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Changes in Hospital–Physician Affiliations in U.S. Hospitals and Their Effect on Quality of Care

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Background: Growing evidence shows that hospitals are increasingly employing physicians.

Objective: To examine changes in U.S. acute care hospitals that reported employment relationships with their physicians and to determine whether quality of care improved after the hospitals switched to this integration model.

Design: Retrospective cohort study of U.S. acute care hospitals between 2003 and 2012.

Setting: U.S. nonfederal acute care hospitals.

Participants: 803 switching hospitals compared with 2085 nonswitching control hospitals matched for year and region.

Intervention: Hospitals' conversion to an employment relationship with any of their privileged physicians.

Measurements: Risk-adjusted hospital-level mortality rates, 30-day readmission rates, length of stay, and patient satisfaction scores for common medical conditions.

Results: In 2003, approximately 29% of hospitals employed members of their physician workforce, a number that rose to 42% by 2012. Relative to regionally matched controls, switching hospitals were more likely to be large (11.6% vs. 7.1%) or major teaching hospitals (7.5% vs. 4.5%) and less likely to be for-profit institutions (8.8% vs. 19.9%) (all *P* values <0.001). Up to 2 years after conversion, no association was found between switching to an employment model and improvement in any of 4 primary composite quality metrics.

Limitations: The measure of integration used depends on responses to the American Hospital Association annual questionnaire, yet this measure has been used by others to examine effects of integration. The study examined performance up to 2 years after evidence of switching to an employment model; however, beneficial effects may have taken longer to appear.

Conclusion: During the past decade, hospitals have increasingly become employers of physicians. The study's findings suggest that physician employment alone probably is not a sufficient tool for improving hospital care.

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Many U.S. policymakers believe that increased integration between hospitals and physicians may foster better care and potentially decrease health care spending. The logic behind this notion is straightforward: When physicians are employed or otherwise more substantially influenced by the hospitals in which they work, they are less likely to focus on generating revenue to maintain an independent practice and more likely to focus on patient care. Further, as hospitals respond to external pressures to improve quality, the presence of a physician workforce that is tightly integrated with the hospital will make it easier to incentivize clinicians to focus on quality metrics, share common information systems, and comply with clinical guidelines (1–4). Growing evidence shows that the tightest form of "vertical integration," namely hospital–physician employment relationships, increased in recent years (4–10), and advocates believe that such a trend will lead to greater care coordination, more closely aligned incentives, and ultimately better patient care (11, 12).

Historically, U.S. hospitals were seen as the "workshops" of physicians, and efforts to employ doctors were discouraged—if not prohibited—by medical societies to prevent the potentially negative consequences of reduced autonomy on the patient–physician relationship (13). This divide helped perpetuate payment models in which hospitals and physicians are reimbursed separately, such as in the fee-for-service system predominant in the United States (14). Despite this divide and the financial failures of provider integration in the 1990s, interest has been growing among health care executives and policymakers to move toward greater integration between hospitals and physicians, mostly by hospitals acquiring medical practices and employing physicians (4, 15).

Understanding whether such integration is "good" for the U.S. health system requires focusing on its implications for patient care. Recently, Baker and colleagues (8) found that through 2007, these arrangements were associated with higher spending and prices. Whether this changing relationship has led to better care, as has been widely postulated, is unclear.

Given the salience of this topic, we sought to examine 3 key questions: First, what proportion of acute care hospitals in the United States report having an employment relationship with their physicians, and how much has that changed during the past decade? Second, what types of hospitals have chosen to enter into these tight employment relationships with physicians during

See also:

Web-Only
Supplement

the past decade, and how do these institutions differ from those that have not? Third, what is the clinical consequence of such a switch on the quality and efficiency of patient care at the hospital level?

METHODS

Data

We used the American Hospital Association (AHA) annual surveys from 2003 to 2012 to capture information regarding hospitals, including their affiliation status with physicians (16). We used the Medicare Provider Analysis and Review File (MedPAR) from 2002 to 2013 to calculate hospital-level risk-adjusted performance on 3 of our outcomes of interest: mortality, readmissions, and length of stay. For these analyses, we limited our sample to Medicare beneficiaries aged 65 years or older who were enrolled in the fee-for-service program. We used Hospital Compare data from 2007 to 2013 to assess overall patient experience as captured by the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey. We focused on nonfederal general medical and surgical hospitals in all 50 states and the District of Columbia.

