

Original Investigation

Association of Financial Integration Between Physicians and Hospitals With Commercial Health Care Prices

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IMPORTANCE Financial integration between physicians and hospitals may help health care provider organizations meet the challenges of new payment models but also may enhance the bargaining power of provider organizations, leading to higher prices and spending in commercial health care markets.

OBJECTIVE To assess the association between recent increases in physician-hospital integration and changes in spending and prices for outpatient and inpatient services.

DESIGN, SETTING, AND PARTICIPANTS Using regression analysis, we estimated the relationship between changes in physician-hospital integration from January 1, 2008, through December 31, 2012, in 240 metropolitan statistical areas (MSAs) and concurrent changes in spending. Adjustments were made for patient, plan, and market characteristics, including physician, hospital, and insurer market concentration. The study population included a cohort of 7 391 335 nonelderly enrollees in preferred-provider organizations or point-of-service plans included in the Truven Health MarketScan Commercial Database during the study period. Data were analyzed from December 1, 2013, through July 13, 2015.

EXPOSURE Physician-hospital integration, measured using Medicare claims data as the share of physicians in an MSA who bill for outpatient services with a place-of-service code indicating employment or practice ownership by a hospital.

MAIN OUTCOMES AND MEASURES Annual inpatient and outpatient spending per enrollee and associated use of health care services, with utilization measured by price-standardized spending (the sum of annual service counts multiplied by the national mean of allowed charges for the service).

RESULTS Among the 240 MSAs, physician-hospital integration increased from 2008 to 2012 by a mean of 3.3 percentage points, with considerable variation in increases across MSAs (interquartile range, 0.8-5.2 percentage points). For our study sample of 7 391 335 nonelderly enrollees, an increase in physician-hospital integration equivalent to the 75th percentile of changes experienced by MSAs was associated with a mean increase of \$75 (95% CI, \$38-\$113) per enrollee in annual outpatient spending ($P < .001$) from 2008 to 2012, a 3.1% increase relative to mean outpatient spending in 2012 (\$2407 [95% CI, \$2400-\$2414] per enrollee). This increase in outpatient spending was driven almost entirely by price increases because associated changes in utilization were minimal (corresponding change in price-standardized spending, \$14 [95% CI, -\$13 to \$41] per enrollee; $P = .32$). Changes in physician-hospital integration were not associated with significant changes in inpatient spending (\$22 [95% CI, -\$1 to \$46] per enrollee; $P = .06$) or utilization (\$10 [95% CI, -\$12 to \$31] per enrollee; $P = .37$).

CONCLUSIONS AND RELEVANCE Financial integration between physicians and hospitals has been associated with higher commercial prices and spending for outpatient care.

JAMA Intern Med. doi:10.1001/jamainternmed.2015.4610
Published online October 19, 2015.

← Invited Commentary

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Hospital employment of physicians and ownership of physician practices has increased during the past decade.¹⁻⁴ For hospitals and health care systems, financial integration with physicians may boost referrals for hospital inpatient and outpatient services and help to meet the challenges of new payment models that hold health care provider organizations accountable for spending across the full spectrum of care. For physicians, the resources and economies of scale offered by hospitals may be attractive as administrative and infrastructure costs of independent practice grow.^{2,5-7}

Conceptually, physician-hospital integration could increase or decrease spending on health care. Integration could yield efficiencies through better coordination and management of health care, but it could also strengthen the bargaining power of provider organizations over insurers, leading to higher commercial health care prices. Because evidence of efficiencies from physician-hospital integration is limited,⁸⁻¹⁰ even in the context of alternative payment models, such as accountable care organizations,¹¹ concerns have been raised that any reductions in health care use achieved by new payment models¹¹⁻¹⁵ could be offset by higher prices negotiated by provider organizations consolidating in response to them.^{16,17}

Although the price-increasing effects of hospital mergers have been well documented,^{8,18-20} less is known about the effects of consolidation among physicians and between physicians and hospitals. Greater concentration in physician markets has been associated with higher prices for physician services in California,²¹ and increases in physician market concentration have been associated with price increases for cardiology and orthopedic services²² and for office visits²³ in national studies. Two regional studies examining the effect of financial integration between physicians and hospitals on hospital prices^{24,25} produced conflicting results. The only national, longitudinal analysis of physician-hospital integration²⁶ examined prices for inpatient services only and found a positive association between physician-hospital integration and hospital prices for inpatient care.

