



A commentary by Jeffrey D. Coe, MD, is linked to the online version of this article at jbj.s.org.

Reconsidering the Affordable Care Act's Restrictions on Physician-Owned Hospitals

Analysis of CMS Data on Total Hip and Knee Arthroplasty

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Background: Concerns about financial incentives and increased costs prompted legislation limiting the expansion of physician-owned hospitals in 2010. Supporters of physician-owned hospitals argue that they improve the value of care by improving quality and reducing costs. The purpose of the present study was to determine whether physician-owned and non-physician-owned hospitals differ in terms of costs, outcomes, and patient satisfaction in the setting of total hip arthroplasty (THA) and total knee arthroplasty (TKA).

Methods: With use of the U.S. Centers for Medicare & Medicaid Services (CMS) Inpatient Charge Data, we identified 45 physician-owned and 2,657 non-physician-owned hospitals that performed ≥ 11 primary TKA and THA procedures in 2014. Cost data, patient-satisfaction scores, and risk-adjusted complication and 30-day readmission scores for knee and hip arthroplasty patients were obtained from the multiyear CMS Hospital Compare database.

Results: Physician-owned hospitals received lower mean Medicare payments than did non-physician-owned hospitals for THA and TKA procedures (\$11,106 compared with \$12,699; $p = 0.002$). While the 30-day readmission score did not differ significantly between the 2 types of hospitals (4.48 compared with 4.62 for physician-owned and non-physician-owned, respectively; $p = 0.104$), physician-owned hospitals had a lower risk-adjusted complication score (2.83 compared with 3.04; $p = 0.015$). Physician-owned hospitals outperformed non-physician-owned hospitals in all patient-satisfaction categories, including mean linear scores for recommending the hospital (93.9 compared with 87.9; $p < 0.001$) and overall hospital rating (93.4 compared with 88.4; $p < 0.001$). When controlling for hospital demographic variables, status as a non-physician-owned hospital was an independent risk factor for being in the upper quartile of all inpatient payments for Medicare Severity-Diagnosis Related Group (MS-DRG) 470 (odds ratio, 3.317; 95% confidence interval, 1.174 to 9.371; $p = 0.024$), which may be because of a difference in CMS payment methodology.

Conclusions: Our findings suggest that physician-owned hospitals are associated with lower mean Medicare costs, fewer complications, and higher patient satisfaction following THA and TKA than non-physician-owned hospitals. Policymakers should consider these data when debating the current moratorium on physician-owned hospital expansion.

Level of Evidence: Therapeutic Level III. See Instructions for Authors for a complete description of levels of evidence.

In 2010, the Affordable Care Act (ACA) restricted the expansion of physician-owned hospitals in the U.S.^{1,2} because of concerns regarding their cost-inefficiency^{3,4}. The debate continues regarding physician-owned hospitals, and relevant arguments have been presented across the health-care literature²⁻⁷. Supporters of the ACA's restrictions maintain that physician-

owned hospitals do not improve patient outcomes or hospital efficiency. Although some studies suggest that physician-owned hospitals increase the cost of health care while decreasing the accessibility of care for many patients^{3,7}, others suggest that physician-owned hospitals provide higher quality and more efficient care⁶. The current literature does not offer consensus

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regarding the appropriateness of the ACA's moratorium on further expansion of physician-owned hospitals.

One national study examined costs, outcomes, and patient satisfaction among physician-owned hospitals in the U.S.⁵. However, such larger studies have been limited to medical diagnoses including heart failure, myocardial infarction, and pneumonia. Few studies in the orthopaedic literature have examined the costs and outcomes of joint replacement in physician-owned hospitals. One statewide analysis showed a positive correlation between physician ownership of hospitals and patient satisfaction; however, physician-owned hospitals had higher inpatient reimbursement⁶. Whether or not physician ownership affects reimbursements or outcomes following joint replacement is not clear.