Variables

We examined 4 primary outcome variables. The first was hospital-level, risk-adjusted, 30-day mortality rates aggregated across 3 common and costly conditions that have garnered a great deal of policy attention in recent years: acute myocardial infarction, congestive heart failure, and pneumonia. If having employed physicians results in greater compliance with guidelines and closer integration of hospital and ambulatory care, one might expect to see the biggest effects for these conditions. Next, we examined the second and third outcome variables—risk-adjusted 30-day readmission rates and risk-adjusted lengths of stay—across each of the 3 common medical conditions. One might postulate that employment relationships would result in greater integration and care coordination to reduce readmissions and allow hospitals to push physicians to shorten lengths of stay (which is a priority for hospitals receiving prospective payment). Our sensitivity analyses also provided separate results for patients with acute myocardial infarction, those with congestive heart failure, and those with pneumonia. Finally, we looked at the fourth outcome variable—whether hospital employment of physicians was associated with subsequent improvements in patient experience—by using each hospital's performance on the HCAHPS metric: the percentage of all adult patients giving high satisfaction scores (9 or 10 on a 10-point scale).

We were interested in key structural variables that might be associated with hospitals switching to physician employment, including size, teaching status, and proportion of patients insured by Medicare or Medicaid. We obtained each of these adjustment variables from the AHA database and used Rural–Urban Commuting Area codes to capture urbanization of the community in which the hospital was located.

With respect to hospital–physician affiliation status, we first categorized all hospitals into 3 main groups—employment affiliation, contractual (nonemployment) affiliation, and no affiliation—to simplify the presentation of trends. These groups, as defined in previous work (17), were constructed from hospitals' responses on the AHA annual survey, which asks what types of integration arrangements, if any, the institution forms with physicians (ranging from independent practice associations to integrated salary models) (see the **Supplement**, available at www.annals.org).

Hospital Panel and Match Group Construction

We constructed a panel of all hospitals that switched to the employment affiliation group during the study period. For example, a hospital reporting that it was not in an employment relationship in 2005 (or the previous 2 years) but that it was in such a relationship in 2006 (as well as the next year) was designated a "switcher," and the "switching year" was 2005. We applied a similar procedure for identifying potential control hospitals (those that did not have an employment model in the base year or previous 2 years and did not switch during the switching or subsequent year).

We then combined the hospitals into match groups according to switching year and hospital referral region (HRR). For each year, all the switcher hospitals in a given HRR were matched to nonswitcher control hospitals in the same HRR. Subsequent analyses compared the outcomes of switcher hospitals with those of matched control hospitals within the same year–HRR match group to account for unobservable characteristics of the local health care market and for temporal trends. Matched control hospitals were identified for nearly all switcher hospitals (95.8%) in our analytic sample. More details on the sample construction may be found in the **Supplement**.