The effect of physician-hospital integration on prices is likely to be greater for outpatient services than for inpatient services because commercial insurers may follow Medicare's outpatient payment system by paying more for services delivered in hospital outpatient settings than for the same services delivered in office settings.^{27,28} Moreover, because hospital markets are much more concentrated than physician markets on average,^{19,23} financial integration between hospitals and physicians may enhance bargaining power more for the physicians than for the hospitals involved. By exerting market power derived primarily from its preexisting share of the hospital market, the integrated entity may be able to command price increases for outpatient physician services by threatening to exclude its affiliated hospitals from an insurer's network. We examined the association between changes in physician-hospital integration from January 1, 2008, through December 31, 2012, and concurrent changes in commercial spending and prices, with a focus on outpatient services.

Methods

Data Sources

We analyzed deidentified data from the Truven Health MarketScan Commercial Database to assess spending, utilization, and prices in 2008 and 2012. The MarketScan database includes inpatient and outpatient claims for a convenience sample of private health care plans and self-insured employers. Because MarketScan data lack identifiers for provider organizations, we used Medicare claims to measure physician-hospital integration at the level of metropolitan statistical areas (MSAs) and linked this information to MarketScan data for each enrollee based on the MSA in which the enrollee resided. Our study was approved by the Harvard Medical School Committee on Human Studies. Because the data were deidentified, the committee deemed the study not to be human subjects research. Consequently, we did not have to apply for a waiver of informed consent.

Study Population

To focus our analyses on fee-for-service spending and prices, we limited our study population to enrollees in preferred-provider organization or point-of-service plans. Because MarketScan data vary geographically in representativeness and included an increasing number of employers and health insurance plans during the study period, we applied 2 restrictions to improve consistency across years and market representativeness in each year. First, we included only enrollees who were present in MarketScan data in 2008 and 2012. Second, we restricted our analyses to MSAs in which the nonelderly MarketScan preferred-provider organization and point-of-service populations constituted at least 15% of the total population of enrollees in these plans as quantified using HealthLeaders InterStudy data on commercial enrollment by plan type.²⁹

Because we used Medicare claims to assess physician-hospital integration, we further excluded MSAs with few physicians billing Medicare to focus analyses on MSAs with greater overlap between the physicians represented in each claims database (eMethods in the [Supplement](#)). Our final study sample included 7 391 335 nonelderly enrollees in 2008 and 2012 in 240 MSAs (of 381 MSAs in the United States).

Study Variables

Physician-Hospital Integration

To measure physician-hospital integration, we exploited a feature of the Medicare outpatient payment system. When a service is provided in a physician practice owned by a hospital, as in a hospital outpatient department (HOPD), Medicare pays a reduced professional fee (a reduced practice expense) and an additional facility fee, with the total payment exceeding what a physician would receive for rendering the same service in the office setting, often substantially so.^{27,30} Subject to a few additional conditions beyond ownership by a hospital, the physician and hospital can legally bill Medicare at the higher HOPD rate even if the physician's practice is not located on the hospital's campus.³¹ The payment differential between HOPD

and office settings provides financially integrated physicians and hospitals with a strong incentive to bill outpatient services at the HOPD rate, which requires a change in place-of-service code from office to HOPD on claims for physicians' professional services.

Using Medicare Carrier (physician/supplier) and Outpatient claims for a random 20% sample of beneficiaries in 2008 and 2012, for each physician in each MSA in each year we calculated the share of claims for outpatient care that was billed with an HOPD setting code. For each MSA in each year, we then calculated the proportion of physicians billing exclusively with an HOPD setting code. In a sensitivity analysis, we alternately specified this MSA-level measure of physician-hospital integration as the proportion of physicians with 25%, 75%, or 95% of their outpatient claims billed in this manner (eMethods in the [Supplement](#)).