The purpose of the present study was to determine whether concerns about increased costs associated with physician-owned hospitals are justified. Our primary research question was the following: is there a difference between physician-owned and non-physician-owned hospitals with respect to payments to hospitals following total hip arthroplasty (THA) and total knee arthroplasty (TKA)? Our secondary study questions were: do physician-owned hospitals have poorer risk-adjusted outcomes following THA and TKA compared with non-physician-owned hospitals, and is there any difference between the 2 types of hospitals in patient satisfaction as assessed by U.S. Centers for Medicare & Medicaid Services (CMS) metrics?

Materials and Methods

In this investigation, we queried the CMS Hospital Compare database, which included data from 4,788 hospitals participating in Medicare across the U.S.⁸. We then accessed the Medicare Provider Utilization and Payment Data: Inpatient Charge Data file for 2014. This dataset includes cost data for >3,000 hospitals that receive Medicare Inpatient Prospective Payment System (IPPS) payments according to Medicare Severity-Diagnosis Related Group (MS-DRG)⁹. The MS-DRGs in the dataset represent >7 million patients and include >75% of total Medicare IPPS discharges⁹. We identified all hospitals with patient records noting MS-DRG 470 (major joint replacement of the lower extremity without major comorbidities or complications) from the Inpatient Charge Data and cross-referenced the Hospital Compare database using each hospital's unique Medicare provider identification. Hospitals with <11 DRG 470 episodes during the year were excluded.

This study was exempt from institutional review board approval because no patient-identifying information was used.

Demographic information from each hospital, including ZIP code and geographic area, was collected. Hospitals were designated as "urban" if they were located in a ZIP code area classified as such according to the 2010 U.S. Census (an area with $\geq 50,000$ people)¹⁰. Hospitals were characterized as being within a "lower" socioeconomic area if the median household income in the ZIP code area was in the bottom quintile ($\leq \$21,432$) nationally¹¹. "Low-volume" hospitals were defined as those that performed <100 cases falling within MS-DRG 470 in 2014. The designation "physician-owned hospital" was noted in the dataset by CMS and made according to the federal definition, namely, "a hospital in

which a physician, or an immediate family member of a physician, has an ownership or investment interest in the hospital. The ownership or investment interest may be through equity, debt, or other means, and includes an interest in the entity that holds an ownership or investment interest in the hospital"⁸.

We recorded the mean hospital-specific charge data and the mean Medicare payment data for each institution. Mean total payments included the MS-DRG amount, bill total per diem, beneficiary primary payer claim payment amount, beneficiary Part A coinsurance amount, beneficiary deductible amount, beneficiary blood deductible amount, and DRG outlier amount⁹. The average total payments also took into consideration teaching hospital status and disproportionate share and capital payments for all cases.

The CMS complication score was specific to patients undergoing THA and TKA and included heart attack (acute myocardial infarction), pneumonia, sepsis, septicemia, or shock during the index admission or within 7 days following admission; surgical site bleeding, pulmonary embolism, or death during the index admission or within 30 days following admission; or mechanical complications or periprosthetic joint infection or wound infection during the index admission or within 90 days following admission¹². The 30-day readmission score was also specific to patients undergoing THA and TKA. The complication score included data from April 1, 2012, to March 31, 2015. The readmission score included data from July 1, 2012, to June 30, 2015. Both the complication and readmission scores were risk-adjusted according to CMS on the basis of patient comorbidities, age, and procedure. A lower score is more favorable. These risk-adjusted scores were developed by a team of clinical and statistical experts from the Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE). Thirty medical comorbidities were identified from the Medicare Part A inpatient claims dataset on the basis of International Classification of Diseases (ICD)-9 codes in the 12 months prior to surgery and were controlled for as variables in their multivariate regression analysis¹².

The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey is a patient-satisfaction survey required by all hospitals in the U.S. HCAHPS survey data from each of the qualifying hospitals in the study were obtained from the Hospital Compare dataset, including star rating and linear score based on patient responses regarding physician and nurse communication, staff responsiveness, and whether they would recommend the hospital¹³. The star rating is an integer score on a scale of 1 to 5, assigned to each facility on the basis of quality metrics and patient-reported outcomes. The linear score is a continuous 0 to 100 score based directly on individual survey results. HCAHPS scores for the hospitals in this study were collected by CMS from October 1, 2014, to September 30, 2015.