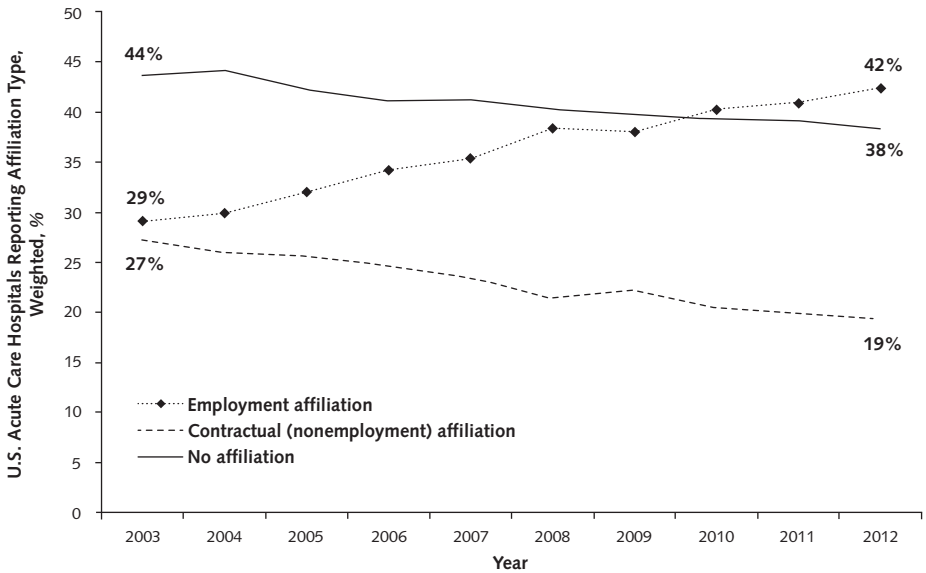
Analysis

To illustrate the changing trend of physician–hospital affiliations over time, we first plotted the proportions of hospitals in each group of interest (employment affiliation, contractual [nonemployment] affiliation, and no affiliation) from 2003 through 2012, accounting for survey nonresponse (see the **Supplement**). This analysis used all available hospitals; all subsequent comparative analyses were limited to the subgroup of hospitals for which match groups could be constructed.

Next, we compared the characteristics of the switcher hospitals (that is, those that switched to an employment-type arrangement) with those of matched hospitals that never switched from 2004 to 2011. We examined the structural differences (such as size and teaching status) of the 2 groups by using chi-square and *t* tests as appropriate.

To help visualize the subsequent effects of switching on aggregate hospital-level clinical outcomes, we calculated and plotted the average mortality rate, readmission rate, and length of stay among patients from switcher and control hospitals according to year, ranging from 2 years before to 2 years after conversion to the employment model. Regarding HCAHPS scores,

Figure 1. Physician–hospital affiliation trends, 2003–2012.



which represent high satisfaction rates, the averages were calculated across hospitals because patient-level data were not available.

To estimate changes in pre- and postconversion mortality rates between switcher and control hospitals, we ran a patient-level logistic regression model for each match group, encompassing mortality data from 2 years before and 2 years after conversion. The primary predictors in the model were fixed effects for each hospital in the match group, a binary indicator for the before–after period, and interaction terms between the hospital and the before–after period. From the interaction terms in the model, predictive margins were used to calculate the change in mortality for each hospital. To ensure that these mortality changes were not confounded by patient factors that changed over time or varied among hospitals, the model was adjusted for patient age and sex and the 27 Elixhauser comorbid conditions that commonly are used in administrative data to account for differences in patient risk (18). A similar patient-based logistic regression model was used to estimate the change in readmission rate for each hospital in each match group, and a patient-based linear regression model was used to estimate the change in length of stay. The change in HCAHPS score for each hospital in each match group was calculated as the difference between the average post- and preconversion scores. Adjustment for patient risk factors is not usually considered appropriate for HCAHPS scores. Details of the models from which we estimated changes in outcome for each hospital are given in the Supplement.

Finally, the (patient risk factor–adjusted) changes in mortality were compared between switcher and control hospitals by using a hospital-based, mixed-effects linear regression model. The change in mortality for each hospital in a match group was the outcome variable, and the primary predictor was the binary indicator for switcher hospitals. To control for potential confounding by year and region, the model included fixed effects for each match group so that switcher hospitals would be compared only with control hospitals in the same HRR during the same year. To control for potential confounding by other hospital characteristics, the model included covariates for hospital size, profit status, teaching status, rurality, percentage of Medicare patients, and percentage of Medicaid patients. To account for the effect of correlation due to hospitals appearing in more than one match group, the model included a random effect for each hospital. Analogous linear regression models were used for changes in readmissions, length of stay, and HCAHPS scores. Details of the models comparing switcher and control hospitals are given in the Supplement.

All analyses were done in SAS, version 9.4 (SAS Institute). Two-tailed *P* values less than 0.05 were considered significant. Approval for this study was obtained from the Office of Human Research Administration at the Harvard T.H. Chan School of Public Health.