Increases in our claims-based measure of physician-hospital integration could result from the acquisition of physician practices by hospitals, physicians leaving or closing their practices to join hospital-owned practices, or market entry of integrated systems. In a validation analysis of the 10 MSAs with the greatest increases in physician-hospital integration according to our measure, we found (via web searches) public reports of major acquisitions or market entry causing greater financial integration between physicians and hospitals in all 10 MSAs.^{32,33}

Physician, Hospital, and Insurance Market Concentration

To control for other changes in provider organization or insurer market structure that also may have affected prices during the study period, we constructed Herfindahl-Hirschman indices (HHIs)³⁴ measuring hospital, physician, and insurance market concentration in each MSA in 2008 and 2012 (eMethods in the [Supplement](#)). The HHI is a standard economic measure of concentration, calculated for each market as the sum of the squared market shares multiplied by 10 000, where higher numbers indicate a more concentrated market (in the extreme, a market served by a single provider organization or insurer would have an HHI of $1^2 \times 10\,000 = 10\,000$).

We constructed the hospital market HHI with 2008 and 2012 data from the American Hospital Association Annual Survey Database,³⁵ using each hospital's share of admissions in an MSA as its market share and accounting for common hospital ownership in hospital systems. For the physician market HHI, we used Medicare Carrier claims from 2008 and 2012 to calculate the market share of each group of physicians billing under a common taxpayer identification number (TIN)—specifically, the proportion of allowed charges for outpatient care in an MSA billed by each TIN (eMethods in the [Supplement](#)). Prices in Medicare (allowed charges) are set administratively and are thus unrelated to provider organization market power. By relying on TINs to identify physician groups, we likely underestimated physician market concentration because large provider organizations often bill under multiple TINs,³⁶ but previous work suggests that physician concentration measures using TINs are highly correlated with measures derived from other data identifying physician groups.³⁷ Finally, we used the HealthLeaders InterStudy data from 2008

and 2012 to create an HHI for insurers by using the proportion of commercially insured lives in each MSA covered by each insurer as the insurer's market share.

We conducted 2 analyses to examine whether changes in prices associated with physician-hospital integration may have been explained by concurrent changes in physician or hospital market concentration. First, we estimated correlations between MSA-level changes in physician-hospital integration and changes in physician or hospital market concentration. Second, we estimated the association between physician-hospital integration and spending with and without adjustment for physician and hospital market concentration.

Additional Covariates

To adjust for other time-varying predictors of health care spending in the MSAs, we assessed the unemployment rate, the proportion of the population in poverty, the proportion of the population older than 65 years, and the number of physicians per 1000 residents from the Area Health Resources File and the number of hospital beds per 1000 residents from the American Hospital Association Annual Survey Database³⁵ and Census Bureau data³⁸ for each MSA in 2008 and 2012. We also created a health risk score using Verisk Health DxCG Stand Alone Software (v4.1.1, Comprising the Budgeting and Underwriting Bundle for the Commercial, Medicaid, and Medicare Populations), which incorporates age, sex, and diagnosis codes from the prior year to predict spending for each enrollee in the year of interest.³⁹ Finally, we measured inpatient and outpatient insurance benefit generosity at the plan level, calculated as the annual mean cost-sharing for a set of frequently used services (eMethods in the [Supplement](#)).

Spending and Utilization

For each enrollee in each year, we calculated spending by summing allowed charges for outpatient services (services with office or HOPD place-of-service codes), including facility payments. We also created an outpatient utilization measure equal to the sum of annual service counts for each service, with each service count multiplied by the national mean of allowed charges for the service, and services defined by *Current Procedural Terminology* codes (eMethods in the [Supplement](#)). By holding the price constant at the national mean for each service, any variation between enrollees in this dollar-denominated measure of utilization (price-standardized spending) indicates a different quantity or mix of services. We similarly calculated annual inpatient utilization by multiplying admission counts for each diagnosis related group by the national mean of allowed charges for that code.