Of the 4,788 hospitals in the Hospital Compare database, 2,086 hospitals were excluded from the Inpatient Charge Data dataset because they performed <11 procedures falling within MS-DRG 470 during the study year. Of the 2,702 hospitals that were included, 45 (2%) were physician-owned and 2,657 (98%) were non-physician-owned. Figure 1 presents a flowchart of hospital selection for the study. All hospitals performed a total of

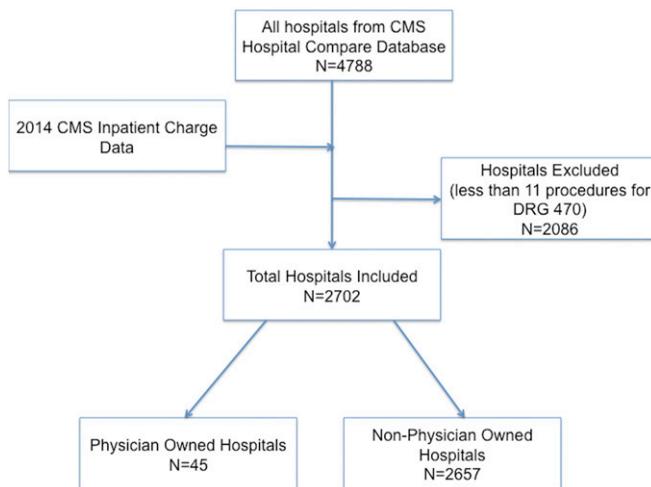


Fig. 1
Flowchart of hospital selection for the study.

458,259 primary TKA and THA procedures (DRG 470) in 2014. Physician-owned hospitals performed a total of 17,580 (4%) of these procedures nationwide. Among all hospitals, covered charges were a mean (and standard deviation) of \$58,486 ± \$28,109 (USD) and Medicare payments, a mean of \$12,672 ± \$2,357. The mean CMS hospital star rating was 3.02 ± 0.88. The mean risk-adjusted complication score was 3.04 ± 0.57, while the mean risk-adjusted readmission score was 4.61 ± 0.57.

Statistical Analysis

We first compared the means of continuous variables, including hospital-specific charges, total payments, and Medicare

payments, between the physician-owned and non-physician-owned hospital groups using a Student t test. Outcome variables, including complication, readmission, and HCAHPS scores, were also compared between the 2 groups using a t test. Categorical variables from the HCAHPS survey, including the number of patients who gave the hospital a high recommendation and rating, were analyzed using a chi-square test, weighted for the number of survey responses for each hospital. When observed or expected values were <5, a Fisher exact test was used. Significance was set at the level of $p < 0.05$. To control for other confounding hospital factors, we performed a multivariate logistic regression analysis to determine risk factors for a hospital being in the upper quartile for inpatient payments for MS-DRG 470, for being in the lowest quartile for readmission and complication scores, and for being designated a “5” per the CMS hospital star rating.

Results

Mean total payments for MS-DRG 470 were lower for physician-owned hospitals than for non-physician-owned hospitals (\$13,443 compared with \$15,272; $p = 0.001$). Mean Medicare payments were also lower for physician-owned hospitals (\$11,106 compared with \$12,699; $p = 0.002$). Both hospital groups had comparable volume, with no difference observed with respect to the average number of hip and knee arthroplasty (DRG 470) procedures per hospital (195 for physician-owned compared with 169 for non-physician-owned; $p = 0.370$). Complete cost data are listed in Table I.