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RESULTS

Trends in Hospital–Physician Affiliations

In 2003, 44% of U.S. hospitals were "unaffiliated," that is, they had no association with physicians beyond the traditional medical staff model (19), whereas 29%

Table 1. Characteristics of Hospitals That Switched to Physician Employment Versus Those That Did Not, 2003–2011*

Variable	Did Not Switch (*n* = 2085)	Switched (*n* = 803)	*P* Value
Size			<0.001
Small	1033 (49.5)	355 (44.2)	
Medium	904 (43.4)	355 (44.2)	
Large	148 (7.1)	93 (11.6)	
Region			0.005
Northeast	218 (10.5)	103 (12.8)	
Midwest	600 (28.8)	264 (32.9)	
South	897 (43.0)	291 (36.2)	
West	370 (17.8)	145 (18.1)	
Teaching status			<0.001
Major teaching	94 (4.5)	60 (7.5)	
Minor teaching	305 (14.6)	142 (17.7)	
Not teaching	1686 (80.9)	601 (74.8)	
Profit status			<0.001
For profit	414 (19.9)	71 (8.8)	
Private nonprofit	1168 (56.0)	564 (70.2)	
Public	503 (24.1)	168 (20.9)	
Rural–urban commuting area			0.64
Urban	892 (42.8)	353 (43.9)	
Suburban	97 (4.7)	40 (4.9)	
Large rural town	372 (17.8)	155 (19.3)	
Small town/isolated rural	623 (29.9)	219 (27.3)	
Mean Medicare patients (SD), %	50.2 (0.23)	49.1 (0.14)	0.187
Mean Medicaid patients (SD), %	16.4 (0.26)	16.4 (0.10)	0.97

* Values are numbers (percentages) unless otherwise indicated. Percentages may not sum to 100 due to rounding.

reported having an employment relationship with physicians and 27% reported having a looser, contractual affiliation (Figure 1). By 2012, the proportion of hospitals reporting unaffiliated relationships or nonemployment affiliations dropped substantially to 38% and 19%, respectively, whereas 42% of hospitals reported having employment arrangements with physicians. From 2009 onward, employment has become the most prevalent hospital–physician affiliation model that U.S. hospitals have formed with at least a subset of their physicians.

Comparison Between Hospitals Switching to Employment Status and Those Not Switching

For our analysis, between 2004 and 2011, there were a total of 803 unique switching hospitals (average of 100 per year). Relative to nonswitching hospitals in the same HRR, the switching hospitals differed in several ways (Table 1). They were more often large (11.6% vs. 7.1%), more often major teaching hospitals (7.5% vs. 4.5%), and less often for-profit institutions (8.8% vs. 19.9%) (all *P* values <0.001). No meaningful differences were found between the 2 groups regarding the proportion of Medicare or Medicaid patients.

Clinical Consequence of Switching to an Employment Model

In comparing switching with nonswitching hospitals in the same HRR, we found no association between conversion to an employment model and subsequent changes in composite mortality, readmissions, length of stay, or patient satisfaction (Figure 2). Table 2 shows the average performance of switcher and matched control hospitals during the 2 years before the switch, as well as the patient- and hospital-adjusted changes in performance from before to 2 years after the conversion. These changes in performance were compared between hospitals that switched to an employment model and their matched controls. For example, the composite 30-day mortality rate was 11.2% among switchers and 11.4% among nonswitchers during the preconversion period. Two years after conversion, the estimated change in mortality was −0.4% (95% CI, −0.8% to −0.08%) among switchers and −0.5% (CI, −0.6% to −0.4%) for nonswitchers. Both groups showed a qualitatively similar decrease in mortality over an average follow-up of 3 years. We formally tested whether these decreases were different between switchers and nonswitchers and found that they were not. Regarding composite mortality, switching to employment status resulted in a slightly lower decrease of 0.1% (CI, −0.3% to 0.4%; *P* = 0.57) during the 2-year postconversion period (Table 2). Likewise, for the other 3 primary composite outcomes, we detected no effect of switching to an employment model on any of our quality metrics, including risk-adjusted readmission rates, length of stay, and patient satisfaction. In addition, our sensitivity analyses examining condition-specific outcomes generally revealed no change in performance between switchers and controls. The only statistically significant difference we detected was in our comparison of changes in pneumonia readmission rates: Switchers had a slightly greater decrease than nonswitchers in readmissions for this condition, although the substantive difference was minimal (the difference in change between switchers and controls after conversion was −0.6% [CI, −1.1% to 0.0%]).

