Original Investigation

Total Expenditures per Patient in Hospital-Owned and Physician-Owned Physician Organizations in California

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IMPORTANCE Hospitals are rapidly acquiring medical groups and physician practices. This consolidation may foster cooperation and thereby reduce expenditures, but also may lead to higher expenditures through greater use of hospital-based ambulatory services and through greater hospital pricing leverage against health insurers.

OBJECTIVE To determine whether total expenditures per patient were higher in physician organizations (integrated medical groups and independent practice associations) owned by local hospitals or multihospital systems compared with groups owned by participating physicians.

DESIGN AND SETTING Data were obtained on total expenditures for the care provided to 4.5 million patients treated by integrated medical groups and independent practice associations in California between 2009 and 2012. The patients were covered by commercial health maintenance organization (HMO) insurance and the data did not include patients covered by commercial preferred provider organization (PPO) insurance, Medicare, or Medicaid.

MAIN OUTCOMES AND MEASURES Total expenditures per patient annually, measured in terms of what insurers paid to the physician organizations for professional services, to hospitals for inpatient and outpatient procedures, to clinical laboratories for diagnostic tests, and to pharmaceutical manufacturers for drugs and biologics.

EXPOSURES Annual expenditures per patient were compared after adjusting for patient illness burden, geographic input costs, and organizational characteristics.

RESULTS Of the 158 organizations, 118 physician organizations (75%) were physician-owned and provided care for 3 065 551 patients, 19 organizations (12%) were owned by local hospitals and provided care for 728 608 patients, and 21 organizations (13%) were owned by multihospital systems and provided care for 693 254 patients. In 2012, physician-owned physician organizations had mean expenditures of $3066 per patient (95% CI, $2892 to $3240), hospital-owned physician organizations had mean expenditures of $4312 per patient (95% CI, $3768 to $4857), and physician organizations owned by multihospital systems had mean expenditures of $4776 (95% CI, $4349 to $5202) per patient. After adjusting for patient severity and other factors over the period, local hospital–owned physician organizations incurred expenditures per patient 10.3% (95% CI, 1.7% to 19.7%) higher than did physician-owned organizations (adjusted difference, $435 [95% CI, $105 to $766], $P = .02$). Organizations owned by multihospital systems incurred expenditures 19.8% (95% CI, 13.9% to 26.0%) higher (adjusted difference, $704 [95% CI,$512 to $895], $P < .001$) than physician-owned organizations. The largest physician organizations incurred expenditures per patient 9.2% (95% CI, 3.8% to 15.0%, $P = .001$) higher than the smallest organizations (adjusted difference, $130 [95% CI, $–32 to $292]).

CONCLUSIONS AND RELEVANCE From the perspective of the insurers and patients, between 2009 and 2012, hospital-owned physician organizations in California incurred higher expenditures for commercial HMO enrollees for professional, hospital, laboratory, pharmaceutical, and ancillary services than physician-owned organizations. Although organizational consolidation may increase some forms of care coordination, it may be associated with higher total expenditures.

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Hospitals and multihospital systems are acquiring medical groups and physician practices as part of a strategy to build integrated delivery systems capable of providing the full range of professional, facility, laboratory, and pharmaceutical services to affiliated patients.[1] This consolidation may lead to greater coordination of care, less duplication of tests and treatments, a substitution of low-cost for high-cost settings where appropriate, and, as a result, lower total expenditures for care.[2] However, this consolidation could lead to higher patient care expenditures due to preferential use of high-priced hospitals for inpatient admissions, substitution of hospital-affiliated outpatient departments for ambulatory surgery and imaging facilities, and increased prices to insurers for laboratory tests, drugs, and other ancillary services.[3-6] The policy debate about consolidation has gained new policy attention due to the financial incentives provided by the Affordable Care Act for physicians to join hospital-affiliated accountable care organizations (ACOs).[7]

It has been difficult to ascertain the influence of hospital ownership on the expenditures for care delivered by physician organizations. Available measures of expenditures often do not cover the full range of services used by patients, because insurers often are reluctant to release claims data, hospitals often refuse to release price data, drugs often are reimbursed by independent pharmacy benefit management firms, and laboratory tests are conducted by a mix of physician practices, hospital facilities, and national laboratory firms. However, public policy makers and private purchasers increasingly are focusing on their total expenditures, rather than expenditures for particular components of care, as the basis for emerging methods of compensation such as pay-for-performance[8] and shared savings for ACOs.[9] The objective of this study was to determine whether total expenditures per patient were higher in physician organizations owned by local hospitals or multihospital systems compared with physician organizations owned by participating physicians.