Because spending is the product of price and quantity (ie, utilization), comparisons of changes in spending vs utilization allowed us to deduce the extent to which changes in spending were driven by changes in prices. For example, a change in spending without a change in utilization must have been caused by a change in prices. We used this method to decompose spending changes into changes in utilization and implied changes in prices rather than to assess prices directly because the data did not reliably support direct assessment of

Table. Comparison of Changes in Characteristics of MSAs With Above- vs Below-Median Changes in Physician-Hospital Integration From 2008 to 2012

MSA-Level Characteristic	Study Year, Mean (IQR)		MSA Change in Physician-Hospital Integration, Mean (IQR)		P Value ^a
	2008	2012	Below Median	Above Median	
Physician-hospital integration, %	18.0 (11.9 to 21.5)	21.3 (14.5 to 25.2)	-0.1 (-1.2 to 1.6)	6.8 (3.8 to 7.1)	<.001
Physician HHI ^b	675 (223 to 682)	726 (254 to 724)	54 (-7 to 114)	49 (-12 to 152)	.86
Hospital HHI ^b	3962 (2346 to 5075)	4143 (2566 to 5134)	127 (-41 to 172)	234 (-15 to 314)	.14
Insurance HHI ^b	2441 (1715 to 2716)	2386 (1701 to 2822)	-52 (-414 to 298)	-58 (-341 to 348)	.95
Population aged ≥16 y and unemployed, %	5.7 (4.7 to 6.4)	7.8 (6.5 to 8.9)	2.3 (1.7 to 2.9)	2.1 (1.5 to 2.8)	.20
Population in poverty, %	13.1 (10.5 to 15.3)	15.7 (12.9 to 18.0)	2.6 (1.8 to 3.4)	2.6 (1.8 to 3.4)	.81
Population aged ≥65 y, %	12.9 (10.9 to 14.2)	14.0 (11.9 to 15.0)	1.1 (0.7 to 1.3)	1.0 (0.7 to 1.3)	.82
No. of physicians per 1000 persons	2.79 (1.89 to 3.09)	2.87 (1.94 to 3.17)	0.08 (-0.02 to 0.12)	0.07 (-0.01 to 0.14)	.59
No. of hospital beds per 1000 persons	2.88 (2.02 to 3.46)	2.75 (1.92 to 3.29)	-0.12 (-0.21 to 0.04)	-0.15 (-0.24 to 0.06)	.51
DxCG risk score ^c	0.69 (0.13 to 0.84)	1.18 (0.30 to 1.38)	0.46 (0.36 to 0.51)	0.44 (0.36 to 0.52)	.30
Mean outpatient OOP payment, \$	29.23 (20.60 to 31.64)	34.44 (23.99 to 37.83)	4.99 (3.17 to 6.85)	4.35 (3.30 to 6.80)	.44
Mean inpatient OOP payment, \$	605.55 (332.66 to 897.92)	796.92 (509.72 to 1196.73)	203.24 (135.29 to 265.26)	200.55 (129.42 to 291.92)	.88

Abbreviations: HHI, Herfindahl-Hirschman index; IQR, interquartile range; MSA, metropolitan statistical area; OOP, out-of-pocket.

^a We report P values for 2-tailed t tests of differences between changes.

^b Calculation of the HHI is described in the eMethods of the Supplement.

^c Calculated using Verisk Health DxCG Stand Alone Software (version 4.1.1)³⁹ such that the mean score within the MarketScan database equals 1. Because our sample includes nonelderly individuals enrolled in preferred-provider organization or point-of-service plans included in the Truven Health MarketScan Commercial Database in 2008 and 2012, we do not expect a mean DxCG score of exactly 1.

prices in hospital-owned practices but did reliably capture all spending and utilization in these settings (eMethods in the Supplement).

Differences Between Settings in Prices for Office Visits

Prior research suggests that payment differences in Medicare for services in office vs HOPD settings are likely to be reflected to some extent in prices negotiated between provider organizations and commercial insurers.⁴⁰ Therefore, we would expect physician-hospital integration to be associated with higher prices, even if integration did not strengthen provider organizations' bargaining position.

