundaries. Larger-sized groups have more administrative levels and complexity (vertical differentiation and hierarchy). Larger size is also associated with physician perceptions of the group as formalized and bureaucratic, with centralized decision-making.

In terms of culture, Krlewski, Dowd, Kaissi et al. (2005) studied the impact of structure in 267 groups (547 physicians) in Minnesota on nine dimensions of group culture: collegiality, information emphasis, quality emphasis, organizational identity, cohesiveness, business emphasis, organizational trust, innovativeness, and autonomy. Group size was negatively associated with every dimension of culture; several of these relationships were statistically significant (quality emphasis, cohesiveness, and trust). The dimension of quality emphasis was tied to peer control, which seems to break down in larger practices. Multispecialty practice (versus single specialty) was negatively associated with seven of the nine dimensions of culture; one of these (quality emphasis via peer control) was significant. Finally, group ownership by a hospital or health plan was negatively associated with seven of the nine dimensions; three of these were

statistically significant (collegiality, organizational identity, and trust). The researchers conclude that group size, complexity, and external ownership degrade the group's culture.

In an earlier study, Curoe, Krlewski, and Kaissi (2003) examined the same relationships that Krlewski et al. (2005) did but in a different set of groups (191 groups comprising 1223 physicians) in four Upper Midwest states). Large group size is significantly and negatively associated with five dimensions of culture (collegiality, quality emphasis, organizational identity, cohesiveness, and trust). Multispecialty group practice is significantly and negatively associated with four culture dimensions (collegiality, quality emphasis, identity, and trust). Finally, external ownership of the group is significantly and negatively related to four culture dimensions (collegiality, identity, trust, and autonomy), but is positively associated with quality emphasis.

These results substantiate those above.

In as related study, Kaissi, Krlewski, Curoe et al. (2004) examine the relationship between these nine dimensions of group culture and the group's use of six quality programs (benchmarking via patient satisfaction, profiling, guidelines, computerized prescription interaction information, EMRs, and

CPOE). Only a handful of associations were detected. A culture of information emphasis is, not surprisingly, associated with four of the quality programs (profiling, guidelines, EMR, CPOE). A culture of business emphasis is tied to the presence of benchmarking and profiling programs. A culture of autonomy was negatively related to the presence of all six programs, although most of these relationships were not statistically significant. The authors conclude that group culture influences the types of quality programs that groups use, but the effects are not widespread.

With regard to staffing mix, Kaissi, Krlewski, and Dowd (2003) analyze determinants of group use of mid-level practitioners (MLPs) such as nurse practitioners (NPs) and physician assistants (PAs). Their sample consists of 128 groups with a primary care physician component. Over half of the groups employed either NPs or PAs; one-third employed both. On average, groups utilized one NP and/or one PA for every four physicians. Multivariate analyses revealed that employment of MLPs was positively associated with group size for groups with 16 or more doctors). MLP use was not associated with group specialty type (single versus multispecialty), group ownership (independent versus other), percentage revenue from risk sharing, or experience with capitation.

In another study, the researchers analyzed determinants of adoption of electronic health records (EHRs) in 2,879 groups with three or more physicians that share a common billing and medical records system (Gans, Kralewski, Hammons et al., 2005). Only 15% of the sample had an EHR. EHR adoption was weakly associated with the size of the group: larger groups had more financial resources and administrative capacity to support adoption.

In a different study of 27 primary care groups, the researchers looked at the drivers of adoption of e-prescribing information technology (Kralewski, Dowd, Cole-Adeniyi et al., 2008). One-fifth of the groups had implemented the technology. One-third of those with an EHR reported that not all of their physicians were using them two years after adoption; one half reported no full adoption of CPOE. At the individual physician level, the percentage of the physician's prescriptions that were sent electronically was positively associated with group size and multispecialty practice. Several dimensions of group culture were positively associated with eprescribing levels (business culture, trust, autonomy), while others were negatively associated (quality emphasis, cohesiveness).