Methods

Data on Physician Organizations

This study was approved by the Western Institutional Review Board, on behalf of the Integrated Healthcare Association (IHA). A waiver was received for informed consent, as no patient identifiers were included in the data. Data on physician organizations were obtained from the IHA, an association of insurers, hospitals, and physician organizations in California.[10] Since 2001, the IHA has coordinated the state's pay-for-performance program in collaboration with the participating health insurance plans and physician organizations. The program focuses on patients enrolled in health maintenance organizations (HMOs), the dominant form of commercial insurance in California. These patients are nonelderly and nonindigent, are not eligible for either Medicare or Medicaid, and thus are broadly representative of the working population in California. They account for 24% of persons with employment-based insurance in California in 2012. All physician organizations are paid by the health plans on a monthly per-member basis for professional and ancillary services, sometimes supplemented with partial capitation for hospital services. The organizations are eligible for financial bonuses if they perform well on measures of clinical process and outcome, patient experience and satisfaction with care, and the meaningful use of clinical information technology. The California pay-for-performance program has been described elsewhere.[11]

For this study, physician organizations were categorized as integrated medical groups, with employed physician members, or independent practice associations (IPAs), with contracting physician practices. Ownership data on each medical group and IPA were obtained from the consulting firm of Cattaneo & Stroud.[12] Cattaneo & Stroud maintain an annually updated database on all physician organizations in California that contract with HMOs, including information of ownership and size. For purposes of this study, organizations were categorized in terms of whether they were owned by their member physicians, a local hospital, or a multihospital system. Physician-owned organizations typically are structured as a partnership or professional corporation. Organizations owned by individual hospitals and local hospital chains, which do not extend across geographic regions (and typically include fewer facilities than regional hospital chains), are categorized for this study as owned by a local hospital (rather than owned by a regional multihospital system).

Four regional multihospital systems own physician organizations in multiple geographic markets in California. Integrated medical groups and IPAs owned by any of these 4 systems are categorized for this study as owned by a regional multihospital system, as distinct from an individual hospital. The organizations included in this study do not provide services to Kaiser Foundation Health Plan, the largest HMO in California, which obtains professional services exclusively from its affiliated Permanente medical groups.

The size of each organization was measured in terms of the number of patients for which the organization received capitation payment from commercial and Medicare Advantage HMO plans. This measure does not capture the scale of the organization's services provided to patients enrolled in commercial preferred provider organizations (PPOs) and the Medicare fee-for-service program. It is not a direct measure of the number of physicians affiliated with the organization. In particular, IPAs tend to have larger numbers of affiliated physicians than integrated medical groups.

Data on Expenditures for Care

The IHA provided 2009-2012 data on the total annual expenditures for the care of patients affiliated with every organization participating in the California pay-for-performance program. The expenditure data were obtained by the IHA from multiple sources, depending on the site and type of care, and represent expenditures from the point of view of insurers and the perspective of employers and individuals who pay insurance premiums. For example, expenditures for hospital ser-

vices are measured in terms of the negotiated rates paid by insurers and the out-of-pocket co-payments made by patients, not the expenditures incurred by the hospitals for wages, supplies, capital equipment, and other inputs.

For physician services, expenditures for care were measured as the monthly capitation payments from the insurers to the organization to cover primary care and specialist physician services, plus the expenditures for laboratory tests. Expenditures by the insurers on hospital services, ambulatory surgery, subacute care, diagnostic imaging, pharmaceuticals, and other nonphysician services were obtained from insurance claims paid to the facilities and pharmaceutical distributors. The data were not audited independently by the IHA but are compiled for each physician organization from the individual claims data for every individual patient by Truven Health Analytics on behalf of the insurers and the IHA. These expenditure data are subject to close scrutiny by insurers and physician organizations for accuracy, because they must reflect the negotiated payment rates and the actual levels of utilization of each type of service by the patients affiliated with each organization. They are not estimates of expenditures, but are the actual expenditures made for covered services. Payments for mental health services were not included, as these services are provided by managed behavioral health organizations on behalf of the health plans and are not delegated to participating organizations.

