



The Effects of Physician-Owned Specialty Hospitals: A Critical Review of the Evidence

November 17, 2007

John E. Schneider, PhD
Robert L. Ohsfeldt, PhD
Janet Benton, JD

Contact:

John E. Schneider, PhD
HECG, LLC
167 Mills St.
Morristown, NJ 07960
Mobile: (319) 331-2122
E-mail: jeschneider@hecg-llc.com
Web: www.hecg-llc.com

EXECUTIVE SUMMARY

This report is based on a comprehensive review of the published literature and reports on physician-owned surgical hospitals, which have generated a considerable amount of debate among policymakers. Our results can be summarized as follows:

- Four out of five studies show that specialty hospitals have higher procedural volumes than their general hospital counterparts. This strongly suggests that specialty hospitals are able to take advantage of the well-established outcomes and learning benefits of high volume.
- Only two of six studies found that specialty hospitals result in higher market-area level utilization, and only one of those studies employed rigorous statistical methods. The one rigorous study, however, failed to account for the selection effects of specialty hospitals purposely locating in markets with high demand and high extant utilization rates.
- The results on quality appear to be unambiguously positive, with all five studies that examined quality differences finding that specialty hospitals, even after controlling for patient severity, generate better health outcomes.
- The results on efficiency are also very consistent, with five of six studies showing that specialty hospitals have shorter length of stays, lower costs, or both. Most of these studies adjust for patient severity.
- Specialty hospitals select healthier patients, but there is no evidence to suggest that such selection is “inappropriate” in the sense that it differs from the normal triage strategies employed in medical care. Sicker patients require more intensive care settings; healthier patients do not.
- Specialty hospitals do not subject their general hospital counterparts to undue hardship. One peer-reviewed study even found that the presence of specialty POHs actually exerts a kind of fiscal discipline on competing general hospitals, leading the latter to reduce costs and improve efficiency.

1. OBJECTIVES

Specialty hospitals and, more generally, physician-owned hospitals (POHs)* continue to spark lively business and political debates. The side in favor of specialty POHs, or at least in favor of allowing them to exist and bill payers for their services, believe that to varying degrees specialty hospitals offer greater economic efficiency, higher quality, more consumer-responsive products and services, and provide beneficial competition to general hospitals (Walker 1998; Herzlinger 2002; Domrzalski 2002; Cain Brothers & Company LLC 2003; FTC 2004; Casey 2004; Dobson and Haught 2005; Chollet et al. 2006). The side opposed to specialty hospitals argue that the presence of limited-service facilities creates an uneven playing field insofar as the specialized facilities can reap the benefits of profitable services without having to cross-subsidize unprofitable services (Choudhry, Choudhry, and Brennan 2005; Iglehart 2005; Shactman 2005). These critics further argue that physician ownership in specialty hospitals creates strong incentives for induced demand and unnecessary services, which in turn increase market-level utilization and expenditures.

Since the genesis of these debates, several comprehensive studies of specialty POHs have been released, either in the form of government reports, privately-funded studies, articles published in peer-reviewed journals. As policy debates continue at state and federal levels, it appears that there is a general lack of understanding of the overall direction of the newer studies. After several years in existence, have specialty hospitals had the effects they were hypothesized (by some) to have, like increased utilization? We explore this and related questions by conducting an exhaustive review of the specialty hospital literature to date. We focus on ten criteria: consumer demand and quality; strategic focus; clinical efficiencies; economies of scale; economies of scope; core competencies; utilization; inpatient expenditures; competition; and physician ownership. The primary methods consist of an exhaustive literature review, a brief survey of specialty hospitals, and site visits of six specialty hospitals.

2. INDUSTRY OVERVIEW

One of the most prominent changes in U.S. industry structure during the latter half of the twentieth century was the adoption of lean production, flexible specialization, and focused factories, which resulted in many business establishments becoming less diverse and more focused (Skinner 1974; Womack, Jones, and Roos 1990; Gollop and Monahan

* We use the term “physician-owned hospitals,” or POHs, to refer mainly to the types of specialty hospitals that have been the subject of recent controversy. However, as the debates have recently shifted to the potential problems associated with physician ownership, we include physician-owned general hospitals and other physician-owned entities in this discussion, except where noted. Note that the vast majority of the recent published literature on physician ownership and its effects has focused on specialty hospitals; thus, most of the following discussion refers mainly to specialty hospitals but can be (in most cases) generalized to the population of physician-owned hospitals.

1991; Essletzbichler 2003). On a smaller scale, the U.S. hospital industry appears to be following a somewhat similar path, evident in the recent diffusion and growth of free-standing specialty hospitals and specialized units within general hospitals (Myers 1998; Eastaugh 2001; Robinson 2005; Haugh 2006).

Specialty hospitals are typically defined as those that treat patients with specific medical conditions or those in need of specific medical or surgical procedures.* The former describes hospitals specializing in psychiatric care, rehabilitation, cancer care, long-term care (excluding nursing homes and skilled nursing facilities) women's care, children's care, and other hospitals focused on certain chronic diseases; the latter describes hospitals specializing in cardiac, orthopedic, and general surgery. These groups can also be generally described as non-surgical and surgical, although in some cases rehabilitation and psychiatric hospitals may perform a very limited scope of surgeries. Taken together, there were 1,902 specialty hospitals in 2000 and 2,199 in 2005, a growth rate of about 16 percent over the five year period. This represents an expansion rate nearly four times higher than then rate of growth in the number of general hospitals (4 percent) over the same period. The number of non-surgical specialty hospitals (rehabilitation, psychiatric, and long-term care) grew from 1,856 in 2000 to 2,108 in 2005—a growth rate of about 14 percent (**Table 1**). Growth in the non-surgical group was driven primarily by a sharp increase in the number of long-term care hospitals.

Growth in the number of surgical hospitals far outpaced their non-surgical counterparts, but counts remain far below non-surgical hospitals and represent only a very small fraction of the number of short-term general hospitals (**Table 1**). The number of surgical hospitals nearly doubled from 2000 to 2005, and has likely continued growing since the expiration of the moratorium. The most common types of surgical specialty hospitals are those specializing in orthopedic procedures, such as hip and knee replacement.† Cardiac surgical hospitals-- which typically perform heart bypass, valve replacement, angioplasty, and alike-- are the next largest subset and the group that has grown the fastest. Many cardiac hospitals are owned by a single for-profit hospital chain, the MedCath Corporation. In total, there were 91 surgical hospitals in existence as of 2005.‡

* For example, the General Accounting Office imprecisely defines specialty hospitals as those that “tend to focus on patients with specific medical conditions or who need surgical procedures” (General Accounting Office 2003b).

† Many orthopedic specialty hospitals also perform a variety of general surgical procedures. Hospitals that perform general surgery excluding orthopedic surgery are included in the general surgery category in this discussion and in Table 1.

‡ Recent reports and published studies of specialty hospitals appear to rely on somewhat different counts of specialty hospitals. For example, the GAO side-stepped this issue in their most recent specialty hospital report by referring to the “approximately 100 specialty hospitals across the nation” (GAO 2006). The discordance in count data is likely due to the presence of general hospitals that have evolved into *specialized* hospitals, focusing on a limited number of DRGs, and perhaps the fact that the industry is growing so rapidly that it is not clear when newly constructed facilities become operational.

TABLE 1
Trends in Numbers of Short-Term General and Specialty Hospitals,
1995-2002

Hospital Type	2000	2005	Percent Change 2000- 05
General Hospitals			
Short-Term Community	4,915	4,936	4.3%
Specialty Hospitals			
Non-Surgical			
Rehabilitation	1,102	1,235	12.1%
Psychiatric	491	481	-2.0%
Long-Term Care	263	392	49.0%
Total Non-Surgical	1,856	2,108	13.6%
Surgical			
Orthopedic Surgery	27	53	96.3%
Cardiac Surgery	12	25	108.3%
General Surgery	7	13	85.7%
Total Surgical	46	91	97.8%
Total Specialty Hospitals	1,902	2,199	15.6%

Sources: Kaiser Family Foundation (2007); MedPAC (2005; 2006; 2007)

Recent political controversies surrounding specialty hospitals have focused primarily on facilities specializing in cardiac, orthopedic and general surgery. The reason for the focus on surgical hospitals appears to be rooted primarily in concerns over physician ownership and self-referral (GAO 2003a, 2003b, 2006; MedPAC 2005, 2006). Approximately 70 percent of surgical hospitals have at least some level of physician ownership (GAO 2003a). Most of these facilities are located in states without certificate-of-need (CON) programs, which restrict market entry by regulating the construction and augmentation of health care facilities (MedPAC 2006). States with the highest concentrations of surgical specialty hospitals are South Dakota, Kansas, Oklahoma, Texas, Louisiana, Arizona, and California (GAO 2003b).

3. STUDY METHODS

Given the intensity of the ongoing debates over surgical specialty hospitals, the focus of this study is on surgical specialty hospitals. The research methodology consists of three components: a comprehensive literature review, a mail and e-mail survey of surgical hospitals, and site visits of five surgical specialty hospitals. Rather than provide a separate literature review section, we report the combined findings of the literature review, surveys, and site visits in the results section.

The literature review focused on research from four disciplines: medicine, health services research, economics, and organizations. Searches were conducted primarily in Medline, PubMed, ABI Inform, Business Source Premier, and EconLit. Additional government and internet searches were conducted to obtain reports and other materials not published in peer-reviewed journals. We also obtained reports from other organizations that had specialty hospital studies underway at the time of our study, including MedPAC, the Centers for Medicare and Medicaid Services (CMS), and Mathematica Policy Research, Inc. (MPR).

In addition to the literature review, we administered a brief e-mail survey to 70 surgical hospitals belonging to the American Surgical Hospital Association (ASHA) and the National Surgical Hospitals, Inc (NSHI).^{*} The survey obtained information on several operational characteristics, including years in business, number of beds, level of physician ownership, volume of inpatient and outpatient surgeries, number of inpatient discharges, revenue sources, nurse staffing ratios, and use of patient satisfaction surveys. The ASHA and NSHI membership represent approximately 85 percent of all surgical hospitals in the U.S. The survey achieved a 50 percent response rate (n = 35), but incorporating additional data from ASHA and examinations of surgical hospital websites resulted in item-level completion rates ranging from 50 to 90 percent. Descriptive statistics from the survey are shown in **Table 2**.