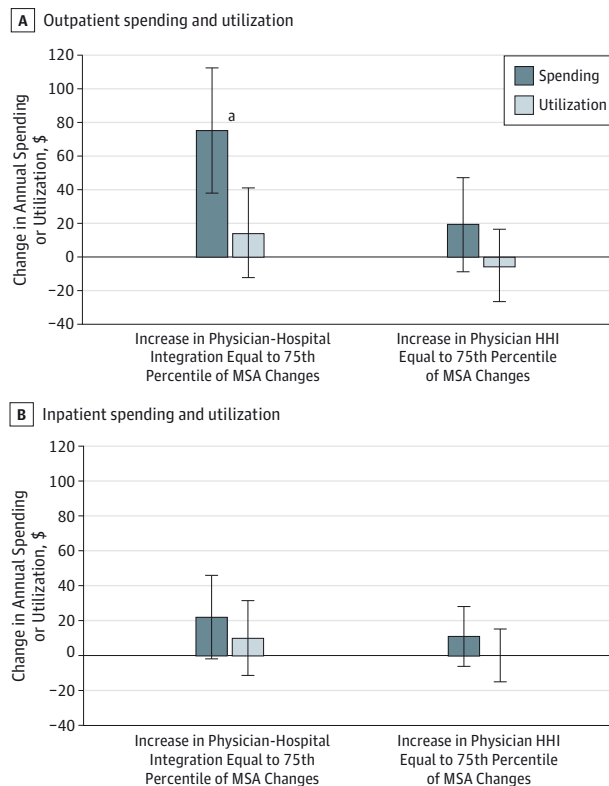
We conducted supplementary analyses of between-setting differences in prices for office visits to determine whether market power likely contributed to price changes associated with physician-hospital integration. Specifically, for each MSA, we computed the difference between the mean payment in Medicare for established patient office visits (*Current Procedural Terminology* codes 99211-99215) with HOPD setting codes (payment = facility fee + professional fee, including reduced practice expense) and the mean payment for office visits in the office setting (payment = professional fee only, including full practice expense) (eMethods in the Supplement).

We computed analogous price differentials using MarketScan data and expected these differentials to reflect setting-related differences transmitted from the Medicare payment system and price negotiations between commercial payers and provider organizations. If provider organizations' market position did not influence prices in the commercial sector, be-

tween-setting price differentials would reflect only differences transmitted from Medicare and therefore would be similar across markets in both the Medicare and MarketScan populations despite variation in physician-hospital integration across markets; some variation in price differentials is expected from geographic adjustments for practice costs in Medicare. Under the scenario in which physician-hospital integration enhances provider organizations' bargaining power over commercial insurers, we would expect the between-setting price differentials to vary more widely across MSAs in the commercial sector than in Medicare. Our analytic approach does not distinguish between the development of new market power owing to physician-hospital integration and the transference of preexisting market power from hospitals to physicians, which could allow markups for physician services to rise to levels negotiated by hospitals.

Statistical Analysis

Data analysis was performed from December 1, 2013, through July 13, 2015. We used linear regression to estimate the association between changes in physician-hospital integration and changes in spending or utilization. Specifically, with the enrollee-year as the unit of analysis, we fit a model of annual spending or utilization per enrollee as a function of year (indicator of 2012, with 2008 as the reference year), MSA indicators, MSA-level physician-hospital integration, other MSA-level measures of provider and insurer market structure, and covariates. We included the year indicator to control for national trends and the MSA indicators to control for time-

Figure 1. Adjusted Estimates of Change per Enrollee in Spending and Utilization

Adjusted estimates of change are associated with increases in physician-hospital integration and physician market concentration from 2008 to 2012. Bars represent the change in spending or utilization (calculated as price-standardized spending) associated with a change in physician-hospital integration or physician market concentration (expressed as Herfindahl-Hirschman index [HHI]) equal to the 75th percentile of changes experienced by metropolitan statistical areas from 2008 to 2012. Error bars denote 95% CIs. Full regression results are given in eTables 2 and 3 in the [Supplement](#).

^a $P < .001$, Wald test.

invariant differences between markets. Thus, the coefficient for each market structure term (including physician-hospital integration) equaled the mean change in spending or in utilization associated with a 1-unit greater change in that measure of market structure, adjusting for changes in other measures of market structure and covariates.