Expenditures were measured in terms of the actual amount paid by the insurer, not billed charges. Annual per-patient expenditures were truncated at $100 000 to exclude the effect of small numbers of very sick patients on average expenditures per patient. Patient co-payments required at the time of receiving care were included in the measure of expenditures.

Professional, hospital, ancillary, pharmaceutical, and consumer cost sharing expenditures during the course of each year were aggregated for each patient by the health insurance plans and Truven Health Analytics, the data intermediary for the pay-for-performance program, to create a measure of the total annual expenditures per patient. The patient data then were aggregated by Truven to measure the average expenditure per patient for each organization in each year. We obtained the expenditure data from Truven for this study already aggregated to the level of the medical group for each year.

The data represent all the expenditures incurred on behalf of the patients, not merely the services directly provided by each organization. The hospital-owned organizations directly provide outpatient and inpatient facility services in addition to physician services. Physician-owned organizations provide only professional services, and refer outpatient and inpatient services to independent facilities. In our measure, expenditures incurred by independent facilities are ascribed to the medical group or IPA with which the patient is affiliated. The measure thus is comparable across organizations regardless of the mix of internally and externally delivered services.[13]

The expenditures incurred by each medical group were adjusted according to the disease burden of its affiliated patient population and the salaries and other inputs that vary across geographic regions. Expenditures were adjusted for differences in disease burden using patient-level relative risk scores based on the Diagnostic Cost Groups (DxCG) relative risk model.[14] The relative risk score accounts for patient age, sex, and health status using diagnosis data obtained from insurance claims. It indicates how much the medical group would be expected to spend on the care of each patient, given the patient's demographic and health status, and is used to adjust the data on actual spending per patient. Risk scores were calculated for all the patients affiliated with each physician organization. The geographic adjustment factor, published by the Centers for Medicare & Medicaid Services and based on its hospital wage index, was used to adjust for input prices in the local market for each physician organization.[15] It measures the ratio of average wages in the local market area of each medical group divided by the national average wage level. The measures of relative risk and geographic input prices were used as covariates in the statistical analyses.

Statistical Methods

We calculated the annual trend between 2009 and 2012 in expenditures per patient for all physician organizations according to ownership, structure, and size. We measured expenditures for physician-owned, local hospital-owned, and multihospital system–owned organizations separately. We divided the organizations into 4 size quartiles based on the number of HMO patients affiliated with each, and measured expenditures per patient for each quartile of organizations to obtain the association between expenditures and this measure of size. We also calculated expenditures separately for different structures: integrated medical groups (organizations with employed physicians) and IPAs (organizations with contracted physicians).

The multivariable association between organizational characteristics and expenditures was calculated using linear regression analysis in Stata (StataCorp), version 12.1. Dollars were converted into logarithmic units so that the coefficients in the regression analyses can be interpreted as percentage differences associated with each covariate. Coefficients from the logarithmic regressions were converted to percentage effects using the transformation $P = 100 [(\exp \times B) - 1]$, where P is the percentage change, exp is the exponential function, and B is the parameter from the regression equation.

We also conducted multivariable regression analyses using expenditures in dollar units rather than in logarithmic units. These dollar regression analyses were used to calculate the dollar differences in expenditures per patient associated with organizational ownership, as a complement to the calculation of percentage differences in expenditures per patient. The coefficients for the ownership covariates in the multivariable regressions directly measure the dollar difference in total expenditures per patient associated with different ownership forms for physician organizations. Covariates included organizational ownership (physician, local hospital, or multihospital system), size (quartile in distribution of number of HMO patients), structure, the geographic expenditure adjustor, the

Table 1. Characteristics of Physician Organizations Participating in the California Pay-for-Performance Program in 2012