DISCUSSION

Using a longitudinal study design, we examined changes in U.S. hospital–reported affiliations with physicians during the past decade. We found that not only has the proportion of hospitals employing physicians increased, but this model now is the most dominant arrangement that hospitals form with physicians. We discovered that large nonprofit teaching hospitals were more likely to have embraced this tightly integrated relationship. Although mixed evidence has suggested potential benefits or costs associated with this change, we found no effect on patient care across an array of metrics, even up to 2 years out. Whether hospital–physician employment relationships are a key part of delivering higher-quality, more efficient care is unclear, but our findings cast doubt on the notion that such a change in itself is likely to have a meaningful effect.

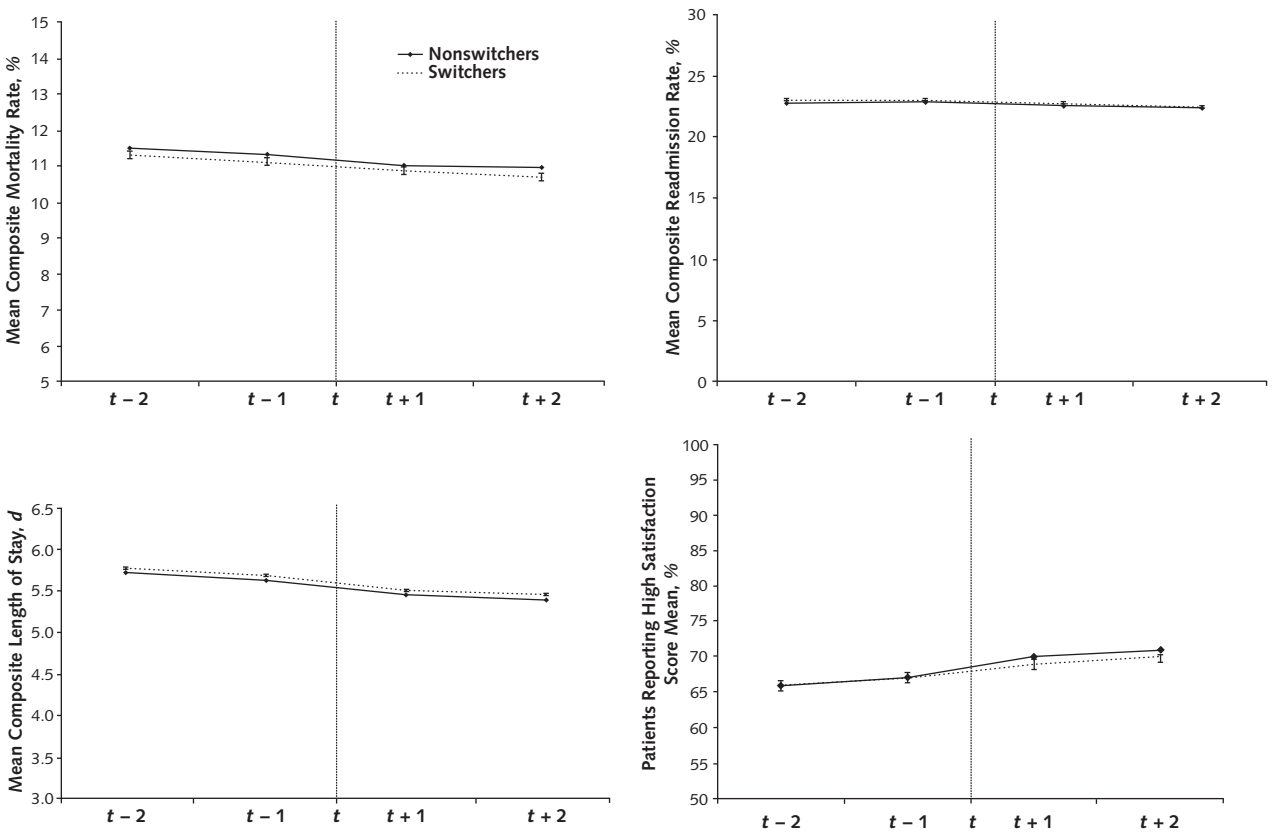
Our findings expand on recent work by Baker and colleagues (8) showing growth of these tightly integrated models through 2007, and by others indicating a fundamental realignment in the relationship between U.S. hospitals and their admitting physicians (4, 13, 20, 21). For hospitals, the investment in purchasing physician groups likely is motivated by broader changes in health care delivery and the need to secure a steady supply of patients (6, 7). For physicians, managing an independent practice may be growing more complex and difficult, prompting many to consider employment as a more attractive, viable model (6, 9, 22). Moreover, regardless of the motivation of each health care provider, this trend may increase further in response to the delivery care reforms within the Patient Protection and Affordable Care Act (8, 22).