The regression coefficients for the physician-hospital integration term yielded estimates of changes in spending or utilization that might occur if a market changed from no integration to full integration or, equivalently, estimates of changes in spending or utilization that might occur for an individual patient if the patient's physicians joined or were acquired by a hospital. To facilitate a realistic market-level interpretation from regression coefficients, we derived estimates of changes in spending or utilization associated with a change in physician-hospital integration equivalent to the 75th percentile of changes experienced by MSAs from 2008 through 2012 (an increase of 5.2 percentage points) while holding all other variables fixed. We report analogous estimates of changes in physician mar-

ket concentration. We chose the 75th percentile to scale our estimates because we found little physician-hospital integration occurring in the bottom quartile of the MSAs (and apparent divestitures), and our analysis intended to support inferences about markets where integration occurred.

We weighted observations by the total preferred-provider organization population in the MSA (from the HealthLeaders InterStudy data) divided by the MarketScan population in our study sample in the MSA, giving greater weight to enrollees in MSAs where MarketScan data included smaller proportions of enrollees in preferred-provider organizations. We used Huber-White robust variance estimators to account for correlated data within the MSAs.^{41,42} Sensitivity analyses using generalized linear models with a log link and a proportional-to-mean variance function produced similar estimates. All statistical analyses were conducted using SAS (version 9.4; SAS Institute Inc) and STATA (version 13; StataCorp) software.