	Medical Groups		
	Physician-Owned	Local Hospital-Owned	Multihospital System-Owned
Total			
No. of POs	118	19	21
No. of HMO patients	3 065 551	728 608	693 254
HMO patients per PO, mean (range)	25 979 (1196-241 800)	38 348 (6101-121 694)	33 012 (1835-108 914)
Structure			
Integrated medical groups			
No. of POs	24	15	16
HMO patients per PO, mean (range)	36 487 (1746-241 800)	37 754 (6101-121 694)	38 193 (1835-108 914)
Independent practice associations			
No. of POs	94	4	5
HMO patients per PO, mean (range)	23 296 (1196-168 689)	40 576 (16 313-84 769)	16 433 (5118-33 473)
Size quartiles[a]			
1st			
No. of POs	37	0	3
HMO patients per PO, mean (range)	3567 (1196-5756)	NA	4146 (1835-5485)
2nd			
No. of POs	29	4	4
HMO patients per PO, mean (range)	9383 (6033-13 727)	7491 (6101-9694)	9478 (6040-11 946)
3rd			
No. of POs	28	8	7
HMO patients per PO, mean (range)	22 216 (15 136-34 248)	23 906 (15 110-34 540)	24 643 (17 944-33 473)
4th			
No. of POs	24	7	7
HMO patients per PO, mean (range)	84 975 (39 247-241 800)	72 485 (38 966-121 694)	67 201 (47 605-108 914)
Severity of patient health status, mean (range)[b]	0.8789 (0.3922-1.5465)	1.1106 (0.8521-1.3415)	1.1247 (0.8721-1.5314)
Index of wages and other supply costs in local market, mean (range)[c]	1.1770 (1.1511-1.4653)	1.2125 (1.1511-1.4266)	1.2399 (1.1511-1.4266)

Abbreviations: HMO, health maintenance organization; NA, not applicable; POs, physician organizations.

[a] The range of the first size quartile was 1196 to 5756 HMO patients, 6033 to 13 727 HMO patients in the second quartile, 15 110 to 34 540 HMO patients in the third quartile, and 38 966 to 241 800 HMO patients in the fourth quartile.

[b] Severity of patient health status is relative to average across all physician organizations. Health status was measured by Truven Health Analytics using patient demographics and diagnostic codes from insurance claims submitted for services provided to each patient, using Sightlines Diagnostic Cost Groups Risk Solutions software. Values represent the expenditures that are expected for each patient, given demographics and comorbidities. Values ranged from 0.327 to 1.589, with higher values representing sicker patients.

[c] The index accounts for differences in wages and wage-related costs in markets across California. The index is obtained from published Centers for Medicare & Medicaid Services (CMS) data.[17] It is used by CMS to adjust hospital payments for Medicare under the Medicare Severity Diagnosis Related Group (MS-DRG) system. The values ranged in this study from 1.125 to 1.465, with 1.0 representing the national average. Lower values represent lower input costs in the local market.

patient disease burden adjustor, and indicator variables for each of the 4 study years. The error terms in the linear regression analyses were clustered by organization across years to account for heteroscedasticity.[16] Differences were considered statistically significant when *P* values were .05 or less in a 2-tailed *t* test.

Results

Table 1 presents 2012 descriptive statistics on all physician organizations participating in the California pay-for-performance program. The number of patients affiliated with these organizations, including both commercial HMO and Medicare Advantage, declined from 4.8 million in 2009 to 4.5 million in 2012. The number of patients affiliated through commercial HMOs declined from 4.4 million to 3.9 million. This accounted for 21% of the total number of persons with private health insurance in California in 2012. During this period, the market share of these HMOs declined in favor of PPO health plans and as an increasing share of total HMO enrollment shifted to Kaiser Permanente, which is not included in this study. The number of physician organizations declined from 162 to 158 due to mergers and acquisitions. In 2009, independent hospitals owned 10 physician organizations, accounting for 7.7% of the HMO patients. By 2012, this had increased to 19 independent hospital-owned organizations and 16.2% of patients. In 2009, the 4 multihospital health systems owned 21 physician organizations, accounting for 15.7% of the patients. The number of multihospital systems remained constant at 15.4%.