The employer–employee relationship between hospitals and physicians may create both opportunities and challenges for patient care (1, 4, 13). For example, by employing physicians, hospitals can more closely direct their activities and drive changes in care (11, 23). Moreover, greater integration between hospitals and physicians, such as through employment models, may improve outcomes by bolstering coordination efforts; increasing continuity of services; improving access to capital, such as electronic health records; boosting physician satisfaction; and augmenting accountability for clinical performance (such as through bonuses and withhold pools) (11, 12, 24). Although some of these improvements certainly are taking place as hospitals increasingly employ physicians (25), on the basis of the hospital performance metrics we examined, we found no national-level evidence that these changes have translated into better patient care.

Another reason hospitals may switch to an employment affiliation model is that it helps bolster productivity and gives them greater leverage in the marketplace when negotiating contracts with private payers (6, 22, 26). Indeed, research recently conducted using a similar hospital-level approach suggests that tightly integrated arrangements between physicians and hospitals are associated with higher prices and greater health care spending for private payers (8, 27). As such, if physicians and hospitals entering these relationships are focusing on consolidation and financial advantage rather than improving quality, there is little reason to believe that these arrangements will translate into better patient care (28).

This study, which focused on quality, adds to important work conducted in the 1990s using hospital-

Figure 2. Unadjusted outcomes between switchers and matched nonswitchers.



Unadjusted patient averages of each composite outcome (mortality, readmissions, length of stay) and patient satisfaction between switchers and nonswitchers with 95% CIs. Switchers are hospitals that switched to an employment model in a given year. They are matched with nonswitchers in the same hospital referral region at the point of the converting year. On the *x*-axis, *t* refers to the year the switch occurred, with, for example, $t - 2$ referring to 2 years before and $t + 2$ referring to 2 y after a switch to an employment model.

Table 2. Hospital-Level Outcomes for Hospitals That Switched and Matched Hospitals That Did Not Switch in the Same Hospital Referral Region Before Switching and Predicted Change in Outcomes After Switching

Variable	Before Conversion, %	Adjusted Change (95% CI), %	Difference in Change (95% CI), *percentage points*	*P* Value
Mortality rate				
Composite	–	–	0.11 (−0.26 to 0.47)	0.57
Switched	11.2	−0.41 (−0.75 to −0.08)	–	
Did not switch	11.4	−0.52 (−0.65 to −0.39)	–	
AMI	–	–	1.32 (0 to 2.81)	0.080
Switched	15.0	0.43 (−0.94 to 1.80)	–	
Did not switch	15.8	−0.89 (−1.42 to −0.36)	–	
CHF	–	–	0.11 (−0.47 to 0.68)	0.71
Switched	9.5	−0.06 (−0.59 to 0.47)	–	
Did not switch	9.7	−0.17 (−0.37 to 0.04)	–	
Pneumonia	–	–	−0.17 (−0.62 to 0.27)	0.45
Switched	11.4	−0.72 (−1.13 to −0.31)	–	
Did not switch	11.4	−0.55 (−0.72 to −0.38)	–	
Readmission rate				
Composite	–	–	−0.45 (−0.92 to 0)	0.054
Switched	23.0	−1.47 (−1.89 to −1.04)	–	
Did not switch	22.9	−1.01 (−1.18 to −0.85)	–	
AMI	–	–	0.04 (−1.80 to 1.83)	0.97
Switched	23.6	−2.24 (−3.89 to −0.58)	–	
Did not switch	23.7	−2.28 (−2.92 to −1.63)	–	
CHF	–	–	−0.05 (−0.81 to 0.72)	0.91
Switched	26.0	−0.95 (−1.65 to −0.24)	–	
Did not switch	26.1	−0.90 (−1.18 to −0.63)	–	
Pneumonia	–	–	−0.60 (−1.10 to 0)	0.020
Switched	19.3	−1.35 (−1.81 to −0.88)	–	
Did not switch	19.1	−0.75 (−0.93 to −0.57)	–	
Length of stay in days				
Composite	–	–	−0.01 (−0.05 to 0.04)	0.76
Switched	5.7	−0.22 (−0.26 to −0.18)	–	
Did not switch	5.7	−0.22 (−0.23 to −0.20)	–	
AMI	–	–	0.02 (−0.08 to 0.11)	0.72
Switched	5.8	−0.21 (−0.30 to −0.12)	–	
Did not switch	5.7	−0.23 (−0.26 to −0.19)	–	
CHF	–	–	0 (−0.05 to 0.06)	0.89
Switched	5.5	−0.17 (−0.22 to −0.12)	–	
Did not switch	5.4	−0.17 (−0.19 to −0.15)	–	
Pneumonia	–	–	−0.03 (−0.08 to 0.03)	0.35
Switched	6.0	−0.28 (−0.33 to −0.23)	–	
Did not switch	5.9	−0.26 (−0.28 to −0.24)	–	
Reported high patient satisfaction				
HCAHPS score	–	–	−0.50 (−1.24 to 0.24)	0.186
Switched	66.2	2.74 (2.05 to 3.42)	–	
Did not switch	66.4	3.24 (2.90 to 3.58)	–	

