



Access, quality, and costs of care at physician owned hospitals in the United States: observational study

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ABSTRACT

OBJECTIVE

To compare physician owned hospitals (POHs) with non-POHs on metrics around patient populations, quality of care, costs, and payments.

DESIGN

Observational study.

SETTING

Acute care hospitals in 95 hospital referral regions in the United States, 2010.

PARTICIPANTS

2186 US acute care hospitals (219 POHs and 1967 non-POHs).

MAIN OUTCOME MEASURES

Proportions of patients using Medicaid and those from ethnic and racial minority groups; hospital performance on patient experience metrics, care processes, risk adjusted 30 day mortality, and readmission rates; costs of care; care payments; and Medicare market share.

RESULTS

The 219 POHs were more often small (<100 beds), for profit, and in urban areas. 120 of these POHs were general (non-specialty) hospitals. Compared with patients from non-POHs, those from POHs were younger (77.4 v 78.4 years, $P<0.001$), less likely to be admitted through an emergency department (23.2% v. 29.0%, $P<0.001$), equally likely to be black (5.1% v 5.5%, $P=0.85$) or to use Medicaid (14.9% v 15.4%, $P=0.75$), and had similar numbers of chronic diseases and predicted mortality scores. POHs and non-POHs performed similarly on patient experience scores, processes of care, risk adjusted 30 day mortality, 30 day readmission rates, costs, and payments for acute myocardial infarction, congestive heart failure, and pneumonia.

CONCLUSION

Although POHs may treat slightly healthier patients, they do not seem to systematically select more profitable or less disadvantaged patients or to provide lower value care.

Introduction

More than 250 US acute care hospitals are partially or fully owned by physicians.^{1,2} Physician owned hospitals (POHs) are controversial. Proponents of POHs argue that such hospitals provide care of equal, or higher, quality compared with non-POHs and stimulate healthy competition between hospitals.^{3,4} However, critics of POHs contend that physician owners have adverse financial incentives to treat healthier and wealthier patients.^{5,6} Two reports by the Medicare Payment Advisory Commission, published in 2005 and 2006, found that specialty hospitals owned by physicians, a subset of all POHs, treated fewer patients who use Medicaid and less severe cases.^{5,7} A few studies have found that care at POHs is associated with increased service utilization.⁸⁻¹¹ The Centers for Medicare and Medicaid Services (CMS) has also expressed concern that specialty POHs may code patient comorbidities more completely than other hospitals, which could result in “biased estimates of individual costs” of care.¹² These and other findings prompted calls by the broader hospital industry, among others, to substantially restrict POHs.¹³

In response to these calls to regulate the POH industry, federal policy makers implemented several important things. In 2007, CMS introduced a change to its diagnosis related group based payments to better account for patient severity of illness and estimated costs of care.¹⁴⁻¹⁶ Policy makers believed that this change would minimize incentives to select healthier patients by reducing the financial rewards for caring for them. In 2010, as part of the Patient Protection and Affordable Care Act, Congress banned the creation of new Medicare certified POHs altogether, greatly restricted the ability of existing POHs to expand, and further limited referrals by physicians to Medicare certified facilities that they own.^{2,17,18} Though POHs vary widely in their percentage of physician ownership, these policies applied equally to all POHs, independent of the size of this ownership proportion. These policies had important and immediate effects, resulting in freezes on the construction of 45 partially completed POHs.^{19,20}

Placing substantial restrictions on an entire class of hospitals based primarily on ownership could be justifiable as a policy if these institutions substantially harmed patients, other providers, or payers. For example, such regulations might be necessary if POHs cherry picked healthier patients (who might have been treated as outpatients at other institutions), provided lower quality

WHAT IS ALREADY KNOWN ON THIS TOPIC

More than 250 hospitals in the United States are partly or completely owned by physicians

Evidence from many observational studies comparing physician owned hospitals (POHs) with non-POHs shows that POHs treat healthier patients, avoid Medicaid patients and those from ethnic and racial minority groups, and increase service utilization

Provisions in the Patient Protection and Affordable Care Act of 2010 banned the formation of new POHs and dramatically restricted the growth of existing POHs

WHAT THIS STUDY ADDS

POHs may treat slightly healthier patients, but do not systematically avoid Medicaid patients or those from ethnic and racial minority groups

Moreover, overall costs of care, payments for care, and quality of care are similar between POHs and non-POHs

Policies that penalize all US hospitals with physician owners need to be re-evaluated

care, avoided poorer and potentially more expensive patients, or extracted substantially greater payments from payers. However, much of the evidence against POHs is rooted in studies of specialty hospitals, some but not all of which are POHs.^{4,21} Relatively few studies have directly examined the impact of physician ownership (as opposed to specialty status) and its effects. Yet, the Affordable Care Act bans POHs more broadly. Given that the best national studies to date on POHs, which were performed by the Medicare Payment Advisory Commission and others, relied on data gathered nearly a decade ago and studied specialty POHs exclusively,^{5,7} more contemporary and comprehensive data on what these institutions are, the patients for whom they provide care, and their performance on quality and cost metrics would be immensely helpful. In this study we sought to determine the characteristics of contemporary POHs and how they compare with other US hospitals, whether POHs seem to avoid certain types of patients (for example, those from ethnic and racial minority groups, those who use Medicaid, or those who are sicker), and whether care at POHs is of lower quality or more costly to the CMS, the largest payer in the United States.