Table 2 presents trends in total expenditures per patient between 2009 and 2012. The mean expenditure per patient across all physician organizations increased during these 4 years by 16.5%, from $2954 (95% CI, $2803-$3105) to $3443 (95% CI, $3528-$3627), *P* = .001. By 2012, expenditures per patient had increased to an average of $3066 (95% CI, $2892-$3240) in physician-owned organizations, $4312 (95% CI, $3768-$4857) in local hospital-owned organizations, and $4776 (95% CI, $4349-$5202) in multihospital system-owned organiza-

Table 2. Total Annual Cost of Care per Patient in Physician Organizations in California, 2009-2012

Year	Physician Organizations, Mean (Median [Range]), $		
	Physician-Owned	Local Hospital-Owned	Multihospital System-Owned
Average total cost of care per patient			
2009	2718 (2638 [1181-5809])	3683 (3627 [2763-4657])	4083 (4098 [2704-5838])
2010	2845 (2757 [1370-5342])	4081 (4199 [2890-5284])	4362 (4153 [2874-6490])
2011	3006 (2915 [1363-5626])	4251 (4403 [2722-5501])	4719 (4715 [3563-6939])
2012	3066 (3003 [1283-5784])	4312 (4400 [2940-7649])	4776 (4845 [3347-6881])

Table 3. Annual Expenditure Differences per Patient by Physician Organization Characteristics, 2009-2012

	Percentage Expenditure		Dollar Expenditure	
	Adjusted Difference (95% CI), %[a]	*P* Value	Adjusted Difference (95% CI), $[b]	*P* Value
Ownership				
Physician	1 [Reference]		1 [Reference]	
Local hospital	10.34 (1.74 to 19.67)	.02	435.37 (104.86 to 765.89)	.01
Multihospital system	19.81 (13.89 to 26.04)	<.001	703.88 (512.42 to 895.34)	<.001
Structure				
Independent practice association	1 [Reference]		1 [Reference]	
Integrated medical group	−4.88 (−8.72 to −0.87)	.02	−126.39 (−259.28 to 6.50)	.06
Organization size, No. of patients				
1st Quartile	1 [Reference]		1 [Reference]	
2nd Quartile	4.44 (−1.15 to 10.34)	.12	90.82 (−67.68 to 249.32)	.26
3rd Quartile	7.65 (1.85 to 13.78)	.009	100.03 (−72.85 to 272.90)	.26
4th Quartile	9.23 (3.79 to 14.96)	.001	130.32 (−31.50 to 292.15)	.11
Year				
2009	1 [Reference]		1 [Reference]	
2010	12.17 (10.16 to 14.21)	<.001	339.20 (275.33 to 403.06)	<.001
2011	18.39 (16.02 to 20.80)	<.001	528.48 (453.12 to 603.84)	<.001
2012	20.56 (17.51 to 23.68)	<.001	564.63 (475.06 to 654.20)	<.001

[a] The percentage expenditure differences are derived from regression coefficients in multivariable regression analyses, with total expenditures per patient measured in logarithmic units. Percentage differences are derived from logarithmic coefficients using the formula P = 100 [(exp × B) − 1], where P is the percentage change, exp is the exponential function, and B is the coefficient from the regression equation. The regression equation explained 84% of the total variation in percentage expenditures across medical groups (R^2 = 0.84).

[b] The dollar expenditure differences are derived from regression coefficients in multivariable regression analyses, with total expenditures per patient measured in dollars. This regression equation explained 83% of the total variation in percent (R^2 = 0.83). Both regressions adjusted for patient health status and geographic differences in input costs.

tions. These represent a 40.6% relative difference in expenditures per patient associated with hospital ownership (*P* = .001) and 55.8% relative difference associated with ownership by a multihospital system (*P* = .001) compared with ownership by member physicians.

Table 3 presents the association between total expenditures for care and ownership by a local hospital or a multihospital system, after adjusting for organizational size, structure, patient illness severity, geographic differences in input costs, and year effects. Local hospital-owned physician organizations incurred total annual expenditures per patient 10.3% (95% CI, 1.7% to 19.7%) higher than did physician-owned organizations, after adjusting for other relevant factors (*P* = .02). Expenditures per patient were 19.8% (95% CI, 13.9% to 26.0%) higher in organizations owned by multihospital systems than in organizations owned by member physicians (*P* = .001). Local hospital-owned organizations incurred total annual expenditures per patient $435 (95% CI, $105 to $766) higher than did physician-owned organizations, after adjusting for other relevant factors (*P* = .010). Expenditures per patient were $704 (95% CI, $512 to $895) higher in organizations owned by multihospital systems than in organizations owned by member physicians (*P* = .000). The expenditure per patient was higher in organizations with a larger compared with smaller number of patients; after adjusting for other factors, organizations in the largest size quartile incurred expenditures 9.2% (95% CI, 3.8% to 15.0%) greater than those in the smallest size quartile (*P* = .001), adjusted difference, $130 (95% CI, $−32 to $292). The IPAs with contracted physicians incurred expenditures 4.9% (95% CI, 0.9% to 8.7%) higher than did integrated medical groups with employed physicians, after controlling for other factors (*P* = .02).