TABLE 2

Means and Standard Deviations of Selected Items: Survey of Surgical Hospitals, 2004

Variable	Mean	SD
Staffed inpatient beds	19.3	13.8
Percent of facilities with ER	42.1%	50.0%
Total number of facility owners	32.7	27.1
Number of physician owners	31.6	23.2
Number of physician owners admitting ≥ 5 patients/year	20.6	13.7
Percent with 0-1% ownership stake	33.6%	17.9%
Percent with 2-5% ownership stake	44.7%	9.2%
Percent with 6-9% ownership stake	12.4%	3.0%
Percent with $\geq 10\%$ ownership stake	6.8%	1.9%
Inpatient discharges per year	835.1	796.9
Inpatient days per year	3,395.7	4,732.4
Inpatient surgeries (overnight stay) per year	717.7	512.7
Outpatient surgeries (no overnight stay) per year	3,105.5	2,849.0
Percent Medicare revenue (%)	32.4%	19.1%
Percent Medicaid revenue (%)	3.7%	3.8%
Percent Commercial revenue (%)	46.4%	25.1%
Percent revenue as charity care (%)	2.1%	2.7%
Total taxes paid (previous tax year)	\$1.9 mil.	\$3.6 mil.
Patient-to-RN ratio	3.4	1.0
Percent w/ patient satisfaction data	92.1%	27.3%

Source: 2004 survey of ASHA and NSHI membership (refer to text for more detail)

^{*} Since the time we conducted our research, these organizations have merged to form a new entity named Physician Hospitals of America (PHA). See <http://www.physicianhospitals.org/home.php>.

Concurrently with the survey, we conducted five site visits of surgical hospitals, the primary goal of which was to gain a more thorough understanding of structure and operations. The hospitals selected for visits—two in California and three in South Dakota—vary according to urbanicity, bed size, years of operation, degree of physician ownership, and market structure. All five provided comparable ranges of surgical services. Based on structural characteristics, the five hospitals are broadly representative of the population of surgical specialty hospital nationwide. Site visits generally involved question and answer sessions with all levels of the management team (including physician owners) at each facility, followed by tours of the physical environment. Also provided were documents on management strategy, quality assurance, consumer satisfaction, physician ownership, and cost management. Again, the main goal of the site visits was to improve our understanding of the layout and functioning of surgical specialty hospitals.

4. RESULTS

We review six key economic and business attributes of hospital specialization: (4.1) consumer demand and quality; (4.2) strategic focus; (4.3) clinical efficiencies; (4.4) economies of scale; (4.5) economies of scope; and (4.6) core competencies. In addition, we review four market-level effects of specialty hospitals on: (4.7) utilization; (4.8) inpatient expenditures, (4.9) competition, and (4.10) physician ownership. The following sections review the theory and evidence on each of these ten factors. The discussion is based primarily on published literature, supplemented by government reports, data from the specialty hospital survey, and insights from the five site visits.

4.1 Consumer Demand & Quality. Demand for specialized inpatient and outpatient services has been growing rapidly in the past decade (GAO 2003b; Casalino, Pham, and Bazzoli 2004; Nallamotheu et al. 2006; Liebhaber and Grossman 2007). The increase in demand is most likely due to a combination of factors, including increased incidence of specific diseases, new treatment processes and technologies, and changes in consumer preferences. Analogous to non-health care industries, the hospital industry has been the subject of renewed emphasis on quality of care and customer satisfaction (Institute of Medicine 2001; Mehrotra, Bodenheimer, and Dudley 2003; Shaller et al. 2003). Defined-contribution benefit plans, consumer-directed insurance plans, and Health Savings Accounts (HSAs) have encouraged consumers to become more involved in choosing health care plans and providers, facing incentives to seek the highest quality at the lowest price (Chao 2005; Agrawal et al. 2005; Robinson 2005). In response, general and specialty hospitals alike have developed consumer-oriented centers of care focused on providing a limited range of services tailored to the specific needs of patients (Baum 1999; Romano and Kirchheimer 2001; Eastaugh 2001; Smith 2002; Urquhart and O'Dell 2004; Herzlinger 2004; Lo Sasso et al. 2004).

Specialty hospitals appear to offer levels of quality at least comparable to and in some cases better than their general hospital counterparts. Cram et al. (2005) found no

significant differences in mortality for cardiac patients treated at specialty hospitals and general hospitals, after adjusting for lower severity and higher procedure volume at specialty hospitals. A more recent study by Cram et al. (2007) reached similar conclusions for orthopedic hospitals. After adjusting for patient severity and procedural volume, they found that the odds of adverse outcomes were significantly lower for patients treated in specialty hospitals undergoing primary joint replacement or revision joint replacement.* A study commissioned by CMS observed similar patterns: cardiac and orthopedic surgical hospitals consistently performed better than expected given the mix of patients treated (CMS 2005; Greenwald et al. 2006). Moreover, the CMS study found that specialty cardiac hospitals performed better than their general hospital competitors on three of the four cardiac inpatient quality indicators. The specialty hospital quality advantage is also evident when the market area is taken as the unit of analysis. Barro, Huckman, and Kessler (2006) analyzed Medicare claims data at the hospital referral region (HRR) level and found that specialty hospital entry leads to both a reduction in expenditures and a decrease in mortality.† A consistent theme in these and other studies is that specialty hospitals have higher procedural volumes on average,‡ and are therefore well-positioned to exploit the positive outcome effects associated with higher volume (Bachmann et al. 2003; Birkmeyer et al. 2003; Nallamothu et al. 2006).

Data gathered from our site visits mirror these findings. Managers of surgical specialty hospitals consistently reported two factors that they believed to be critical to achieving high quality patient outcomes: high volume and high nursing intensity. Consistent with the findings of higher procedure volume in specialty hospitals, managers of surgical hospitals strongly believed that they were improving care through ongoing learning and process improvement. Surgical hospitals also reported nurse-to-patient ratios higher than the national average, which suggests that they may be able to capture some of the positive quality and outcome effects associated with richer nurse staffing (Kovner et al. 2002; Lang et al. 2004; Stanton and Rutherford 2004; Mark et al. 2004). For example, Kovner et al. (2002) found that the median number of RN hours per adjusted patient day was 6.43 in a sample of 534 hospitals. For the five specialty hospitals we visited, RN hours per adjusted patient day ranged from 10 to 15 hours per patient day.§

* Similar results have been found when comparing ambulatory surgery centers and general hospitals (e.g., Warner, Shields, and Chute 1993; Mezei and Chung 1999).

† These findings are based on the assumption that HRRs would have retained their 1993-1999 trend in expenditures and outcomes in the absence of specialty hospital entry

‡ Of the 15 studies of specialty hospitals available at the time of this writing, five studies explicitly compared procedural volumes in specialty versus general hospitals. Of those five studies, four studies found that specialty hospitals had higher procedural volumes (Woods, O'Connor, and Pierce 2005) and one showed no difference (2007).

§ These data comparisons are somewhat limited in interpretability. Ideally, nurse staffing ratios should be compared only within particular product and service lines (e.g., orthopedic).

Offering a limited scope of services is also likely to increase accountability associated with the smaller set of procedures. For example, a specialty hospital leader at one of the visited hospitals remarked that “four procedures account for seventy percent of our business; if we develop any kind of quality problem in one or more of those procedures it’s a huge problem for our organization.” In addition, specialty hospitals typically engage in extensive collection of data on quality and patient satisfaction, and use these data to modify care processes (Walker 1998; Iqbal and Taylor 2001; Fine 2004). Among the hospitals surveyed, 92 percent reported that they engage in regular assessments of customer satisfaction (Table 2). A recent study commissioned CMS also found that specialty hospitals exhibited higher levels of patient satisfaction compared to general hospitals in the same market (Greenwald et al. 2006).

From an organizational ecology perspective (Carroll and Hannan 2000), growth in specialty hospitals may to some extent reflect inertia on the part of established general hospitals in adapting to changes in consumer preferences, technology, and other market effects. In their discussion of the adaptive capabilities of dominant firms and organizational models, Carroll and Hannan (2000) note that “as the largest firms attempt to make their products appeal to a larger, more diverse consumer base, they lose their appeal to those with unusual tastes. This untapped part of the market becomes attractive to entrepreneurs, and they start specialist firms targeted to it.” (p.9)

4.2 Strategic Focus. An additional motivation for market entry is likely to be the existence of above-average profit margins on certain procedures. Prospective administered pricing mechanisms create incentives for general and specialty hospitals alike to focus on diagnosis categories and procedures where administered prices exceed average costs. In general, Medicare’s prospective pricing system (PPS) has been shown to affect the scope of services offered by acute care hospitals. The PPS system employs a fee schedule based on approximately 500 diagnosis related groups (DRGs); each DRG is mapped to a price, with some hospital-specific adjustments. Payment by DRG provides strong incentives to hospitals to specialize in those DRGs for which they have relatively low production costs (Dranove 1987; GAO 1992; Herzlinger 2004c). In the context of specialty hospitals, Robinson (2005) posits that “The success enjoyed by the specialized firms reflects astute selection of services and markets as much as efficiency in delivering care” (p.58). As long as hospitals are able to earn above-average margins on some procedures, there will be incentives for incumbent hospitals to specialize in those procedures and for entrepreneurs to form hospitals specializing in high-margin procedures (Dobson and Haught 2005; Hadley and Zuckerman 2005).*

* The same incentives, which are well-established in the economics literature, may also attract entry at the market level. For example, In a recent study, Schneider et al. (Roberts et al. 1999) found that general hospitals residing in markets with one or more specialty hospital had higher operating margins. Longitudinal models with fixed hospital effects suggested that, consistent with the economic theory, the entry of specialty hospitals was driven in part by higher general hospital operating margins in the market.

General hospitals of course can also focus on profitable DRGs, and there is strong evidence suggesting that they do (Dranove 1987; GAO 1992). However, general hospitals typically view the provision of less profitable services a large part of their mission. Depending on the market, less profitable services usually include maternity care, oncology, substance abuse treatment, behavioral health, and transplants. Thus, general hospitals' incentives to focus on profitable DRGs is driven more by the need to internally cross-subsidize less profitable services than the desire to develop a core business focus for the purposes of learning, positive volume-outcome effects, and other production economies.

This raises an important but very complex policy issue: are specialty hospitals “harmful” insofar as they take profitable business away from general hospitals—business that general hospitals need to fulfill their community obligations? This may in some cases be true, but the solution to this problem is most likely best addressed in ways other than simply excluding specialty hospitals from the market (FTC 2004; Havighurst 2005), mainly because general hospitals' most lively competition for high-margin services comes from other general hospitals. Instead, as MedPAC and CMS have already discussed, the solution is to improve the accuracy of DRG prices and seek more sophisticated methods of risk-adjustment.