Methods

Data

We used a nearly comprehensive list of existing medical and surgical POHs in the United States made available by the Physician Hospitals of America and linked data from three other sources to this list: data on hospital characteristics from the 2010 American Hospital Association survey; 2010 Medicare claims data concerning inpatient hospital admissions, including discharge diagnosis, patient personal and clinical characteristics, and costs and charges for Medicare admissions; and Medicare Hospital Compare, which contains hospital performance data on process of care measures for common medical conditions and on patient experience from the Hospital Consumer Assessment of Healthcare Providers and Systems survey. All analyses were performed using SAS version 9.3.

Identifying POHs and non-POHs

We assigned each POH to one of 306 hospital referral regions—a common measure of healthcare markets utilized by the Dartmouth Atlas²²—and compared each POH with other non-POHs within the hospital referral region. We restricted our analysis to hospital referral regions with at least one POH. From the analysis we excluded hospitals that specialized in obstetrics and gynecology, rehabilitation, and long term acute care. We compared POHs with non-POHs within hospital referral regions to account for geographic variations in access to healthcare services, case mix, and patterns of service utilization and healthcare spending.

Structural and organizational measures

We characterized all POHs and non-POHs according to their number of hospital beds, using standard American Hospital Association designations (small, 0-99 beds; medium, 100-399 beds; large, ≥400 beds),

geographic region, location (urban, suburban, or rural), profit status, teaching status, primary service provided (for example, cardiac, orthopedic, surgical, general medical and surgical, or “other”), presence of an intensive care unit (both cardiac or cardiac intensive care unit, and medical or medical intensive care unit), critical access hospital status, proportion of patient population using Medicare or Medicaid insurance, proportion of Medicare population with a Health Maintenance Organization insurance plan, and nurse to bed ratio (equal to the ratio of full time equivalent registered nurses/total number of facility inpatient days×1000).

Patient characteristics

Given concerns that patients using POHs may be younger, healthier, and less likely to be covered by Medicaid than patients using non-POHs, we evaluated the mean age, discharge diagnosis, source of admission, discharge destination, Elixhauser comorbidities, race, and insurance status of patients receiving care in POHs compared with non-POHs. We also used Medicare claims data to calculate risk adjusted length of stay for all Medicare admissions for all POHs and non-POHs.

Patient case mix measures

In addition to analyzing patient characteristics, we assessed whether patients admitted to POHs were healthier than those admitted to non-POHs by calculating each hospital’s predicted 30 day mortality scores for acute myocardial infarction, congestive heart failure, and pneumonia based on a hierarchical logistic regression model. This model estimates the risk of death for each patient based on the Elixhauser comorbidity score. Each hospital was assigned the average predicted mortality score for their patients. We averaged these predicted mortality scores for acute myocardial infarction, congestive heart failure, and pneumonia to create an indirect composite predicted mortality score for each hospital. The predicted mortality scores can be interpreted such that hospitals with low scores see, on average, healthier patients (that is, patients with lower predicted risks of death).

Quality of care measures

For each hospital we calculated summary scores for performance on processes of care for acute myocardial infarction, congestive heart failure, and pneumonia, and created a composite measure that combines performance on these three conditions.^{23,24} To assess patient experience, we used data from the Hospital Consumer Assessment of Healthcare Providers and Systems survey to calculate the proportion of patients at each hospital who were satisfied with their overall experience (defined as a rating of 9 or 10 on a 10 point scale). In addition, we built patient level hierarchical logistic regression models to calculate 30 day risk adjusted mortality rates as well as 30 day risk adjusted readmission rates for acute myocardial infarction, congestive heart failure, and pneumonia to serve as quality measures. We then created an indirect composite measure for risk adjusted mortality and risk adjusted readmission, which averages performance on these outcomes

for acute myocardial infarction, congestive heart failure, and pneumonia.