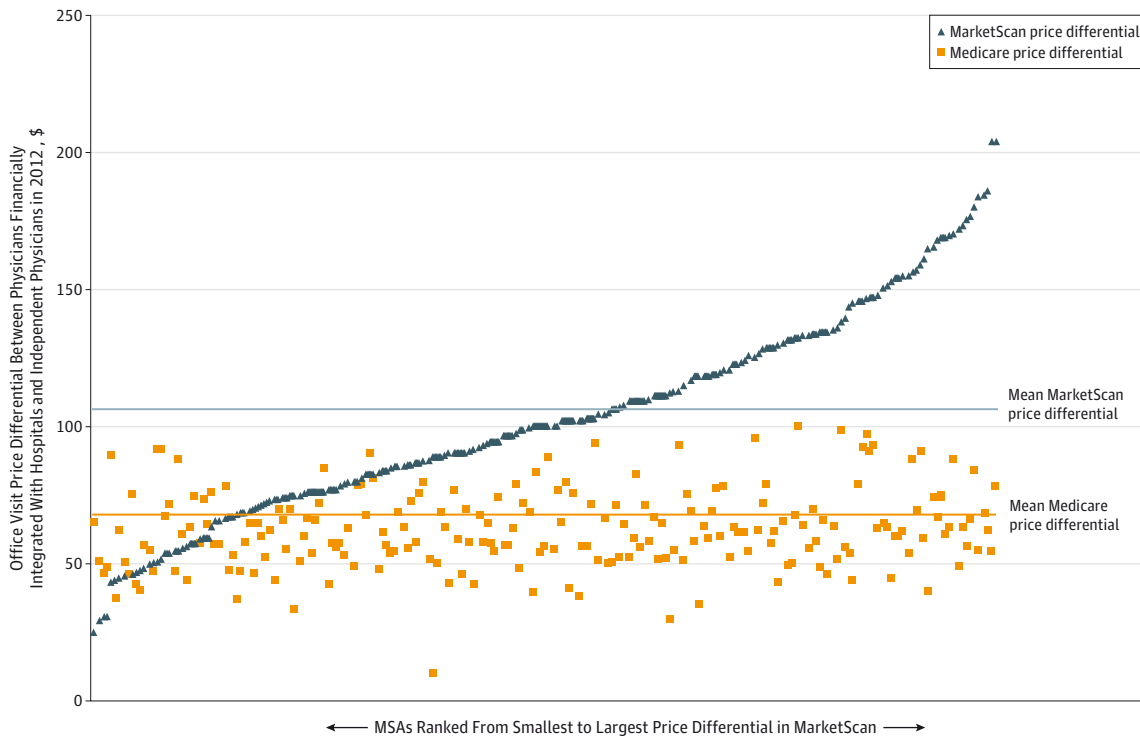
Results

Among the 240 MSAs, the proportion of physicians with billing patterns consistent with financial integration with hospitals increased from 2008 to 2012 by 3.3 percentage points (from 18.0% to 21.3%). This change varied considerably across MSAs (interquartile range, 0.8-5.2 percentage points). Metropolitan statistical areas with above- vs below-median growth in physician-hospital integration exhibited similar changes in other characteristics, including the concentration of physician and hospital markets ([Table](#)). Across MSAs in 2008, physician-hospital integration was not significantly correlated with hospital market concentration ($r = -0.05$; $P = .47$) or with physician market concentration ($r = -0.03$; $P = .64$). Changes in physician-hospital integration from 2008 through 2012 were weakly and negatively correlated with changes in physician concentration ($r = -0.12$; $P = .05$) and were not correlated with changes in hospital market concentration ($r = -0.03$; $P = .60$). Changes in physician-hospital integration by specialty are presented in eTable 1 in the [Supplement](#).

For our study sample of 7 391 335 nonelderly enrollees in preferred-provider-organization or point-of-service plans, mean (95% CI) annual spending per enrollee in 2012 was \$2407 (\$2400-\$2414) for outpatient care and \$872 (\$865-\$880) for inpatient care. In adjusted analyses, an increase in physician-hospital integration equivalent to the 75th percentile of changes experienced by MSAs was associated with a minimal change in utilization as measured by price-adjusted spending (\$14 [95% CI, -\$13 to \$41] per enrollee; $P = .32$) but a significant increase in annual outpatient spending (\$75 [95% CI, \$38-\$113] per enrollee; $P < .001$) or a 3.1% increase relative to mean outpatient spending in 2012. Because spending is the product of price and utilization, this increase in outpatient spending without an increase in utilization suggests that the spending increase was driven almost entirely by price increases ([Figure 1A](#) and eTable 2 in the [Supplement](#)).

In contrast, greater increases in physician-hospital integration were not associated with significantly greater increases in inpatient utilization (change in price-adjusted spending associated with an increase in physician-hospital integration equal to

Figure 2. Difference in Mean Prices for Office Visits Between Independent and Hospital-Integrated Physicians, by MSA for Medicare and MarketScan Populations



The mean difference between prices for office visits with a hospital outpatient department (HOPD) setting code and those with an office setting code (mean HOPD setting price - mean office setting price) is plotted for each MSA in the

Medicare and MarketScan populations (after trimming outliers above the 95th percentile of Medicare and MarketScan price differences in 2012). The MSAs are ordered based on the price differential in the MarketScan population.

the 75th percentile of MSA changes, \$10 [95% CI, -\$12 to \$31] per enrollee; $P = .37$) or inpatient spending (\$22 [95% CI, -\$1 to \$46] per enrollee; $P = .06$) (Figure 1B and eTable 3 in the Supplement). Alternative definitions of physician-hospital integration reduced the increase in inpatient spending by 28% to 62% but did not appreciably affect estimates for outpatient spending (eTables 4 and 5 in the Supplement). Increases in physician market concentration were associated with lower utilization and higher outpatient spending, but these associations were not statistically significant (Figure 1A).

Estimates from analyses adjusted only for enrollee and plan-level characteristics were similar (eTables 2 and 3 in the Supplement). In addition, the results were not changed substantively by restriction to MSAs with large MarketScan populations (eTable 6 in the Supplement), by weighting each enrollee equally (eTable 7 in the Supplement), or by use of generalized linear models (eTable 8 in the Supplement).

The mean price for an office visit billed with an HOPD setting code was \$68 greater than the mean price for an office visit billed with an office setting code in the Medicare population and \$108 greater in the MarketScan population. Price differentials varied substantially more across MSAs in the MarketScan population (interquartile range, \$77-\$134) than in the Medicare population (interquartile range, \$54-\$73) (Figure 2) and eFigure in the Supplement).

Discussion

From 2008 to 2012, markets with greater increases in physician-hospital integration exhibited greater increases in spending for outpatient care for a large commercially insured population, almost entirely owing to price increases rather than changes in utilization. In contrast, physician-hospital integration was not associated with higher inpatient prices. These findings are consistent, on average, with hospitals conferring their existing market power to newly employed physicians or acquired practices as the integrated organization negotiates prices for outpatient physician services but not with physician-hospital integration strengthening the organization's bargaining power in negotiating prices for inpatient hospital services.