4.3 Clinical Efficiencies. Clinical efficiencies include the ability of physicians to directly control the quality of care, scheduling, triaging patients to most appropriate settings, and equipment utilization and purchasing (Walker 1998; MedPAC 2003; Casalino, Devers, and Brewster 2003; Casalino, Pham, and Bazzoli 2004; Casey 2004; Rohack 2004; Iglehart 2005). In some cases, the existence of competing clinical objectives impedes physician decision-making and productivity. According to our site visits, in the specialty hospital setting physicians feel they have substantially more control over decisions made regarding patient care and their work environment. This differs from the experiences of physicians in general hospitals, where physicians report that the decision-making process is “less efficient” and “overly bureaucratic.”* These differences are to some extent analogous to the differences between large multi-specialty versus single-specialty practices. For example, Casalino, Pham, and Bazzoli (2004) report that one of the motivating factors for single-specialty medical groups was to “avoid the complicated governance and operational issues engendered by having primary care and specialty physicians in the same organization” (p.86). Similar thoughts are expressed in a recent report on specialty hospitals compiled by the American Medical Association (Rohack 2004), “[physicians] want a greater involvement in governance and management, reinvestment of profits to maintain state-of-the-art care and equipment, and greater control over scheduling and types of cases performed in the operating room” (p.3).

* All of the surgeons that we interviewed at the visited hospitals treated patients at the specialty hospital and the general/community hospital in the same geographic area (i.e., dual admitting privileges). Thus, most of the site visit questions prompted comparative responses.

According to the site visits, surgeons value specialty hospitals because there is more opportunity to maintain “control over the investments in their workplace.” In addition, surgeons in the specialty surgical hospital setting “feel they are treated more like customers, their surgical equipment tends to be newer, and the operating rooms tend to run more efficiently.” Reasons for improved operating room efficiency ranged from “shorter turn-over times” to “the fact that cases do not get moved to accommodate emergencies.” Surgeons at the visited hospitals also believed that the quality of nursing care is better at specialty hospitals relative to general hospitals. They indicated that “specialty hospitals usually attract the best nurses because of the good work environment, which in turn leads to a better nurse-to-patient ratio and a higher quality of care.” According to managers at visited hospitals, patients prefer specialty hospitals over the traditional hospital for a number of reasons, including more intensive nursing care, perceptions of higher quality, and a higher level of structural and functional hospitality (e.g., larger rooms with more amenities; friendlier staff).

4.4 Economies of Scale. Economies of scale exist if the average costs of producing a product or service decline as the volume of production increases.* The evidence on economies of scale in the production of hospital services, while highly variable, indicates that U.S. general hospitals typically experience scale economies up to approximately 10,000 discharges per year (Cowing, Holtmann, and Powers 1983; Vita 1990; Gaynor and Anderson 1995; Keeler and Ying 1996; Dranove 1998b; Li and Rosenman 2001). However, the same evidence suggests that scale economies vary significantly by product and service line. In order to assess the potential role of scale economies in specialty hospital efficiency, scale economies for specific services in specialty hospitals versus general hospitals would need to be compared. We are not aware of any study that does so. However, for many specific surgical procedures, the volume of specific services performed at specialty hospitals typically exceeds that performed in general hospitals within the same market area (GAO 2003b; Cram, Rosenthal, and Vaughan-Sarrazin 2005; Mitchell 2005; Cram et al. 2007). Thus, given the higher procedural volume in some services, to the extent economies of scale exist in these specific procedures they are likely to be realized to a greater degree in specialty hospitals compared to general hospitals.

4.5 Economies of Scope. In some cases the joint production of two or more products or services can be accomplished at lower cost than the combined costs of producing each individually. This is often the case when production relies on common resources, such as technology, workers, inputs, and general overhead. Cases where the costs of conjoint production are lower than the costs of separate production are said to exhibit economies of scope (Panzar and Willig 1981). The decision to specialize will depend in part on the

* In some cases, economies of scale refer to declining average and marginal costs in the relevant range of production. These cases are generally referred to as “natural monopoly,” and have historically been applied to industries with high fixed costs (e.g., network utilities, like water, natural gas, electricity, telephone cable television, etc.). Although arguments have been made that the relatively high fixed costs of hospitals (Schneider 2003) invite comparisons to natural monopoly (2001; 1992).

extent to which firms' existing scope of products and services exhibit diseconomies of scope (i.e., where joint production is more costly than separate production). Conversely, the decision to diversify will in part be based on the extent to which joint production costs are less than separate production costs.

Evidence on economies of scope in the U.S. hospital industry is inconclusive. Menke (1997) found limited evidence of inpatient-outpatient scope economies in chain and non-chain hospitals. Similarly, Fournier and Mitchell (1992) found significant scope economies among select outpatient services and surgery services, but their study is based on 20-year old data from one state. Sinay and Campbell (1995) examined 262 merging acute care hospitals in the U.S. during the period 1987 to 1990. Of the service pairings studied, evidence of economies of scope was found between acute care and sub-acute care (in merging hospitals) and between intensive care and outpatient visits (in control hospitals); all other pairings showed either diseconomies of scope (e.g., acute care and outpatient care; intensive care and sub-acute care) or were statistically insignificant. Rozek (1988) failed to observe scope economies in general hospital diversification into psychiatric services, and Li and Rosenman's (2001) study of hospitals in the state of Washington reached inconclusive findings on scope economies. While economies of scope in theory should be an important determinant of the scope of hospital service offerings, the lack of consistent findings limits the ability to assess the role of scope economies in the hospital industry.

4.6 Core Competencies. The extent to which firms organize and strengthen their "core business" has been shown to be an important determinant of organizational design, function, and performance (Teece 1982; Chandler 1990, 1992; Teece et al. 1994a; Teece and Pisano 1994b; Wruck and Jensen 1994). Core competencies refer to firms' existing stock of knowledge assets (including tacit knowledge and know-how), skills, and resources. By diversifying and expanding into activities that are related to core competencies, firms are typically able to take better advantage of the learning process and improve managerial efficiency (Hill 1994; Danneels 2002). For example, focusing on core competencies has been associated with improved supply chain management (primarily through standardization), simplified human resource management, and streamlined production scheduling. In addition, limiting expansion into related business lines is likely to minimize some of the negative tradeoffs associated with growth in firm size, such as influence costs and other forms of incentive attenuation (Milgrom and Roberts 1990).

Skinner (1974) stressed that "simplicity, repetition, experience, and homogeneity of tasks breed competence" (p.115). Similarly, according to Teece et al. (1994, p.17), "If too many parameters are changed simultaneously, the ability of firms to conduct meaningful quasi experiments is attenuated." In other words, concentrating on core competencies is believed to enhance the learning process by assuring that decision-making situations are repeated in sufficiently large numbers. Learning occurs as the experience of production in one time period influences the production in a later time period; that is, the production process is assumed to have some degree of flexibility and can change over the relevant range of output (March 1996; Nooteboom 2000; Greve 2003). The implication is that the

costs of producing the first batch of output are greater than the costs of the producing a subsequent batch due to the learning that occurred during the production of the first batch. Assuming that experiences of producing the first batch can be applied to the second batch (and other subsequent batches), the average costs of production are expected to decline as output cumulates over time. The learning effect will depend on the ability of the firm to process information during the production process and then apply that information appropriately. The learning process is critical to the formation and adaptation of organizational routines, which include rules of thumb, guidelines, templates, and protocols (Nelson and Winter 1982). Specialized routines are the subcomponents of organizational “know how” and core competencies, and are often sources of comparative advantage and production economies (Chandler 1992; Wruck and Jensen 1994; Greve 2003).

In health care settings, there also appear to be distinct advantages to focusing production within core competencies.* Shortell, Morrison, and Hughes (1989), in their three-year case study of eight large hospital systems, found that the best performing systems and hospitals were the ones that avoided diversification into “unrelated activities,” thereby minimizing diseconomies of scope and maximizing efficiencies associated with learning. Eastaugh (2001) examined a panel of 219 U.S. acute care hospitals from 1991 to 2000, finding that a 31 percent increase in specialization over the time period was associated with an eight percent decline in costs per admission. Douglas and Nyman (2003) review the theory of core competencies in hospitals and test the theory using data from the 32 largest hospital markets in the U.S. They found that the degree to which hospitals focused on core competencies was positively related to hospital financial performance.

Do specialty hospitals have an advantage over general hospitals in terms of core competencies and learning? This is a question for which the literature on the economics of organizations, combined with the survey and site visits, offers some potentially useful guidance but no definitive answers. Let us begin by considering the potential advantages on the part of specialty hospitals. First, the smaller size of specialty hospitals may be an advantage. Given the complexities of the learning process, the costs of learning in some cases may be lower for smaller specialized firms. Smaller firms may have the advantage of being able to allocate the majority of the resources available for learning and adaptation to a relatively small set of related production process (e.g., Almeida, Dokko, and Rosenkopf 2003). Second, specialty hospitals’ high procedure volumes across a limited scope of services suggest that they are well positioned to take advantage of the learning process. Our site visited supported this hypothesis. At all six facilities, leaders responsible for quality monitoring and improvement focused on just three or four process and outcome measures. In all cases data were collected systematically and fed back to the care teams. For example, at a facility specializing in general surgery, leadership was

* The relationship between core competencies and hospital efficiency is relatively understudied. General discussions are provided by Eastaugh (1998); Snail and Robinson (2003); Douglas and Ryman (1985); Coddington, Palmquist, and Trollinger (2004), Porter and Teisberg (2004), Herzlinger (1990), Moore (1988), and Walker and Rosko (MedCath Corporation 2001).

primarily focused on three areas: infection control, anesthesia time, and post-operative pain management. For each of these areas, leadership systematically collected detailed clinical data and had distinct processes in place for feeding results back to each surgical care team.

In addition, we consistently observed a culture supportive of coordination and cooperation aimed at achieving ongoing improvements in efficiency and quality. Specialty hospital managers generally attributed their success in process adaptation to three factors: (1) relatively small size, which enables more rapid and efficient decision making; (2) flat hierarchical structures, which allow decision making and process improvement to migrate to the most appropriate level; and (3) focused and consistent management goals, which make it easier for team members to learn and practice their roles. Leaders and managers also emphasized the importance of performance feedback, mainly through surveys of customer satisfaction. According to the survey results, 92 percent of specialty hospitals reported conducting systematic customer satisfaction surveys. Again, leaders and managers indicated that their relatively small size allowed them to spend more time collecting, analyzing and acting on customer feedback.