When controlling for confounding hospital demographic variables (Table II), status as a non-physician-owned hospital was an independent risk factor for being in the upper quartile of

TABLE I Comparison of Data on Costs and Complications for THA and TKA Among Medicare Patients

Variable	Physician-Owned, N = 45	Non-Physician Owned, N = 2,657	P Value
Covered charges* (USD)	\$53,703 ± \$24,581	\$58,567 ± \$28,162	0.250
Total payments* (USD)	\$13,443 ± \$5,222	\$15,272 ± \$3,684	0.001
Medicare payments* (USD)	\$11,106 ± \$5,235	\$12,699 ± \$3,312	0.002
No. of MS-DRG 470 procedures per hospital (2014)*	195 ± 243	169 ± 193	0.370
CMS hospital star rating*	4.20 ± 0.95	3.01 ± 0.87	<0.001
Risk-adjusted complication score*	2.83 ± 0.57	3.04 ± 0.57	0.015
Risk-adjusted readmission score*	4.48 ± 0.62	4.62 ± 0.57	0.104
Geographic area†			0.006
Northeast	4 (9)	438 (16)	
Midwest	12 (27)	680 (26)	
South	27 (60)	1,016 (38)	
West	2 (4)	523 (20)	
Hospital in urban ZIP code area†	39 (87)	1,818 (68)	0.042
<100 MS-DRG 470 procedures†	18 (40)	1,245 (47)	0.361
Hospital in lower socioeconomic area†	1 (2)	41 (2)	0.532

*The values are given as the mean and the standard deviation. †The values are given as the number, with the percentage of the group in parentheses.

TABLE II Multivariate Analysis: Hospital Demographic Factors Associated with Being in the Upper Quartile for Inpatient Payments for THA and TKA

Factor	Odds Ratio	95% CI	P Value
Urban hospital	1.495	1.193-1.872	<0.001
Northeast region	2.239	1.782-2.813	<0.001
Lower socioeconomic area hospital	1.989	1.038-3.813	0.038
Low-volume hospital	2.146	1.764-2.609	<0.001
Non-physician-owned hospital	3.317	1.174-9.371	0.024

TABLE III Multivariate Analysis: Hospital Demographic Factors Associated with Being in the Lowest Quartile for CMS Risk-Adjusted Readmission Score for THA and TKA

Factor	Odds Ratio	95% CI	P Value
Urban hospital	0.685	0.540-0.868	0.002
Northeast region	1.089	0.840-1.412	0.518
Lower socioeconomic area hospital	0.417	0.160-1.084	0.073
Low-volume hospital	0.265	0.212-0.330	<0.001
Physician-owned hospital	1.873	0.982-3.573	0.057

all inpatient payments for MS-DRG 470 (odds ratio [OR], 3.317; 95% confidence interval [CI], 1.174 to 9.371; $p = 0.024$). Physician-owned hospitals had a lower mean CMS risk-adjusted hip and knee arthroplasty complication score than did non-physician-owned hospitals (2.83 compared with 3.04; $p = 0.015$). There was no difference between physician-owned and non-physician-owned hospitals in the mean CMS risk-adjusted hip and knee arthroplasty readmission score (4.48 compared with 4.62, respectively; $p = 0.104$). When controlling for other hospital demographic variables and volume, the association between status as a physician-owned hospital and being in the lowest quartile for readmission score did not reach significance (OR, 1.873; 95% CI, 0.982 to 3.573; $p = 0.057$) but status as a physician-owned hospital was significantly associated with being in the lowest quartile for complication score (OR, 3.167; 95% CI, 1.675 to 5.988; $p < 0.001$) (Tables III and IV). Physician-owned hospitals also had a higher mean CMS star rating than did non-physician-owned hospitals (4.20 compared with 3.01; $p < 0.001$).

In addition, when controlling for other demographic variables, physician-owned hospitals were more likely to be designated as a 5-star hospital (OR, 12.848; 95% CI, 6.189 to 26.674; $p < 0.001$) (Table V).

Comparing demographic characteristics of each hospital, physician-owned hospitals were more likely to be in an urban ZIP code area (87% compared with 68%; $p = 0.042$) and to be located in the South (60% compared with 38%; $p = 0.006$). On the basis of the numbers available, there was no significant difference in the proportion of hospitals located in a lower socioeconomic ZIP code area (2% compared with 2%; $p = 0.532$).