Discussion

Local hospitals and multihospital health systems are acquiring physician organizations and employing individual physicians as part of a strategy to build integrated delivery systems that can provide the full range of professional and institutional services. Hospitals have been encouraged in this population-based focus by the Affordable Care Act, which creates incentive for the development of ACOs. The ACOs need not be owned by a hospital. As a practical matter, however, hospitals often have more financial capital and managerial expertise to create these complex organizations than physician-owned organizations.

Numerous studies have examined the relationship of mergers between hospitals with the prices charged for hospital services and 1 recent study has examined the association between hospital acquisition of physician practices and prices.[18,19] The present study is the first of which we are aware to measure the association between hospital ownership and the total expenditures on care, including professional, institutional, laboratory, imaging, and pharmaceutical services. The findings are not encouraging for proponents of integration. Organizations owned by local hospitals and multihospital systems may better coordinate care than organizations owned by their participating physicians. For the hospital-owned organizations represented in this study, however, any resulting improvements in coordination were not associated with lower expenditures per patient. Organizations in California that are owned by local hospitals or multihospital systems incur significantly higher expenditures per patient than integrated medical groups and IPAs owned by participating physicians. Between 2009 and 2012 the total expenditures for care per patient were 10% higher in physician organizations that were owned by a local hospital and 20% higher in organizations owned by a multihospital system than in organizations owned by participating physicians, after adjusting for patient disease severity and other factors.

These findings are in contrast to the hope and expectation that organizational consolidation of physicians with hospitals would result in greater coordination, and hence lower expenditures. Policymakers must strive to ensure that hospital acquisition of medical groups and physician practices does not lead to higher expenditures. Antitrust law and policy need to find the appropriate balance between permitting hospital acquisitions that improve efficiency, on the one hand, and preventing acquisitions that increase expenditures, on the other.[20] Reform of payment methods by Medicare and private insurers should focus on the total expenditures made on behalf of patients by the physicians and facilities involved in their care to promote coordination but also to create incentives for efficiency and price reductions.

The results from the study should be interpreted within the limitations of the data. First, our measure of expenditures includes physician, hospital, laboratory, imaging, and pharmaceutical services, but excludes payment for mental health care. We were not able to distinguish whether total expenditures reflect differences in unit prices vs differences in the volume of services provided (eg, price per ambulatory surgery procedure vs number of procedures). Second, our measure reflects the point of view of insurers and consumers, for whom expenditures are measured in terms of what is paid to providers and manufacturers. It does not reflect the production costs incurred by the physician organizations, hospitals, pharmaceutical firms, and other providers. Third, we were not able to measure the quality of the services provided across the range of services embodied in our expenditure measure. Thus, policy efforts to decrease expenditures may have uncertain effects on the quality of medical services provided by physician groups. Fourth, our data are derived from physician organizations in California, a state with a long tradition of group practice, capitation payment, and managed care. These findings may not be generalizable directly to other states. However, physicians outside California increasingly are joining integrated medical groups and IPAs, many of which are being acquired by hospitals. The organization of physician practice nationally is coming to resemble forms traditionally associated with California. Public policy makers and private purchasers also are endeavoring to shift payment methods from fee-for-service to population-based payments that resemble those prevalent in the California managed care market. Fifth, the study focuses solely on the expenditures for patients enrolled in commercial HMOs, to the exclusion of patients covered by commercial PPOs, Medicare, and Medicaid. We do not have expenditure data on these patients.

Conclusions

From the perspective of the insurers and patients, between 2009 and 2012, hospital-owned physician organizations in California incurred higher expenditures for commercial HMO enrollees for professional, hospital, laboratory, pharmaceutical, and ancillary services than did physician-owned organizations. Although organizational consolidation may increase some forms of care coordination, it may be associated with higher total expenditures per patient.