When asked why their facility performed one set of procedures or services and not another, specialty hospital managers consistently indicated that they had a strong desire to “not venture too far” from the core of their collective knowledge. Managers and owners emphasized that the key decision makers are typically physician owners, most of whom are likely to feel most comfortable focusing on the delivery of services in their specialty field. One chief executive officer and physician owner stressed that specialty hospitals often attract the most highly trained and skilled physicians in the community by allowing them to essentially redesign the care process based on the state of the art in their field. We found corroborating anecdotal evidence in the trade press (Walker 1998; Baum 1999; Daus 2000; Casey 2004; Wolski 2004; Zuckerman 2004).*

Can diversified general hospitals achieve similar learning and competency-related production economies? The short answer is yes. At least in theory, there are no technical or structural impediments to creating semi-autonomous divisions (i.e., clinical lines of business) within general hospitals wherein volumes are sufficiently high to benefit from the positive relationship between volume and outcomes and related production efficiencies. Indeed, general hospitals have increasingly been adding specialized services, creating “centers of excellence” and joint-venturing with specialized facilities

* MedCath’s description of their facilities is apposite: “Externally, MedCath’s heart hospitals appear typical; however, a step inside reveals important differences: Physicians empowered to make decisions about hospital operations; state-of-the-art operating rooms; cutting-edge equipment and technology; centrally located services such as radiology, pharmacy and laboratories; nursing stations strategically positioned to allow better patient monitoring; and large, single-patient, fully equipped rooms that avoid unnecessary patient moves and permit family members to remain overnight. Above all, physicians and nurses freed from bureaucratic and administrative chores so they can devote a majority of their time and energy directly to caring for their patients.” (Berenson, Bazzoli, and Au 2006)

and physician specialists (e.g., Haugh 2006; Scalise 2006; Betbeze 2007). However, the extent to which general hospitals can capture the same kinds of production economies within divisions and product lines depends on two factors—diseconomies of scope and incentive attenuation. As we argued earlier, the former is clearly important but difficult to assess. The latter-- incentive attenuation-- has been shown to be an important determinant of the scope of firms (Alchian and Demsetz 1972; Teece 1980; Milgrom and Roberts 1990; Holstrom and Milgrom 1991). As firms broaden their scope of services, they become more susceptible to problems of incentive alignment within divisions and product lines and information impediments between divisions, product lines, and central management. Other challenges include optimal transfer pricing and reward mechanisms. In sum, it is difficult to assess the extent to which core competencies play a role in specialty versus general hospitals. However, the balance of literature suggests that limiting the scope of services does have distinct advantages, many of which may be unrealized in diversified general hospitals.

4.7 Utilization. One concern of POHs is that markets in which they are located may experience faster growth in utilization than would otherwise be observed in the absence of POH entry, due in part to the financial incentives associated with ownership. As we reported earlier in this report, there is relatively consistent evidence that POHs have higher procedural volume than their general hospital counterparts for certain procedures commonly performed at specialty POHs (Cram et al. 2007; Cram, Rosenthal, and Vaughan-Sarrazin 2005). The higher procedure volumes at specialty hospitals have been shown to lead to better outcomes and are likely to result in economies of scale and enhanced learning.

Critics of POHs generally deemphasize the positive effects of higher procedural volume and instead focus on the potential for “physician-induced demand” (PID) associated with physician ownership. Higher volumes, they argue, are the result of induced demand and result in higher utilization rates at the market level (which in turn result in higher expenditures). Jean Mitchell makes this argument and offers before-and-after utilization changes in market areas in Arizona and Oklahoma as evidence (Mitchell 2005, 2007). Unfortunately, Mitchell’s studies suffer from serious limitations, the most egregious of which were inaccurate identification of ownership levels* and simple before-and-after utilization comparisons which do not take into account the role of other determinants of utilization (i.e., multivariable regression was not used). Due to these limitations, it is not possible to draw any meaningful conclusions from the Mitchell studies.

More rigorous volume studies were conducted by Research Triangle Institute (RTI) and Nallamothu et al. (2007), both of which used Medicare claims data as the primary source of data. The RTI study is especially noteworthy because they were able to measure actual physician ownership shares through site visits to 13 specialty hospitals, and link those ownership shares to Medicare claims data through the Medicare provider ID; no

* In the Arizona study, for example, ownership was inexplicably defined according to extant referrals, where physicians treating a high volume of cases at specialty POHs were assumed to be owners.

other study has done this. The RTI study found that the incentive for physicians to refer to hospitals in which they have an ownership stake depended more on the size of the ownership stake rather than the fact that they were owners (Greenwald et al. 2006). Given that ownership shares on average were very low, the RTI study found that referral patterns were not significantly affected by the entry of specialty POHs into the market. This is not at all surprising because, for a physician with a small ownership share, the indirect payment to the physician via hospital investment would be quite small compared to the direct payment for physician services provided.

The Nallamotheu et al. study reached somewhat different conclusions (Nallamotheu et al. 2007). They find that rates of change for total revascularization were higher in hospital referral areas (HRRs) after cardiac hospitals opened when compared with HRRs where new cardiac programs opened at general hospitals and HRRs with no new programs. Four years after their opening, the relative increase in adjusted rates was more than 2-fold higher in HRRs where cardiac hospitals opened when compared with HRRs where new cardiac programs opened at general hospitals and HRRs with no new programs. These findings were consistent when rates for CABG and PCI were considered separately. For PCI, this growth appeared largely driven by increased utilization among patients without acute myocardial infarction.

The main problem with the Nallamotheu et al. study, however, is that they do not control for what we call “endogenous entry.” Endogenous entry refers to the likelihood that specialty POHs enter markets that already have higher utilization rates, simply because to the POHs these represent the most viable markets. Such entry behavior is entirely consistent with economic theory and evidence from other industries (Tirole 1988). Thus, if we make the reasonable assumption that endogenous entry exists, the findings of Nallamotheu et al. are potentially biased by this endogeneity. Utilization may have been high in these HRRs even without the entry of specialty POHs.

In addition to the methodological flaws in the Mitchell and Nallamotheu papers, there are two underlying conjectures that are perhaps even more problematic than the more technical methodological problems. The first is the simple “so what” question. What does it mean that some HRRs have higher utilization rates? Again, critics of POHs believe the answer to this question is self-evident -- they argue that the higher utilization rates represent induced demand for “unnecessary” care. This interpretation is flawed for several reasons.

First, there is ample evidence showing that, in areas characterized by significantly different utilization rates (i.e., small area variation), the proportions of appropriate versus inappropriate care are roughly the same (Chassin 1993; Newhouse 1993). Thus, one can *not* conclude that the existence of area variation implies that the higher-utilization area is higher because of higher rates of inappropriate or unnecessary care.

Second, the notion of physician-induced demand, while having some appeal at the conceptual level, generally is over-subscribed in studies of physician behavior. It should be obvious enough that areas with greater availability of physician services would be

expected to be characterized by higher utilization rates. But the existence of an association between availability and utilization does not establish that greater availability “causes” greater utilization.

To illustrate this point, health economists David Dranove and Paul Wehner looked for evidence of demand inducement in childbirths (Dranove and Wehner 1994). Using state-of-the-art methods to adjust for the “endogenous entry” of obstetricians into market areas, they still found “evidence” that obstetricians induced demand for childbirths. They conclude that this obviously nonsensical finding illustrates the inherent methodological difficulties encountered when assessing the magnitude of demand inducement given this “chicken or egg” problem. It is obvious that physicians were attracted to areas with a strong potential for growth in the rate of childbirths. The model Dranove and Wehner use attempts to account for this “demand pull” phenomenon by isolating the effect from any “supply push” utilization caused by physician availability (i.e., PID).

Their nonsensical findings indicate that commonly used empirical strategies to isolate the portion of the association between availability and utilization “caused” by availability are inadequate. The same methodological challenges emerge when assessing the extent of PID for any other physician specialties or service lines.* The advantage of the Dranove and Wehner study is the focus on a utilization metric that entails no clinical judgment and thus is not subject to “manipulation” by physicians, as the PID hypothesis assumes. Indeed, an essential element of the PID hypothesis is the assumption of a passive and myopic buyer—an assumption that may have been appropriate twenty years ago but is less plausible in today’s payment environment characterized by managed care and better-informed patients.

A general problem with studies drawing inferences from differences in utilization rates is that the rates are based predominantly on supply factors and do not adequately account for demand factors. Although some studies do attempt to account for demand factors through patient-level covariates such as age, these are only rough approximations of demand, and as the Dranove and Wehner study illustrates, are inadequate for measuring the extent of demand. For example, it is not possible to accurately assess the “true” number of people in an area who really “want” knee replacement by accounting for the age distribution of the population of the area or even the proportion of the population with osteoarthritis. Demand for medical care is a function of several factors, including individual preferences and price (e.g., Grossman 1972; Rosenzweig and Schultz 1983). All of these demand determinants are expected to vary by hospital referral region, metropolitan area, and county, depending on the socioeconomic characteristics of the area.

Even if we were able to adequately control for socioeconomic differences between market areas, we would still be faced with the problem of variation in net prices. Since most prices faced by specialty POHs and general hospitals alike are administered by

* Like the specialty POH entry argument, this point is completely consistent with the economic theory of location.

third-party payers using variants of essentially the same fee-schedule, the only prices left to vary are those related to transaction costs. Specialty POHs, by virtue of their design, scope, and amenities, may be associated with lower search costs (Schneider, Miller et al. 2007). For the “marginal” patient,^{*} these lower search costs may be enough to encourage them to seek treatment (as opposed to not seeking treatment at all). It is methodologically difficult to identify such patients using conventional databases, but the main point is that we do not know the proportion of increased utilization (e.g., as found by Nallamotheu et al.) that can be attributed to such factors.

By way of conclusions, we offer the following summary points concerning specialty POHs and volume of services:

- At the level of the individual facility, high volume is desirable due to the well-documented association between high volume and better outcomes. Specialty POHs are high volume, and these higher volumes are associated with higher quality in specialty POH settings.
- At the level of the market area, there are four studies addressing volume effects of specialty POHs: two studies by Mitchell, one by RTI, and one by Nallamotheu et al. The Mitchell studies are substantially limited due to problems with study design and methodology. The RTI study and the Nallamotheu et al. studies are substantially better, but reach somewhat different conclusions: the RTI study found that referral patterns do not change much when specialty POHs enter markets, and that the ownership incentive appear to only matter when ownership levels far exceed the average. The Nallamotheu et al. study, using somewhat different methods, found the opposite—market area utilization increases following the entry of specialty POHs.
- The conflicting findings of the RTI and Nallamotheu et al. studies should be evaluated against the backdrop of three important issues: (a) what is the “correct” rate of utilization?—this is very difficult to judge yet it is essential to determining whether a rate is “too high” or “too low;” (b) none of the four studies controls adequately for the endogeneity problem—markets with higher rates of utilization will be attractive to new entrants, thereby complicating any assessment of specialty POH entry effects; and (c) there is insufficient evidence to declare that demand inducement is responsible for higher post-entry utilization rates. The presence of area variation is insufficient to assume inducement, especially given the relatively high prevalence of care management and better consumer information.

4.8 Expenditures. An issue closely related to the volume and utilization issue is that of overall expenditures. Again, critics of POHs argue that volume effects ultimately lead to higher expenditures in markets with POHs. The evidence, however, suggests the

^{*} For example, the “marginal” patient may be someone who has identified a basic need (e.g., knee replacement), either on their own or with the help of their physician, and is undecided as to the most appropriate next step. As has been observed in several case studies of specialty POHs, these patients tend to prefer smaller, more staff-intensive settings.

opposite: markets with specialty POHs tend to be associated with lower expenditures, and general hospitals in markets with specialty POHs tend to be more efficient.