AMI = acute myocardial infarction; CHF = congestive heart failure; HCAHPS = Hospital Consumer Assessment of Healthcare Providers and Systems.

level approaches to assess the implications of vertical integration on health care spending and quality (19, 27, 29). One study from that era, which examined the effect of such an affiliation on patients with acute myocardial infarction, showed primarily a greater intensity of services after physicians became employed (19). Another found modest declines in mortality in 3 states after physicians became "integrated" with hospital systems but failed to find benefits on the other quality indicators examined (27). Moreover, our longitudinal, hospital-level analysis complements recent cross-sectional, physician-level studies examining the characteristics of physician practices that may be associated with improved quality of care (30–32). For example, using a novel national physician survey, Casalino and colleagues (31) showed that physician-owned practices had lower rates of admission for ambulatory care–sensitive conditions than hospital-owned groups. These physician group–based studies complement our hospital-level analysis, which is the first to our knowledge to examine the effects of the current era of hospital employment of physicians on quality of care.

This study has important limitations. First, we examined outcomes primarily for an older patient population (Medicare beneficiaries aged 65 years and older); therefore, whether these findings would apply to outcomes in those younger than 65 is unclear. However, we have little reason to believe that hospitals, after switching to an employment model, would improve care for 1 group of patients but not another. Second,

although we used the best national data available to identify which hospitals switched, these data are imperfect, and we may have missed some switchers or failed to perfectly classify nonswitchers. It is possible that hospitals vary in their interpretation of employment, further adding to the imprecision of the variable, although these AHA variables have been used widely in examining issues regarding vertical integration, and no data suggest that the variable is particularly imprecise (8, 19, 27, 29). Third, although we examined patient outcomes up to 2 years after the switch, beneficial effects on these clinical metrics may not appear until later. Finally, although our results are useful for understanding what this change in the marketplace might mean for patients, other outcomes that are not available in these data sources—such as total costs and physician satisfaction—may be important to examine in this context (33).

Although we did not detect aggregate improvements in hospitals' quality performance as a result of the changes in physician–hospital affiliations nationwide, consensus is building that the status quo, in which care is fragmented across the clinical spectrum, no longer is a viable option for the U.S. health care system. Our study, which used contemporary national data, suggests that a fundamental improvement in care delivery will require more than mere changes in hospital–physician integration, and if physician employment is a key ingredient, it must be linked to other key goals, such as hospital prioritization of quality, to be successful.

We found that during the past decade, an important shift has occurred in the relationship between U.S. hospitals and physicians. Indeed, for the first time in recent history, U.S. hospitals are more likely to employ physicians than to enter into any other kind of affiliation or relationship with them. This trend, remarkable as it is, will probably increase in the absence of antitrust legal or regulatory challenges (34). Although many advocates have suggested that hospital employment of physicians will likely result in much better care, we have found no substantive evidence to date to support this notion. As hospital systems continue to acquire physician practices and employ physicians, a focus on true clinical integration, as well as a renewed focus on improving the quality of patient care and clinical outcomes, will be essential.

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