One study examined the determinants of quality and patient outcomes in group practices. Kralewski, Dowd, Heaton et al. (2005) examined prescribing errors among 78 groups serving a managed care organization in the Upper Midwest in 2001. Such errors were unrelated to the percentage of the group's revenue from capitation, the percentage of primary care physician compensation from salary, computerized prescribing information technology, various dimensions of the group's culture (collegiality, quality emphasis, cohesiveness), the group's size, and the number of specialties represented in the group. Error rates were instead inversely associated with the employment of nurse case managers and the autonomy dimension of the group's culture.

The remaining studies examined the determinants of group efficiency in use of resources and the cost of care they provided. In their study of 86 clinics serving a managed care organization in 1996, Kralewski, Rich, Feldman et al. (2000) found that after adjusting for patient factors and disease severity, groups using more resources were more likely to have physicians paid on a salary basis and compensation based on productivity, a higher percentage of primary care physicians in the group, to be part of a system of groups and a system of groups with a hospital. Resource use was also higher in larger-sized groups, but the association was not statistically

significant. Resource use was lower in groups with a higher percentage of revenue from capitated sources, physician compensation based on individual physician management of resources (ancillary, referrals), and use of profiling and guidelines.

Kralewski, Wingert, Knutson et al. (1999) examined the factors associated with episode of care costs for treating hypertension among 26 groups serving an HMO in the Twin Cities. There was significant variation in these costs across the patients treated in these groups. In general, group culture was more important than group structure in explaining this variation. With regard to culture, group solidarity and entrepreneurialism (business and commercial values) were associated with lower costs, while organizational formality (rules) was associated with higher resource use. With regard to structure, group size was associated with higher costs, while the percentage of revenue from capitated sources and treatment by a family practitioner were associated with lower costs.

In a later study, Andes, Metzger, Kralewski et al. (2002) used data envelopment analysis (DEA) techniques to relate group inputs (personnel staffing in various categories, square footage) and outputs (gross charges). The more efficient groups used fewer non-medical staff per physician and

less square footage. The results again suggested that increasing group size does not lead to increased efficiency.

Kralewski, Dowd, and Xu (2011) then examined the relationship between the quality and the cost of care provided by groups. In a study of 53 groups serving more than 300 patients in selfinsured health plans in Minnesota, they found that the variation in per-member-per-year (PMPY) costs (including both premiums and out-of-pocket) adjusted for case-mix index far exceeded the variation in various quality measures (disease prevention, cancer screening, chronic illness management, avoidable hospitalizations, and inappropriate admissions from the emergency department). They also found that cost was generally not related to either a composite quality measure or most component quality measures (average spearman correlation = $-.03$; the one exception was higher cost associated with avoidable hospitalization rates. One reason for this pattern is that groups might score highly on one quality dimension but low on another. They also found no improvement in quality once a cost threshold (\$3,000 PMPY) was reached, suggesting an inverse U-shaped relationship.

Finally, Kralewski, Dowd, Xu et al. (2011) conducted a comprehensive analysis of quality and cost outcomes among 256 groups in the MGMA

database that included Medicare enrollee claims data. As found above, structural measures of group practice were not highly correlated with quality or cost. The number of physicians and MLPs was not associated with costs, but was associated with avoidable hospitalizations; the provision of multispecialty services was associated with higher costs; and hospital ownership was associated with higher costs, avoidable hospitalizations, and inappropriate ED visits. The presence of an EHR was weakly associated with quality but not related to costs. Lower costs were associated with several dimensions of group culture: quality, collegiality, and participative management.

The authors then utilized DEA to identify efficient practices that provided the highest quality at the lowest cost. Group efficiency was not a function of the group's size. Efficiency was promoted by use of fewer MLPs, provision of fewer clinical services, use of an EHR, and physician ownership of the group. Finally, in a subset analysis of 52 groups in an employer claims database, they found that physician-owned groups exhibited the lowest rates of inappropriate ED visits and avoidable hospitalizations. The group's quality measures were not highly correlated with one another or with costs.

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