Using Medicare claims data and hospital referral regions (similar to Nallamotheu et al.), Barro, Huckman, and Kessler (2006) found that patients admitted to specialty POHs have slightly higher raw one-year hospital expenditures compared to general hospitals (+\$483). The main reason for the differences was that patients admitted to specialty POHs were more likely to undergo intensive treatment. However, at the HRR level, the net effects of specialty hospitals tend to dilute these higher per-patient expenditures. Under the reasonable assumption that HRRs with specialty POH entry would have retained their pre-entry trends in expenditures and outcomes, Barro et al. found that specialty POH entry leads to both a *reduction* in expenditures of at least 7% and a decrease in mortality of at least 4%.

4.9 Competition. The Barro et al. findings are consistent with the facility-level effects observed by Schneider et al. (2007). They estimated longitudinal fixed effects models for a national panel of short-term acute care hospitals for the eight-year time period 1997 to 2004. Models were estimated for general hospital patient-care revenue, costs and operating margins. They found that the presence of one or more new or established specialty POH in a market* has a negative effect on general hospital costs and that the presence of one or more established specialty POH has a positive effect on general hospital operating margins. Results were consistent across several different modeling approaches. The implication is that the presence of specialty hospitals encourages greater efficiency on the part of incumbent general hospitals, and the existence of profits attracts market entry. These results are completely consistent with the GAO, which found that specialty POHs have no meaningful effects on general hospital financial performance (GAO 2006). Thus, specialty POHs appear to have, at the very worst, a negligible affect on general hospitals and may help provide incentives for general hospitals to become more efficient. The lower overall HRR expenditures in markets with specialty POHs support this conjecture.

Another aspect of competition that has been alluded to but not formally reported has been the ongoing battle between general hospitals and their high-revenue specialists. These tensions rise to higher levels when specialty POHs are involved. Consider the hypothetical example of a “franchisable” orthopedic surgeon. Assume that she is franchisable because she is high volume, high quality, or both. Further assume that she currently practices at a general hospital. This is a potentially unstable situation, as would be the retention of any high-revenue employee, associate, or contractor. In terms of the labor market, our orthopedic surgeon has several choices: (1) she can bargain with the general hospital to give her more support, physical space (office space; “centers of excellence”), equipment, favorable operating room times, limited ER call, etc. (and these concessions might enable her to spend more time on lucrative cases); (2) she can threaten

* The authors estimated two sets of models: one where the county was the unit of analysis, and another where the MSA was the unit of analysis. The models reached the same conclusions.

to defect to a competing general hospital (presumably for the same kinds of perquisites); or (3) she can threaten to defect to an established or new specialty hospital (where she may or may not become a part owner).

In most cases, we observe option #1—high-revenue surgeons bargaining with their general hospital of primary affiliation for what are in many cases substantial perquisites (Betbeze 2007; Cain Brothers & Company LLC 2003; Scalise 2006). The second most common option is #2, where surgeons shift the majority of their cases to a competing general hospital. The specialty hospital option is of course the least common, if for no other reason than the fact that there are only 53 orthopedic specialty hospitals nationwide, compared to well over 2,000 general hospitals that perform inpatient orthopedic surgery.

In spite of this fairly obvious hierarchy of choices for surgeons, the trade press suggests that general hospitals' biggest fear is competition from specialty hospitals. A common anecdote is that, in order to keep option #3 off the table, general hospitals have threatened defecting surgeons with denial of access to the general hospital—also referred to as “economic credentialing.” We find little evidence suggesting that such practices are common. The RTI report, for example, found that most POH physician owners retain admitting privileges at both the specialty hospital and the general hospital (CMS 2005). However, there have been some relatively high-profile cases of physicians initiating legal action against general hospitals that threaten to deny admitting privileges to physicians with ownership interests in competing facilities (e.g., Carbonara and Caplin 2004). Courts have generally ruled in favor of the general hospitals (Killoran 2002), there have been state-lead legislative attempts to place limits on hospitals' use of physician economic credentialing (e.g., *Discrimination Based on Ownership or Investment Interest in Another Hospital Prohibited* 2004). Thus, we submit that economic credentialing (in the case of specialty POHs) is a relatively small issue, and it is too soon to determine the trajectory of those debates.

4.10 Physician Ownership. Many of the concerns over physician ownership can be addressed using the discussion points raised in the utilization section (4.7). One of the main concerns over physician ownership of specialty hospitals is that the financial incentive associated with ownership will encourage unnecessary or inappropriate usage. In addition to the critique and discussion of the PID provided in section 4.7, we offer some additional comments here.

The costs and benefits of physician self-referral has been debated for many years, mainly because the dominant physician payment mechanism in the U.S. has been and continues to be fee-for-service, which creates financial incentives for self-referral. In the case of specialty hospitals, the general argument against physician self-referral is that physician ownership may result in financial incentives to admit patients to the facilities in which they have an ownership stake. These arguments are to some extent based on research that has found that utilization of ancillary services is higher when an ownership relationship exists between referring physicians and ancillary services (Mitchell and Sass 1995; Lynk and Longley 2002; Kouri, Parsons, and Alpert 2002; Zientek 2003; O'Sullivan 2004). However, there are at least four important limitations to applying these arguments to acute care hospitals.

First, the vast majority of studies of higher utilization resulting from self-referral are based on physician ownership of *ancillary* services, rather than acute care hospitals. Mitchell and Sass (1995), in their frequently cited study of physician referral, failed to find higher utilization rates associated with self-referral to acute care hospitals. This lack of association has been one of the main reasons that the two phases of Stark anti-kickback legislation have exempted physician ownership of acute care hospitals (Stout and Warner 2003; Rohack 2004; O'Sullivan 2004). In addition, there is no direct evidence that the observed higher utilization rates resulting from self-referral to ancillary services represent inappropriate or unnecessary care (Kouri, Parsons, and Alpert 2002; Zientek 2003).

Second, there is no direct evidence that physician self-referral is motivated disproportionately by financial incentives. Physician self-referral is motivated by four factors: appropriateness, quality, efficiency, and financial returns. The relative magnitude of each of these incentives has been the subject of debate, but there is no direct evidence to suggest how, on average, physicians assign weights to each factor. Consistent with the empirical findings, anecdotal evidence suggests that physicians may disproportionately weight financial incentives when the referral is for standardized products or services (e.g., lab or pharmacy), and disproportionately weight appropriateness and quality when the referral is for more intensive procedures, such as surgery (Moore 2003).

Third, there is no evidence that self-referrals result in worse outcomes than other types of referral (Kouri, Parsons, and Alpert 2002; Zientek 2003). A likely reason for these findings is the endogeneity of three factors: physician quality, the likelihood of self-referral, and the quality of patient outcomes. In the case of specialty hospitals, site visits and trade press literature indicate that physician investors in specialty hospitals tend to be those who highly value efficiency in quality and cost dimensions. Thus, for many physician investors, self-referral is likely to represent the most optimal referral in terms of quality and cost.

Fourth, in the case of physician ownership of acute care facilities, it is likely that the magnitude of financial incentives is limited. The General Accounting Office (2003a) found that 30 percent of specialty hospitals surveyed had no physician investors. For half of the facilities with physician investors, the average individual physician ownership share was less than two percent. In the ASHA survey, virtually all physician investors owned only five percent or less (Table 2). Moreover, the entrepreneurial returns (i.e., the fraction of the facility fee considered operating margin) for any single case are likely to be substantially less than the professional fee charged by physicians. Given the order of magnitude difference between these two revenue streams, physician incentives are likely to be driven more by professional fees, which do not vary significantly by practice setting.* Indeed, in this context the potential for a surgeon to enhance his or her own

* It should also be noted that high variation in utilization and referral patterns exist without respect to physician ownership. For example, Weinstein et al. (2004) recently observed significant variation in utilization patterns for major surgery for degenerative

productivity is a more likely source of financial incentive for self-referral to a specialty hospital. In other words, the primary financial motivation may be to enhance the return on investment for the surgeon's investment in "human capital" (associated with the number of procedures performed)* rather than any effort to assure a return on investment in the form of financial assets (associated with the overall financial performance of the hospital).

5. DISCUSSION

We reviewed the vast majority of published literature and government reports on physician-owned specialty hospitals to date. Our main goal was to pull together the resources and summarize the current state of knowledge. We supplemented the literature review with information from six site visits and a brief survey of specialty hospitals. We arrive at two important overall findings. First, there are some important advantages to hospital specialization, and several of those advantages are more likely to be achieved in a specialty rather than general hospital setting. These include a closer connection with consumer demand, higher quality, and enhanced opportunities for learning associated with higher procedural volume and a more narrow business focus. Second, in terms of the effects of specialty hospitals, the most consistent theme is simply that they do not appear to have an impact that differs significantly from the impact of any competitor.

Given the structure of the acute care industry, it is much more likely that a general hospital will compete directly with one or more other general hospitals, and the type of competition is likely to be across all product lines and, consequently, of greater importance to general hospitals. We have observed unequivocally good results, in terms of consumer welfare and economic efficiency, from competition between general hospitals, and there is no reason to suspect that the same benefits would not surface in competition between general and specialty hospitals (Zwanziger and Melnick 1988; Kessler and McClellan 2000; Zwanziger, Melnick, and Bamezai 2000; FTC 2004; Kessler and Geppert 2005; Santerre and Vernon 2005; Ohsfeldt and Schneider 2006).

An alternative means of summarizing the findings on specialty hospitals is shown in **Table 3**. Most of the studies listed in this table have been discussed above, but for the purposes of the summary table we applied a uniform selection criteria for study inclusion based on *at least* one of the following: (a) reasonably sound and rigorous methods; (b) analysis of primary or secondary datasets (i.e., excludes studies based solely on case-studies); or (c) published in peer-reviewed research journals. The six column headings—volume, utilization, quality, efficiency, selection, and competition—represent the main metrics within which specialty hospitals have been evaluated. We summarize the findings using a "(+)" to indicate a "positive" specialty hospital effect (e.g., higher efficiency, lower expenditures, higher quality, and so forth), and a "(-)" to indicate a

diseases of the hip, knee, and spine in several South Florida hospital referral regions where there are no physician-owned specialty hospitals.