With respect to patient-satisfaction outcomes by HCAHPS metrics, physician-owned hospitals outperformed non-physician-owned hospitals in all categories, including mean linear scores for recommending the hospital (93.9 compared with 87.9; $p < 0.001$), overall hospital rating (93.4 compared with 88.4; $p < 0.001$), doctor communication (94.2 compared with 91.5; $p < 0.001$), and nurse communication (94.2 compared with 91.0;

TABLE IV Multivariate Analysis: Hospital Demographic Factors Associated with Being in the Lowest Quartile for CMS Risk-Adjusted Complication Score for THA and TKA

Factor	Odds Ratio	95% CI	P Value
Urban hospital	0.922	0.716-1.187	0.528
Northeast region	1.082	0.829-1.410	0.563
Lower socioeconomic area hospital	1.091	0.525-2.267	0.815
Low-volume hospital	0.206	0.163-0.260	<0.001
Physician-owned hospital	3.167	1.675-5.988	<0.001

TABLE V Multivariate Analysis: Hospital Demographic Factors Associated with Being Designated a CMS 5-Star Hospital

Factor	Odds Ratio	95% CI	P Value
Urban hospital	0.996	0.548-1.808	0.988
Northeast region	0.448	0.203-0.992	0.048
Lower socioeconomic area hospital	1.048	0.230-4.774	0.952
Low-volume hospital	0.144	0.074-0.279	<0.001
Physician-owned hospital	12.848	6.189-26.674	<0.001

TABLE VI Comparison of Data for Patient-Reported Outcomes Following THA and TKA Among Medicare Patients

Variable	Physician-Owned Hospitals, N = 45	Non-Physician-Owned Hospitals, N = 2,657	P Value
Recommend hospital*			
Linear score	93.9 ± 3.4	87.9 ± 4.0	<0.001
Star rating	4.32 ± 0.90	3.08 ± 0.74	<0.001
Doctor communication*			
Linear score	94.2 ± 1.9	91.5 ± 1.9	<0.001
Star rating	4.32 ± 0.93	3.03 ± 0.92	<0.001
Nurse communication*			
Linear score	94.2 ± 2.6	91.0 ± 2.2	<0.001
Star rating	4.47 ± 0.92	3.41 ± 0.82	<0.001
Staff responsiveness*			
Linear score	91.2 ± 4.7	84.5 ± 3.7	<0.001
Star rating	4.37 ± 0.94	3.02 ± 0.88	<0.001
Overall hospital rating*			
Linear score	93.4 ± 2.65	88.4 ± 2.89	<0.001
Star rating	4.58 ± 0.79	3.17 ± 0.87	<0.001
HCAHPS summary star rating*	4.31 ± 0.90	3.08 ± 0.74	<0.001
Definitely recommend hospital†	84%	73%	<0.001
Rate hospital ≥9 (of 10)†	83%	71%	<0.001
Rate hospital ≤6 (of 10)†	5%	8%	<0.001

*The values are given as the mean and the standard deviation. †Percentage of patients who responded to the HCAHPS survey.

$p < 0.001$). Physician-owned hospitals had a higher mean overall HCAHPS summary star rating compared with non-physician-owned hospitals (4.31 compared with 3.08; $p < 0.001$). When weighted for hospital volume, more patients of physician-owned hospitals would rate the hospital ≥ 9 (of 10) than would patients of non-physician-owned hospitals (83% compared with 71%; $p < 0.001$). Patient-satisfaction results are detailed in Table VI.

Discussion

Controversy continues to surround physician-owned hospitals following the ACA's moratorium on the expansion of existing physician-owned hospitals and the construction of new hospital facilities. Supporters of physician-owned hospitals argue that limiting a hospital's scope to focus on a single

specialty allows these facilities to deliver better quality of care at a lower cost^{6,14}. Opponents suggest that physician owners have a financial conflict of interest and that the increased resource utilization at physician-owned hospitals drives up health-care spending¹⁵. Despite the longstanding controversy, few studies have evaluated the costs and outcomes of physician-owned hospitals taking care of patients who undergo hip and knee arthroplasty. From a large cohort of 2,702 hospitals from across the U.S., our findings suggest that physician-owned hospitals are associated with lower costs to CMS, fewer complications and readmissions, and superior patient-reported satisfaction scores compared with non-physician-owned hospitals.