ARTICLE INFORMATION

Author Contributions: Dr Robinson had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.
Study concept and design: Robinson.
Acquisition, analysis, or interpretation of data: Robinson, Miller.
Drafting of the manuscript: Robinson.
Critical revision of the manuscript for important intellectual content: Robinson, Miller.
Statistical analysis: Robinson, Miller.
Obtained funding: Robinson.
Administrative, technical, or material support: Robinson, Miller.
Study supervision: Robinson.

Conflict of Interest Disclosures: All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

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REFERENCES

1. Burns LR, Goldsmith JC, Sen A. Horizontal and vertical integration of physicians: a tale of 2 tails. *Adv Health Care Manag*. 2013;15:39-117.

2. Fisher ES, McClellan MB, Bertko J, et al. Fostering accountable health care: moving forward in Medicare. *Health Aff (Millwood)*. 2009;28(2):w219-w231.

3. Berenson RA, Ginsburg PB, Kemper N. Unchecked provider clout in California foreshadows challenges to health reform. *Health Aff (Millwood)*. 2010;29(4):699-705.

4. Vogt WB, Town RJ. *How Has Hospital Consolidation Affected the Price and Quality of Hospital Care? Research Synthesis Report 9*. Princeton, NJ: Robert Wood Johnson Foundation; 2006.

5. Gaynor M, Town R. The impact of hospital consolidation. http://www.rwjf.org/en/search-results.html?u=&k=hospital+consolidation. Accessed September 25, 2014.

6. Cutler DM, Scott Morton F. Hospitals, market share, and consolidation. *JAMA*. 2013;310(18):1964-1970.

7. Correia EW. Accountable care organizations: the proposed regulations and the prospects for success. *Am J Manag Care*. 2011;17(8):560-568.

8. Robinson JC, Williams T, Yanagihara D. Measurement of and reward for efficiency in California's pay-for-performance program. *Health Aff (Millwood)*. 2009;28(5):1438-1447.

9. Centers for Medicare & Medicaid Services. Shared savings program: frequently asked questions. http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/FAQ.html. Accessed June 20, 2014.

10. Integrated Healthcare Association. Integrated Healthcare Association website. http://iha.org/. Accessed September 25, 2014.

11. Integrated Healthcare Association. Pay-for-performance fact sheet. http://www.iha.org/pdfs_documents/p4p_california/P4P-Fact-Sheet-September-2014.pdf. Accessed February 10, 2014.

12. Cattaneo & Stroud. Cattaneo & Stroud website. http://www.cattaneostroud.com/. Accessed September 25, 2014.

13. Yegian J, Yanagihara D. Value-based pay-for-performance in California. http://www.iha.org/pdfs_documents/p4p_california/Value-Based-Pay-for-Performance-Issue-Brief-September-2013.pdf. Accessed February 10, 2014.

14. Verisk Health. Verisk Health website. http://www.veriskhealth.com/. Accessed September 25, 2014.

15. Medicare Payment Advisory Commission. Payment basics: hospital acute inpatient services payment system 2013. http://www.medpac.gov/documents/payment-basics/hospital-acute-inpatient-services-payment-system.pdf?sfvrsn=0. Accessed September 12, 2014.

16. Bertrand M, Duflo E, Mullainathan S. How much should we trust differences-in-differences estimates. *Q J Econ*. 2004;119(1):249-275. doi:10.1162/003355304772839588.

17. Centers for Medicare & Medicaid Services. Medicare: acute inpatient PPS: wage index. http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/wageindex.html. Accessed September 12, 2014.

18. Gaynor M, Town R. Competition in health markets. In: Barros P, McGuire T, Pauly M, eds. *Handbook of Health Economics*. Vol 2. Waltham, MA: Elsevier; 2011:499-627.

19. Baker LC, Bundorf MK, Kessler DP. Vertical integration: hospital ownership of physician practices is associated with higher prices and spending. *Health Aff (Millwood)*. 2014;33(5):756-763.

20. Porter E. Health law goals face antitrust hurdles. http://www.nytimes.com/2014/02/05/business/economy/health-law-goals-face-antitrust-hurdles.html. Accessed September 25, 2014.