* Refer to section 4.1

“negative” specialty hospital effect (e.g., favorable selection, higher utilization rates, and so forth). A “(0)” is used to indicate a null finding; that is, the study looked for effects but the net effects of specialty hospitals were mixed or not statistically significant from zero. A blank cell indicates that the study did not attempt to examine the effect. Table 3 reveals some important trends, which can be summarized as follows:

TABLE 3
Literature Summary and Comparison Grid

Study (Year)	Volume	Utiliz. (1)	Quality	Effic.	Select.	Comp. (2)
1. GAO (2003a)					(-)	
2. GAO (2003b)	(+)(3)			(+)(4)	(-)	
3. Lewin Group (2004)			(+)	(+)	(+)	
4. MedPAC (2005)		(0) (5)		(+)(6)	(-)	(0)
5. Woods et al. (2005)	(0) (7)	(0)				
6. Cram et al. (2005)	(+)		(+)(8)		(-)	
7. CMS / RTI (2005) (9)			(+)		(0)	(0) (10)
8. Mitchell (2005) (11)	(+)				(-)	
9. GAO (2006)						(0) (12)
10. MedPAC (2006) (13)		(0)		(0) (14)	(-) (15)	(0)
11. Chollet et al. MPR (2006)						(0)
12. Barro et al. (2006)		(0) (16)	(+) (17)	(+)	(-)	
13. Schneider et al. (2007)				(+)		(+)
14. Cram et al. (2007)	(+)		(+)			
15. Nallamotheu et al. (2007)		(+)				
16. Mitchell et al. (2007) (18)		(+)				
Estimated Net Effects	(+)	(0)	(+)	(+)	(-)	(0)

Notes: (1) includes effects on area-level expenditures, which are highly correlated with utilization; (2) includes economic effects of POHs on community hospitals in the same market (operating margins, clinical operations, and referral patterns/revenue); (3) in this column, (+) refers to higher POH procedural volumes; (4) based only on Medicare operating margins; (5) rate of decline for only one of five cardiac surgeries was found to be slightly smaller in POH markets; (6) costs were not significantly different, but lengths of stay were shorter in specialty POHs; (7) surgeon volume as opposed to facility volume (8) differences between general hospitals and specialty POHs are not significant when adjusted for volume differences; (9) also reported in Greenwald et al. (2006), *Health Affairs* 25(1):106-118; (10) referral patterns largely unchanged after entry of specialty POH; (11) this study identified owners based on referral patterns, which constitutes a severe methodological limitation. Hence, the effects cannot be considered statistically different from zero; (12) no operational or clinical changes in response to specialty POH market entry; (13) also reported in Stensland and Winter (2006), *Health Affairs* 25(1):119-129; (14) efficiency effects were similar to those found in MedPAC 2005 study, but also showed that orthopedic/surgical hospitals had 20% higher costs (a statistically significant finding); (15) no increase on the proportion of surgeries performed on healthier patients; (16) effect on overall market-level expenditures, based on the assumption that market area rates continue their growth trends from before Specialty POH entry; (17) based on aggregate market-level quality; (18) study uses only simple before-and-after comparisons rather than time-series multivariable regression-- a severe methodological limitation. Hence, the effects cannot be considered statistically different from zero.

- Four out of five studies show that specialty hospitals have higher procedural volumes than their general hospital counterparts. This strongly suggests that specialty hospitals are able take advantage of the well-established outcomes and learning benefits of high volume.
- Only two of six studies found that specialty hospitals result in higher market-area level utilization, and only one of those studies employed rigorous statistical methods. The one rigorous study, however, failed to account for the selection effects of specialty hospitals purposely locating in markets with high demand and high extant utilization rates.

- The results on quality appear to be unambiguously positive, with all five studies that examined quality differences finding that specialty hospitals, even after controlling for patient severity, generate better health outcomes.
- The results on efficiency are also very consistent, with five of six studies showing that specialty hospitals have shorter length of stays, lower costs, or both. Most of these studies adjust for patient severity.
- Specialty hospitals select healthier patients, but there is no evidence to suggest that such selection is “inappropriate” in the sense that it differs from the normal triage strategies employed in medical care. Sicker patients require more intensive care settings; healthier patients do not.
- Specialty hospitals do not subject their general hospital counterparts to undue hardship. One peer-reviewed study even found that the presence of specialty POHs actually exerts a kind of fiscal discipline on competing general hospitals, leading the latter to reduce costs and improve efficiency.

6. CONCLUSIONS

We conclude from these findings that the debates over the merits and potential harm of specialty hospitals have been conducted largely in the absence of a clear picture of what these kinds of facilities have to offer and how they impact existing community hospitals. We find that, at a minimum, specialty POHs offer some distinct economic advantages, even if some of those advantages can also be attained in a general hospital setting. In addition, we find that the impact of specialty hospitals in general is positive—they offer better outcomes in a more efficient, consumer-friendly setting. Concerns about induced demand, inappropriate/unnecessary utilization, and unfair competition are unfounded after several years of study. Thus, policymakers should consider the benefits of specialty hospitals and promote entrepreneurial activities that ultimately benefit patients.

About HECG

The Health Economics Consulting Group LLC (www.hecg-llc.com), founded in 2004, is a group of academic health economists and health services researchers providing research consulting services in a number of subject areas in health economics, including cost and outcome analysis (e.g., analytic support for product development and commercialization; cost-benefit analysis, etc.), market and business analysis (e.g., effects of market structure and competition; assessment of business strategy and development; health insurance and managed care market analysis), and regulation and policy analysis. Clients include large pharmaceutical companies, medical device manufacturers, hospitals and health systems, and trade associations. The group consists of faculty affiliated with a number of research universities across the United States, including the University of Iowa, Texas A&M University, Duke University, Emory University, University of Louisville, University of Nebraska, Purdue University, and Washington University.

HECG is also capable of conducting analyses in numerous other areas of health economics and health services research. In addition, HECG principals, associates, and collaborators are able to provide litigation support and expert testimony in several areas pertaining to the economics and business aspects of the health industry. HECG has extensive knowledge and experience in data management and analysis, including the application of advanced statistical analyses to large health care databases. We have extensive experience working with a variety of databases, including Medicare and Medicaid claims databases, commercial health plan claims databases, Medstat MarketScan® claims databases, state-level discharge abstracts, Medicare Cost Reports, American Hospital Association Annual Survey data, the Area Resource File, industry data from the Census and the Bureau of Economic Analysis, and several others. In working with these databases, HECG has developed broad knowledge and expertise with statistical analysis software, including SAS®, Stata®, SPSS®, Treeage®, S-Plus, Access®, and others.

Contact:

John E. Schneider, PhD
HECG, LLC
167 Mills St.
Morristown, NJ 07960
Mobile: (319) 331-2122
E-mail: jeschneider@hecg-llc.com
Web: www.hecg-llc.com

References

- Agrawal, V., T. Ehrbeck, K.O. Packard, and P. Mango. 2005. Consumer-Directed Health Plan Report: Early Evidence is Promising. Pittsburgh, PA: McKinsey & Company.
- Alchian, A.A., and H. Demsetz. 1972. Production, Information Costs, and Economic Organization. *American Economic Review* 62 (December):777-795.
- Almeida, P., G. Dokko, and L. Rosenkopf. 2003. Startup Size and the Mechanisms of External Learning: Increasing Opportunity and Decreasing Ability? *Research Policy* 32 (2):301-316.
- Bachmann, M.O., D. Alderson, T.J. Peters, C. Bedford, D. Edwards, S. Wotton, and I.M. Harvey. 2003. Influence of Specialization on the Management and Outcome of Patients with Pancreatic Cancer. *British Journal of Surgery* 90:171-177.
- Barro, J.R., R.S. Huckman, and D.P. Kessler. 2006. The Effects of Cardiac Specialty Hospitals on the Cost and Quality of Medical Care. *Journal of Health Economics* 25:701-721.
- Baum, N.H. 1999. 'Focused Factories' Could be Wave of the Future. *Urology Times* 27 (3):22.
- Berenson, R.A., G.J. Bazzoli, and M. Au. 2006. Do Specialty Hospitals Promote Price Competition? In *Issue Brief No. 103*. Washington, DC: Center for Studying Health System Change.
- Betbeze, P. 2007. *Keep 'Em Close*. HealthLeaders Media 2007 [cited August 22 2007]. Available from www.healthleadersmedia.com/print.cfm?content_id=90336&parent=105.
- Birkmeyer, J.D., T.A. Stukel, A.E. Siewers, P.P. Goodney, D.E. Wennberg, and F.L. Lucas. 2003. Surgeon Volume and Operative Mortality in the United States. *New England Journal of Medicine* 349 (22):2117-2127.
- Cain Brothers & Company LLC. 2003. If You're Niche'd, It Might Be Your Fault. In *Strategies in Capital Finance, Vol. 39*. San Francisco, CA.
- Carbonara, P., and J. Caplin. 2004. The Hospital Wars: Are Specialty Hospitals a Model for the Future, or a Time Bomb? *Money*, February 1, 147.
- Carroll, G.R., and M.T. Hannan. 2000. *The Demography of Corporations and Industries*. Princeton, NJ: Princeton University Press.
- Casalino, L.P., K.J. Devers, and L.R. Brewster. 2003. Focused Factories? Physician-owned Specialty Facilities. *Health Affairs* 22 (6):56-7.

- Casalino, L.P., H. Pham, and G. Bazzoli. 2004. Growth of Single-Specialty Medical Groups. *Health Affairs* 23 (2):82-90.
- Casey, J. 2004. The Case for Specialty Hospitals. *Modern Healthcare* 34 (47):21-22.
- Chandler, A.D. 1990. *Scale and Scope: The Dynamics of Industrial Capitalism*. Cambridge, MA: The Belknap Press/Harvard University Press.
- . 1992. Organizational Capabilities and the Economic History of the Industrial Enterprise. *Journal of Economic Perspectives* 6 (3):79-100.
- Chao, L. 2005. Shopping for the Best Medical Prices. *Wall Street Journal* September 8, 2005, D3.
- Chassin, M.R. 1993. Explaining Geographic Variations: The Enthusiasm Hypothesis. *Medical Care* 31 (5):YS37-YS44.
- Chollet, D., S. Liu, G. Gimm, C. Fahlman, L. Felland, A. Gerland, M. Banker, and A. Liebhaber. 2006. Analysis of Niche Hospitals in Texas and the Financial Impact on General Hospitals: Final Report to the Texas Department of State Health Services: Mathematica Policy Research, Inc.
- Choudhry, S., N.K. Choudhry, and T.A. Brennan. 2005. Specialty Versus Community Hospitals: What Role for the Law? *Health Affairs Web Exclusive* W5:361-372.
- CMS. 2005. Study of Physician-owned Specialty Hospitals Required in Section 507(c)(2) of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003: Centers for Medicare and Medicaid Services, Department of Health and Human Services.
- Coddington, D.C., L.E. Palmquist, and W.V. Trollinger. 1985. Strategies for Survival in the Hospital Industry. *Harvard Business Review* (May-June):129-138.
- Cowing, T.G., A.G. Holtmann, and S. Powers. 1983. Hospital Cost Analysis: A Survey and Evaluation of Recent Studies. *Advances in Health Economics and Health Services Research* 4:257-303.
- Cram, P, GE. Rosenthal, and M Vaughan-Sarrazin. 2005. Cardiac revascularization in specialty and general hospitals. *New England Journal of Medicine* 352 (14):1454-1463.
- Cram, P., M.S. Vaughan-Sarrazin, B. Wolf, J.N. Katz, and G.E. Rosenthal. 2007. A Comparison of Total Hip and Knee Replacement in Specialty and General Hospitals. *Journal of Bone and Joint Surgery* 89 (8):1675-1684.
- Cram, P.C., G.E. Rosenthal, and M.S. Vaughan-Sarrazin. 2005. Cardiac Revascularization in Specialty and General Hospitals. *New England Journal of Medicine* 352 (14):1454-1462.