Our study had several limitations. First, the CMS datasets used in this study provide hospital-level data only and do not

include individual patient-level data for costs, complications, or readmissions. Our analysis was limited because of residual confounding due to imprecision in the adjustment of variables and the inability to adjust at the patient level. While acknowledging this limitation in our analysis, our sample of size of just over 2,700 hospitals with comparable volume and demographics between the 2 hospital groups helps to enable effective comparisons. Second, while the hip and knee arthroplasty complication and readmission scores were risk-adjusted for medical comorbidities by CMS, the cost data and patient-satisfaction scores were not. Concerns exist that physician-owned hospitals target only the healthiest, most profitable patients, thus placing full-service acute hospitals at a disadvantage where cost-shifting occurs to other valuable but less lucrative services such as trauma and emergency care¹⁶⁻¹⁸. An expansion in physician-owned hospital facilities that focus on higher-reimbursement specialties, such as orthopaedic surgery, may cause access-to-care problems for lower-income patients who cannot utilize these hospitals. Non-physician-owned hospitals may suffer financially by only caring for the sicker, uninsured or underinsured patients. Finally, our data were limited to the Medicare patient population only, and caution should be used when extrapolating our data to the setting of private payers. Comparing only Medicare patients obviates concerns discussed in previous studies, namely that physician-owned hospital outcomes are biased by the targeting of patients with more lucrative insurance by physician-owned hospitals⁷.

Our results suggest that physician-owned hospitals are more cost-efficient in providing TKA and THA care with lower mean Medicare payments. While prior studies have linked higher costs to urban hospitals and variability in spending by geography^{19,20}, we controlled for hospital demographic and geographic factors, as most of the physician-owned hospitals in our study were in the lower-cost South. Unfortunately, the CMS datasets used do not provide details about each facility's payer mix. Physician-owned hospitals tend to serve a higher-income, non-Medicaid patient population. To compensate for their payer mix, non-physician-owned hospitals often will negotiate for higher reimbursement from commercial payers and, by virtue of the methodology in the Medicare IPPS, are often given higher reimbursements by CMS. Some physician-owned hospitals are specialty-based and do not provide emergency services or care for uninsured or underinsured patients. We have tried to control for this by identifying hospitals in lower socioeconomic ZIP code areas. Being a non-physician-owned hospital was the strongest independent risk factor for being in the upper quartile for inpatient payments. Although the measures of costs and payments are not risk-adjusted by CMS, the trend toward lower charges coupled with significantly lower payments provides support for the economic benefits of physician-owned hospitals. These results, however, should be interpreted with caution. While the difference in payment amounts was significant, non-physician-owned hospitals may care for a disproportionately larger share of lower-income patients and are frequently teaching hospitals. In calculating

payment to facilities, these variables are taken into account by CMS and provide a higher payment adjustment. Independent of comorbidities and outcomes, hospitals that provide care to a higher share of lower-income patients and that train residents will receive a higher payment from Medicare per case. While lower reimbursements to physician-owned hospitals for total joint arthroplasty will result in cost savings in the Medicare population, a large proportion of such savings is formulaic and not based on outcomes. Our data differ from those of a recent single-state analysis of total joint arthroplasty and hospital ownership, which found higher total spending but similar risk-adjusted spending by physician-owned hospitals compared with non-physician-owned hospitals⁶. That study, however, was limited by sample size and geographic scope. Our results should be interpreted with caution, as the cost differences could be due to a healthier patient comorbidity mix in the physician-owned hospital group. Physician-owned hospitals may limit access to care if less healthy patients do not have similar access to these facilities.