Differences in prices for office visits between independent physicians and physicians integrated with hospitals were larger and varied across MSAs substantially more in the commercially insured population than in the Medicare population. These pricing patterns provide suggestive evidence that price increases associated with physician-hospital integration did not result solely from transmission of setting-related price differentials in the Medicare payment system but likely also resulted from the enhanced market power of the provider organizations.

Consistent with prior research,^{8-10,36} physician-hospital integration was not associated with lower utilization, suggesting that this form of provider consolidation has not led to gains in health care efficiency in recent years through improved care coordination or management. Efficiencies from physician-hospital integration may only manifest under alternative payment models with incentives to limit utilization, although early evidence from accountable care organizations in Medicare suggests spending reductions were not related to financial integration between physicians and hospitals.^{11,43} Similarly, price increases associated with physician-hospital integration may not generalize beyond the fee-for-service context, although provider organizations with greater bargaining power could negotiate higher global budgets under alternative payment models. Whether new payment models accelerate physician-hospital integration beyond ongoing trends remains to be seen. Although consolidation in the physician market was not associated with significant increases in spending in our study, it was associated with spending increases and reductions in utilization, which together implied sizable price increases consistent with the findings of prior studies.²¹⁻²³

Our study has several limitations. First, changes in unobserved predictors of prices could have contributed to our findings. Changes in observed time-varying characteristics of patients, plans, and providers, however, were generally similar in MSAs exhibiting smaller vs larger increases in physician-hospital integration. Moreover, adjustment for changes in hospital and physician market concentration did not attenuate estimates, suggesting that our results were not likely driven by other unobserved changes in provider market structure correlated with physician-hospital integration.

Second, several sources of measurement error probably led us to underestimate the strength of the relationship between physician-hospital integration and price increases, assuming

the error was unrelated to the extent of physician-hospital integration in a market according to our claims-based measure. Some physician practices owned by hospitals may not bill with HOPD setting codes despite the strong financial incentive for the integrated entity to do so. In addition, contractual relationships between hospitals and physicians that do not involve ownership of physician practices by hospitals (eg, physician-hospital organizations) may also enhance bargaining power and would not be detected by our claims-based measure. Within-market differences in the providers represented in the Medicare and MarketScan database claims and sampling error from each data source also likely biased our findings toward the null.

Third, integration between physicians and hospitals mechanically causes greater concentration in the physician market because physician practices become financially integrated through relationships with common hospitals. We could not discern the extent to which this concentration in the physician market contributed to price increases related to physician-hospital integration. Finally, we did not assess quality of care. Improved quality would enhance value in the absence of changes in utilization.

Conclusions

Increases in physician-hospital integration from 2008 through 2012 were associated with increased spending and prices for outpatient services, with no accompanying changes in utilization that would suggest more efficient care from better care coordination and economies of scale. Changes in the structure of health care provider markets and in spending should be monitored, particularly as payment systems shift away from fee-for-service, and may require additional regulatory measures to control.

ARTICLE INFORMATION

Accepted for Publication: July 20, 2015.

Published Online: October 19, 2015.
doi:10.1001/jamainternmed.2015.4610.

Author Contributions: Ms Neprash 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: Neprash, McWilliams.
Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Neprash, Hicks.
Critical revision of the manuscript for important intellectual content: Neprash, Chernew, Gibson, McWilliams.

Statistical analysis: Neprash, Hicks, McWilliams.
Obtained funding: McWilliams.

Administrative, technical, or material support: Gibson.

Study supervision: Neprash, McWilliams.

Conflict of Interest Disclosures: Dr Gibson reports formerly being employed by Truven Health Analytics. No other disclosures were reported.

Funding/Support: This study was supported by grant 71408, Changes in Health Care Financing and Organization, from the Robert Wood Johnson Foundation.

Role of the Funder/Sponsor: The funding source had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Additional Contributions: Dan Ly, MD, Department of Medicine, Massachusetts General Hospital, and Michael R. McKellar, MHSA, Department of Health Care Policy, Harvard Medical School, contributed to the measures used in this study. Neither contributor was compensated for their role in this study.

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