- Danneels, E. 2002. The Dynamics of Product Innovation and Firm Competencies. *Strategic Management Journal* 23:1095-1121.
- Daus, C. 2000. The Dream Team. *Orthopedic Technology Review* 2 (5).
- Ohio Senate. 2004. *Discrimination Based on Ownership or Investment Interest in Another Hospital Prohibited*. HB 67.
- Dobson, A., and R. Haught. 2005. The Rise of the Entrepreneurial Physician. *Health Affairs Web Exclusive* (W5):494-497.
- Domrzalski, D. 2002. Specialty Hospitals are Changing the Face of U.S. Health Care. *New Mexico Business Weekly*, August 12.
- Douglas, T.J., and J.A. Ryman. 2003. Understanding Competitive Advantage in the General Hospital Industry: Evaluating Strategic Competencies. *Strategic Management Journal* 24 (4):333-347.
- Dranove, D, and P Wehner. 1994. Physician-Induced Demand for Childbirths. *Journal of Health Economics* 13 (1):61-73.
- Dranove, D. 1987. Rate-Setting by Diagnosis Related Groups and Hospital Specialization. *RAND Journal of Economics* 18 (3):417-427.
- . 1998b. Economies of Scale in Non-Revenue Producing Cost Centers: Implications for Hospital Mergers. *Journal of Health Economics* 17:69-83.
- Eastaugh, S.R. 1992. Hospital Strategy and Financial Performance. *Health Care Management Review* 17 (3):19-31.
- . 2001. Hospital Costs and Specialization: Benefits of Trimming Product Lines. *Journal of Health Care Finance* 28 (1):61.
- Essletzbichler, J. 2003. From Mass Production to Flexible Specialization: The Sectoral and Geographical Extent of Contract Work in U.S. Manufacturing. *Regional Studies* 37 (8):753-771.
- Fine, A. 2004. The Specter of Specialty Hospitals, Part I. *Hospitals & Health Networks*.
- Fournier, G.M., and J.M. Mitchell. 1992. Hospital Costs and Competition for Services. *Review of Economics and Statistics* 74 (4):627-635.
- FTC. 2004. Improving Health Care: A Dose of Competition. Washington, D.C.: Federal Trade Commission & U.S. Department of Justice.
- GAO. 1992. Excessive Payments Support the Proliferation of Costly Technology. Washington, DC: U.S. General Accounting Office.

- . 2003a. Specialty Hospitals: Information on National Market Share, Physician Ownership, and Patients Served. Washington, D.C.: General Accounting Office.
- . 2003b. Specialty Hospitals: Geographic Location, Services Provided, and Financial Performance. Washington, D.C.: General Accounting Office.
- . 2006. General Hospitals: Operational and Clinical Changes Largely Unaffected by Presence of Competing Specialty Hospitals. In *Report to the Chairman, Committee on Ways and Means, House of Representatives*. Washington, DC: United States General Accountability Office.
- Gaynor, M., and G.F. Anderson. 1995. Uncertain Demand, the Structure of Hospital Costs, and Cost of Empty Hospital Beds. *Journal of Health Economics* 14:291-317.
- General Accounting Office. 2003a. Specialty Hospitals: Information on National Market Share, Physician Ownership, and Patients Served. Washington, D.C.: General Accounting Office.
- . 2003b. Specialty Hospitals: Geographic Location, Services Provided, and Financial Performance. Washington, D.C.: General Accounting Office.
- Gollop, F.M. , and J.L. Monahan. 1991. A Generalized Index of Diversification: Trends in U.S. Manufacturing. *Review of Economics and Statistics* 73 (2):318-330.
- Greenwald, L., J. Cromwell, W. Adamache, S. Bernard, E. Drozd, E. Root, and K.J. Devers. 2006. Specialty Versus Community Hospitals: Referrals, Quality, and Community Benefits. *Health Affairs* 25 (1):106-118.
- Greve, H.R. 2003. *Organizational Learning from Performance Feedback: A Behavioral Perspective on Innovation and Change*. Cambridge: Cambridge University Press.
- Grossman, M. 1972. On the Concept of Health Capital and the Demand for Health. *Journal of Political Economy* 80 (Mar.-Apr.):223-255.
- Hadley, J., and S. Zuckerman. 2005. Physician-Owned Specialty Hospitals: A Market Signal for Medicare Payment Revisions. *Health Affairs Web Exclusive* (W5):491-493.
- Haugh, R. 2006. Centers of Excellence Take Tiering to the Max. *Hospitals and Health Networks* 80 (2):42-44.
- Havighurst, C.C. 2005. Monopoly is Not the Answer. *Health Affairs Web Exclusive* (W5):373-375.
- Herzlinger, R.E. 2002. Let's Put Consumers In Charge of Health Care. *Harvard Business Review* 80 (7):44-50;52-55;123.

- . 2004. Consumer-Driven Health Care. *Healthcare Financial Management* 53 (3):66-68.
- . 2004. Specialization and Its Discontents: The Pernicious Impact of Regulations Against Specialization and Physician Ownership on the US Healthcare System. *Circulation* 109:2376-2378.
- . 2004c. Specialization and Its Discontents: The Pernicious Impact of Regulations Against Specialization and Physician Ownership on the US Healthcare System. *Circulation* 109:2376-2378.
- Hill, C.W.L. 1994. Diversification and Economic Performance: Bringing Structure and Corporate Management Back into the Picture. In *Fundamental Issues in Strategy: A Research Agenda*, edited by R. P. Rumelt, D. E. Schendel and D. J. Teece. Boston, MA: Harvard Business School Press.
- Holstrom, B., and P. Milgrom. 1991. Multitask Principal-Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design. *Journal of Law, Economics and Organization* 7 (Spring):24-52.
- Iglehart, J.K. 2005. The Emergence of Physician-Owned Speciality Hospitals. *New England Journal of Medicine* 352 (1):78-84.
- . 2005. The Emergence of Physician-Owned Specialty Hospitals. *New England Journal of Medicine* 352 (1):78-84.
- Institute of Medicine. 2001. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, D.C.: National Academy Press.
- Iqbal, Y., and D. Taylor. 2001. Surgical Hospitals: Where Do They Fit In? *Outpatient Surgery* 11 (7):6-12.
- Keeler, T.E., and J.S. Ying. 1996. Hospital Costs and Excess Bed Capacity: A Statistical Analysis. *Review of Economics and Statistics*:470-81.
- Kessler, D.P., and J.J. Geppert. 2005. The Effects of Competition on Variation in the Quality and Cost of Medical Care. *Journal of Economics and Management Strategy* 14 (3):575-589.
- Kessler, D.P., and M.B. McClellan. 2000. Is Hospital Competition Socially Wasteful? *Quarterly Journal of Economics* 115 (2):577-615.
- Killoran, G.C. 2007. *Courts Continue to Reject Physician Challenges to Hospitals' Medical Exclusive Contracts*. Michael Best & Friedrich LLP, July 3 2002 [cited September 27 2007]. Available from http://www.michaelbest.com/offices.cfm?action=view&office_id=8.

- Kouri, B.E., R.G. Parsons, and H.R. Alpert. 2002. Physician Self-Referral for Diagnostic Imaging: Review of the Empiric Literature. *AJR* 179:843-850.
- Kovner, C., C. Jones, C. Zhan, P.J. Gergen, and J. Basu. 2002. Nurse Staffing and Postsurgical Adverse Events: An Analysis of Administrative Data form a Sample of U.S. Hospitals, 1990-1996. *Health Services Research* 37 (3):611-629.
- Lang, T.A., M. Hodge, V. Olson, P.S. Romano, and R.L. Kravitz. 2004. Nurse-Patient Ratios: A Systematic Review of the Effects of Nurse Staffing on Patient, Nurse Employee, and Hospital Outcomes. *Journal of Nursing Administration* 34 (7-8):326-337.
- Li, T., and R. Rosenman. 2001. Cost Inefficiency in Washington Hospitals: A Stochastic Frontier Approach Using Panel Data. *Health Care Management Science* 4 (2):73-81.
- . 2001. Estimating Hospital Costs with a Generalized Leontief Function. *Health Economics* 10 (6):523-538.
- Liebhaber, A., and J.M. Grossman. 2007. Physicians Moving to Mid-Sized, Single-Specialty Practices. In *Community Tracking Study "Tracking Report: Quality & Care Delivery"*. Washington, D.C.: Center for Studying Health System Change.
- Lo Sasso, A.T., T Rice, J.R. Gabel, and H. Whitmore. 2004. Tales From the New Frontier: Pioneers' Experiences with Consumer-Driven Health Care. *Health Services Research* 39 (4 pt 2):1071-1090.
- Lynk, W.J., and C.S. Longley. 2002. The Effect of Physician-Owned Surgicenters on Hospital Outpatient Surgery. *Health Affairs* 21 (4):215-21.
- March, J.G. 1996. Exploration and Exploitation in Organizational Learning. In *Organizational Learning*, edited by M. D. Cohen and L. S. Sproull. Thousand Oaks, CA: Sage.
- Mark, B.A., D.W. Harless, M. McCue, and Y. Xu. 2004. A Longitudinal Examination of Hospital Registered Nurse Staffing and Quality of Care. *Health Services Research* 39 (2):279-300.
- MedCath Corporation. 2001. Corporate Profile. Charlotte, NC.
- MedPAC. 2003. Transcript from Public Meeting on Inpatient and Outpatient Hospital Payment Issues. Washington, D.C.: Medicare Payment Advisory Commission.
- . 2005. Physician-Owned Specialty Hospitals: Testimony by Mark E. Miller, PhD, of Medicare Payment Advisory Commission, Before the Subcommittee on Federal Financial Management, Government Information and International Security Committee on Homeland Security and Governmental Affairs, edited by U. S. Senate.