Our data suggest that physician-owned hospitals have lower risk-adjusted complication scores. The 30-day readmission score was also lower at physician-owned hospitals, although this difference was not significant with the numbers available. A fundamental question that remains is whether a physician-owned hospital provides better care than a non-physician-owned hospital. Proponents of physician-owned hospitals argue that increased physician involvement in administrative decision-making and hospital governance makes for quality, cost-effective care. Whether this care differs from that of full-service, non-physician-owned hospitals that engage their physician leadership will continue to be debated. Hospital-specific data for complications and readmissions after total joint arthroplasty are risk-adjusted by CMS for comorbidities present before surgery^{8,12}. The CMS hospital star rating is used to provide patients with a general overview of the quality of care provided at a hospital by assigning hospitals a single number on a 5-point scale. This rating encompasses a variety of patient outcomes in different categories, including mortality, safety of care, readmission, effectiveness of care, and timeliness of care^{8,13}. In the current study, physician-owned hospitals outperformed non-physician-owned hospitals with respect to the CMS star rating. There are limitations to these CMS outcome metrics. They do not track orthopaedic-specific outcomes, including dislocation, arthrofibrosis, or functional outcomes. The CMS scoring systems, however, are risk-adjusted and specific to hip and knee arthroplasty.

Patient-reported satisfaction was significantly higher at physician-owned hospitals on all HCAHPS measures including patient satisfaction, communication, and overall rating. These results agree with those of Lundgren et al., who found higher patient-satisfaction scores among physician-owned hospitals in Pennsylvania⁶. There are limitations with the HCAHPS scores published by CMS, including the inability to adjust for patient demographics and comorbidities. However, a recent review did not find worsening medical comorbidities to negatively impact patient satisfaction, except in the setting of certain psychiatric

diagnoses and orthopaedic comorbidities such as osteoarthritis in the contralateral limb²¹. The discussion regarding physician-owned hospitals should consider the opinions not only of physicians and health-care policy scholars but also of patients. In a recent investigation of patient attitudes toward physician ownership of orthopaedic-related businesses, including ambulatory surgery centers, 3 of 4 patients surveyed agreed that surgeons should be allowed to own these businesses, and only 1 of 6 patients agreed that the government should control what kinds of business orthopaedic surgeons owned²². Further research regarding the opinions of patients toward physician-owned hospitals and physician ownership of health-care businesses at large needs to be conducted.

In summary, physician-owned hospitals had lower mean Medicare costs and received lower mean total payments following THA and TKA than did non-physician-owned hospitals. One should interpret the reimbursement results with caution, as CMS adjusts reimbursement for care of lower-income patients and care at teaching facilities. Physician-owned hospitals also had superior patient-reported outcomes, with fewer risk-adjusted complications, while outperforming non-physician-

owned hospitals in all patient-satisfaction categories. In an effort to provide quality care at lower costs for arthroplasty patients, policymakers should consider these data when debating the current moratorium on physician-owned hospital expansion. ■