- . 2006. Physician-Owned Specialty Hospitals Revisited. Washington, DC: Medicare Payment Advisory Commission.
- Mehrotra, A., T. Bodenheimer, and R.A. Dudley. 2003. Employers' Efforts to Measure and Improve Hospital Quality: Determinants of Success. *Health Affairs* 22 (2):60-71.
- Menke, T.J. 1997. The Effect of Chain Membership on Hospital Costs. *Health Services Research* 32 (2):177-197.
- Mezei, G., and F. Chung. 1999. Return Hospital Visits and Hospital Readmission After Ambulatory Surgery. *Annals of Surgery* 230 (5):721-7.
- Milgrom, P., and J. Roberts. 1990. Bargaining Costs, Influence Costs, and the Organization of Economic Activity. In *Perspectives on Positive Political Economy*, edited by J. Alt and K. Shepsle. Cambridge: Cambridge University Press
- Mitchell, J.M. 2005. Effects of Physician-Owned Limited Service Hospitals: Evidence from Arizona. *Health Affairs* W5:481-490.
- . 2007. Utilization Changes Following Market Entry by Physician-Owned Specialty Hospitals. *Medical Care Research and Review* 64 (4):395-415.
- Mitchell, J.M., and T.R. Sass. 1995. Physician Ownership of Ancillary Services: Indirect Demand Inducement or Quality Assurance? *Journal of Health Economics* 14:263-289.
- Moore, N.J. 2003. Regulating Self-Referrals and Other Physician Conflicts of Interest. *HEC Forum* 15 (2):134-154.
- Moore, W.B. 1990. Hospitals Win Healthy Margins by Following Business Basics. *Hospitals* April 20:56,58.
- Myers, H. 1998. Focused Factories: Are You Ready for the Competition? *Hospitals and Health Networks* 72 (7):p24, 6p.
- Nallamothu, B.K., M.A.M. Rogers, M.E. Chernew, H.M. Krumholz, K.A. Eagle, and J.D. Birkmeyer. 2007. Opening of Specialty Cardiac Hospitals and Use of Coronary Revascularization in Medicare Beneficiaries. *Journal of the American Medical Association* 297 (9):962-968.
- Nallamothu, B.K., Y. Wang, D.J. Magid, R.L. McNamara, J. Herrin, E.H. Bradley, E.R. Bates, C.V. Pollack, and H.M. Krumholz. 2006. Relationship Between Hospital Specialization With Primary Percutaneous Coronary Intervention and Clinical Outcomes in ST-Segment Elevation Myocardial Infarction: National Registry of Myocardial Infarction-4 Analysis. *Circulation* 113 (January 17).
- Nelson, R.R., and S.G. Winter. 1982. *An Evolutionary Theory of Economic Change*. Cambridge, MA: Belknap Press.

- Newhouse, J.P. 1993. *Free for All? Lessons from the RAND Health Insurance Experiment*. Cambridge, MA: Harvard University Press.
- Nooteboom, B. 2000. *Learning and Innovation in Organizations and Economies*. Oxford and New York: Oxford University Press.
- O'Sullivan, J.O. 2004. Medicare: Physician Self-Referral ("Stark I and II"). Washington, D.C.: Domestic Social Policy Division, Congressional Research Service / Library of Congress.
- Ohsfeldt, R.L., and J.E. Schneider. 2006. *The Business of Health: The Role of Competition, Markets, and Regulation*. Washington, DC: AEI Press.
- Panzar, J. C., and R.D. Willig. 1981. Economies of Scope. *The American Economic Review* 71 (2):268-272.
- Porter, M.E., and E.O. Teisberg. 2004. Refining Competition in Health Care. *Harvard Business Review* 82 (6):65-76.
- Roberts, R.R., P.W. Frutos, G.G. Ciavarella, L.M. Gussow, E.K. Mensah, L.M. Kampe, H.E. Straus, G. Joseph, and R.J. Rydman. 1999. Distribution of Variable vs. Fixed Costs of Hospital Care. *Journal of the American Medical Association* 281 (7):644-649.
- Robinson, J.C. 2005. Entrepreneurial Challenges to Integrated Health Care. In *Policy Challenges in Modern Health Care*, edited by D. Mechanic, L. B. Rogut, D. C. Colby and J. R. Knickman. New Brunswick, NJ: Rutgers University Press.
- . 2005. Managed Consumerism in Health Care. *Health Affairs* 24 (6):1478-1489.
- Rohack, J.J. 2004. Report to the Board of Trustees: Specialty Hospitals and Impact on Health Care. Chicago, IL: American Medical Association.
- Romano, M., and B. Kirchheimer. 2001. The Latest Surgery Suite, and a Room with a View. *Modern Healthcare* 31 (9):26-28;30.
- Rosenzweig, M.R., and T.P. Schultz. 1983. Estimating a Household Production Function: Heterogeneity, the Demand for Health Inputs, and their Effects on Birth Weight. *Journal of Political Economy* 91 (5):723-746.
- Rozek, R.P. 1988. A Nonparametric Test for Economies of Scope. *Applied Economics* 20:653-663.
- Santerre, R.E., and J.A. Vernon. 2005. Hospital Ownership Mix Efficiency in the US: An Exploratory Study: NBER Working Paper Series #11192.
- Scalise, D. 2006. Strange Bedfellows. *Hospitals and Health Networks* (December):10,12.

- Schneider, J.E. 2003. Changes in the Effects of Mandatory Rate Regulation on Growth in Hospital Operating Costs, 1980-1996. *Review of Industrial Organization* 22 (4):297-312.
- Schneider, J.E., T.R. Miller, R.L. Ohsfeldt, M.A. Morrissey, B.A. Zelner, and P. Li. 2007. The Economics of Hospital Specialization. Morristown, NJ: Health Economics Consulting Group LLC.
- Schneider, J.E., R.L. Ohsfeldt, M.A. Morrissey, P. Li, T.R. Miller, and B.A. Zelner. 2007. Effects of Specialty Hospitals on the Financial Performance of General Hospitals, 1997-2004. *Inquiry* 44 (Autumn):(Forthcoming).
- Shactman, David. 2005. Specialty Hospitals, Ambulatory Surgery Centers, And General Hospitals: Charting A Wise Public Policy Course. *Health Affairs* 24 (3):868-873.
- Shaller, D., S. Sofaer, S.D. Findlay, J.H. Hibbard, D. Lansky, and S. Delbanco. 2003. Consumers and Quality-Driven Health Care: A Call to Action. *Health Affairs* 22 (2):95-101.
- Shortell, S. M., E. Morrison, and S. Hughes. 1989. The Keys to Successful Diversification: Lessons from Leading Hospital Systems. *Hospital and Health Services Administration* 34 (4):471-492.
- Sinay, U.A., and C.R. Campbell. 1995. Scope and Scale Economies in Merging Hospitals Prior to Merger. *Journal of Economics and Finance* 19 (2):107-123.
- Skinner, W. 1974. The Focused Factory. *Harvard Business Review* 52 (3):113-20.
- Smith, R.B. 2002. The Return of the Heart Hospital. *Healthcare Financial Management* 56 (10):76.
- Snail, T.S., and J.C. Robinson. 1998. Organizational Diversification in the American Hospital. *Annual Review of Public Health* 19:417-453.
- Stanton, M.W., and M.K. Rutherford. 2004. Hospital Nurse Staffing and Quality of Care. In *Research in Action (Issue #14 AHRQ Pub. No. 04-0029)*. Rockville, MD: Agency for Healthcare Research and Quality.
- Stout, S.M., and D.C. Warner. 2003. How Did Physician Ownership Become a Federal Case? The Stark Amendments and Their Prospects. *HEC Forum* 15 (2):171-187.
- Teece, D.J. 1980. Economies of Scope and the Scope fo the Enterprise. *Journal of Economic Behavior and Organization* 1 (3):223-247.
- . 1982. Towards an Economic Theory of the Multiproduct Firm. *Journal of Economic Behavior and Organization* 3:39-63.

- Teece, D.J., and G. Pisano. 1994b. The Dynamic Capabilities of Firms: An Introduction. *Industrial and Corporate Change* 3 (3):537-556.
- Teece, D.J., R. Rumelt, G. Dosi, and S. Winter. 1994a. Understanding Corporate Coherence: Theory and Evidence. *Journal of Economic Behavior and Organization* 23:1-30.
- Tirole, J. 1988. *The Theory of Industrial Organization*. Cambridge, MA: The MIT Press.
- Urquhart, D.J.B., and A. O'Dell. 2004. A Model of Focused Health Care Delivery. In *Consumer-Driven Health Care: Implications for Providers, Payers, and Policymakers*, edited by R. E. Herzlinger. San Francisco, CA: John Wiley & Sons, Inc.
- Vita, M. 1990. Exploring Hospital Production Relationships with Flexible Functional Forms. *Journal of Health Economics* 9:1-21.
- Walker, L.R., and M.D. Rosko. 1988. Evaluation of Health Care Service Diversification Options in Health Care Institutions and Programs by Portfolio Analysis: A Marketing Approach. *Journal of Health Care Marketing* 8 (1):48-59.
- Walker, T. 1998. Specialty Care Facilities Make a Case by Improving Outcomes and Costs. *Managed Healthcare* 8 (6):51-54.
- Warner, M.A., S.E. Shields, and C.G. Chute. 1993. Major Morbidity and Mortality Within 1 Month of Ambulatory Surgery and Anesthesia. *JAMA* 270 (12):1437-41.
- Weinstein, J.N., K.K. Bronner, T.S. Morgan, and J.E. Wennberg. 2004. Trends and Geographic Variations in Major Surgery for Degenerative Diseases of the Hip, Knee, and Spine. *Health Affairs Web Exclusive (VAR)*:81-89.
- Wolski, C. 2004. Watching Your Back. *Orthopedic Technology Review* 6 (6).
- Womack, J.P., D.T. Jones, and D. Roos. 1990. *The Machine That Changed the World*. New York: Harper Perennial.
- Woods, G.W., D.P. O'Connor, and P. Pierce. 2005. Orthopaedic Surgeons Do Not Increase Surgical Volume After Investing in a Specialty Hospital. *Journal of Bone and Joint Surgery* 87-A (6):1185-1190.
- Wruck, K.H., and M.C. Jensen. 1994. Science, Specific Knowledge, and Total Quality Management. *Journal of Accounting and Economics* 18:247-87.
- Zientek, D.M. 2003. Physician Entrepreneurs, Self-Referral, and Conflicts of Interest: An Overview. *HEC Forum* 15 (2):111-133.
- Zuckerman, A.M. 2004. Competing on Quality. *Hospitals & Health Networks*.

Zwanziger, J., and G. Melnick. 1988. The Effects of Hospital Competition and the Medicare PPS Program on Hospital Cost Behavior in California. *Journal of Health Economics* 7:301-20.

Zwanziger, J., G. Melnick, and A. Bamezai. 2000. The Effect of Selective Contracting on Hospital Costs and Revenues. *Health Services Research* 35:849-67.