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References

1. Patient Protection and Affordable Care Act. 2010. Pub. L. 111-148 p 124 Stat. 119. <https://www.gpo.gov/fdsys/pkg/PLAW-111publ148/html/PLAW-111publ148.htm>. Accessed 2016 Nov 2.
2. Plummer E, Wempe W. The Affordable Care Act's effects on the formation, expansion, and operation of physician-owned hospitals. *Health Aff (Millwood)*. 2016 Aug;35(8):1452-60.
3. Carey K, Burgess JF Jr, Young GJ. Specialty and full-service hospitals: a comparative cost analysis. *Health Serv Res*. 2008 Oct;43(5 Pt 2):1869-87. Epub 2008 Jul 25.
4. D'Ambrosia RD. Health care reform and physician-owned hospitals. *Orthopedics*. 2010 Aug;33(8):545.
5. Blumenthal DM, Orav EJ, Jena AB, Dudzinski DM, Le ST, Jha AK. Access, quality, and costs of care at physician owned hospitals in the United States: observational study. *BMJ*. 2015 Sep 2;351:h4466.
6. Lundgren DK, Courtney PM, Lopez JA, Kamath AF. Are the Affordable Care Act restrictions warranted? A contemporary statewide analysis of physician-owned hospitals. *J Arthroplasty*. 2016 Sep;31(9):1857-61. Epub 2016 Mar 3.
7. Trybou J, De Regge M, Gemmel P, Duyck P, Annemans L. Effects of physician-owned specialized facilities in health care: a systematic review. *Health Policy*. 2014 Dec;118(3):316-40. Epub 2014 Sep 30.
8. Centers for Medicare & Medicaid Services. Hospital Compare datasets. <https://data.medicare.gov/data/hospital-compare>. Accessed 2016 Nov 1.
9. Centers for Medicare & Medicaid Services. Medicare Provider Utilization and Payment Data: Inpatient Charge Data FY 2014. <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Inpatient2014.html>. Accessed 2016 Nov 1.
10. United States Census Bureau. 2010 urban area to ZIP code tabulation area (ZCTA) relationship file. http://www.census.gov/geo/maps-data/data/ua_rel_download.html. Accessed 2016 Nov 1.
11. United States Census Bureau. ACS 5-year estimate: median household income in the past 12 months by 5 digit ZIP code tabulation area. http://factfinder.census.gov/faces/nav/jsf/pages/guided_search.xhtml. Accessed 2016 Nov 1.
12. Centers for Medicare & Medicaid Services. Hospital Compare. Complication rate for hip/knee replacement patients. <http://www.medicare.gov/hospitalcompare/Data/Surgical-Complications-Hip-Knee.html>. Accessed 2016 Nov 1.
13. Centers for Medicare & Medicaid Services. Hospital Compare. Survey of patients' experiences (HCAHPS). <http://www.medicare.gov/hospitalcompare/Data/Overview.html>. Accessed 2016 Nov 1.
14. Casalino LP, Devers KJ, Brewster LR. Focused factories? Physician-owned specialty facilities. *Health Aff (Millwood)*. 2003 Nov-Dec;22(6):56-67.
15. Hollingsworth JM, Ye Z, Strobe SA, Krein SL, Hollenbeck AT, Hollenbeck BK. Physician-ownership of ambulatory surgery centers linked to higher volume of surgeries. *Health Aff (Millwood)*. 2010 Apr;29(4):683-9.
16. Carey K, Burgess JF Jr, Young GJ. Hospital competition and financial performance: the effects of ambulatory surgery centers. *Health Econ*. 2011 May;20(5):571-81.
17. Gabel JR, Fahlman C, Kang R, Wozniak G, Kletke P, Hay JW. Where do I send thee? Does physician-ownership affect referral patterns to ambulatory surgery centers? *Health Aff (Millwood)*. 2008 May-Jun;27(3):w165-74. Epub 2008 Mar 18.
18. Kahn CN 3rd. Intolerable risk, irreparable harm: the legacy of physician-owned specialty hospitals. *Health Aff (Millwood)*. 2006 Jan-Feb;25(1):130-3.
19. Zhang Y, Baik SH, Fendrick AM, Baicker K. Comparing local and regional variation in health care spending. *N Engl J Med*. 2012 Nov 1;367(18):1724-31.
20. Cooper RA, Cooper MA, McGinley EL, Fan X, Rosenthal JT. Poverty, wealth, and health care utilization: a geographic assessment. *J Urban Health*. 2012 Oct;89(5):828-47.
21. Lau RL, Gandhi R, Mahomed S, Mahomed N. Patient satisfaction after total knee and hip arthroplasty. *Clin Geriatr Med*. 2012 Aug;28(3):349-65. Epub 2012 Jun 2.
22. Yi PH, Cross MB, Johnson SR, Rasinski KA, Nunley RM, Della Valle CJ. Patient attitudes toward orthopedic surgeon ownership of related ancillary businesses. *J Arthroplasty*. 2016 Aug;31(8):1635-1640.e4. Epub 2016 Jan 29.