Costs of care measures

We evaluated hospital financial performance in two ways. Firstly, we calculated mean and median risk adjusted cost per admission to hospital for acute myocardial infarction, congestive heart failure, and pneumonia employing a commonly used method that converts charges to costs and adjusts for a variety of factors that are thought to be outside the hospital's control (see supplementary appendix 1 for additional details about methods for calculating cost of care).²⁴ Secondly, we determined the mean Medicare reimbursement per hospital admission for acute myocardial infarction, congestive heart failure, and pneumonia, all of which were obtained from Medicare claims data. We then averaged the mean costs for acute myocardial infarction, congestive heart failure, and pneumonia and the mean Medicare reimbursements for these conditions to create indirect composite cost and payment measures for each hospital.

Analysis

We calculated summary statistics for hospital characteristics, demographics, and patient comorbidities of POHs and non-POHs, and compared these summary statistics using χ^2 tests or *t* tests. We then created linear regression models, weighted according to the number of hospital discharges, and examined whether a hospital's performance on quality of care, patient mix, and financial performance measures was associated with physician ownership. We performed both unadjusted calculations and calculations adjusted for several organizational characteristics, including hospital size, hospital referral region, location in urban, suburban, or rural setting, hospital profit status, and teaching status.

We individually analyzed performance on processes of care for acute myocardial infarction, congestive heart failure, pneumonia, and the composite measure of these processes. Similarly, we performed individual analyses of 30 day mortality rates, 30 day readmission rates, predicted mortality rates, hospital costs, and payments for acute myocardial infarction, congestive heart failure, and pneumonia as well as the indirectly standardized composite measures described above (see supplementary appendix 2 for additional details about methods for calculating risk adjusted mortality and readmission rates). We also performed adjusted regressions for patient experience scores, proportions of patients with Medicare or Medicaid, and proportions of black and Hispanic patients. Finally, in a subgroup analysis we compared specialty and general POHs in terms of their structural and patient characteristics, costs of care, and quality of care. Our models were weighted by the number of discharges (unweighted results were not significantly different). We considered a two sided P value of less than 0.05 to be significant.

Patient involvement

There was no patient involvement in this study.

Results

Hospital structural characteristics

Our hospital sample consisted of 219 POHs in 95 hospital referral regions, with 1967 non-POHs in these same regions. POHs were more likely to be small (<100 beds), located in urban areas, and specialized (table 1). All 219 POHs were for profit. On average, POHs and non-POHs accounted for 6.3% and 93.7% of Medicare admissions (254 to POHs for each hospital referral region, 12144 to non-POHs for each hospital referral region), respectively, in hospital referral regions where they were present ($P<0.001$; table 1). No major teaching hospitals were POHs.

Patient characteristics

Differences in the mean age and sex of patients between POHs and non-POHs were modest. Patients admitted to POHs were younger than those admitted to non-POHs (77.4 v 78.4 years, $P<0.001$). POHs had slightly more admissions through physician or clinic referral (129 845 (68.2%) v 1 979 404 admissions (62.3%) for non-POHs, $P<0.001$) and somewhat fewer through their emergency

Table 1 | Characteristics of physician owned hospitals (POHs) and non-POHs. Values are percentages unless stated otherwise

Variables	POHs (n=219)	Non-POHs (n=1967)	P value
Hospital size:			
Small	41.4	17.3	<0.001
Medium	55.4	51.8	
Large	3.3	30.9	
Hospital region:			
North east	0.3	1.9	0.009
Midwest	14.9	29.6	
South	57.6	44.2	
West	27.2	24.3	
Profit status:			
For profit	100	14.2	<0.001
Private non-profit	0	66.3	
Public	0	19.5	
Teaching hospital status:			
Major teaching	0	15.5	<0.001
Minor teaching	13.1	23.6	
Non-teaching	86.9	60.9	
Rural urban commuting area:			
Urban	84.8	70.4	0.001
Suburban	3.2	2.4	
Large rural town	6.1	14.2	
Small town/isolated rural	5.8	13.0	
Primary service:			
General medical and surgical	82.3	99.3	<0.001
Surgical	6.2	0.1	
Heart	5.3	0.1	
Orthopedic	3.0	0	
Other specialty	3.2	0.5	
Presence of cardiac intensive care unit	32.8	52.9	<0.001
Presence of medical intensive care unit	56.3	81.5	<0.001
Critical access hospital	0.5	9.2	0.003
Mean % of Medicare admissions per HRR	6.3	93.7	<0.001
Median (interquartile range) Medicare admissions per HRR	4.0 (1.3-9.7)	96.0 (90.3-98.7)	
Nurse ratio (No of nurses per 1000 inpatient days)	8.4	5.6	<0.001
Median (interquartile range) nurse ratio	5.9 (4.4-9.4)	5.5 (4.1-6.8)	

HRR=hospital referral region.

Table 2 | Characteristics of patients in physician owned hospitals (POHs) and non-POHs. Values are percentages unless stated otherwise

Variables	POHs (n=190 389)	Non-POHs (n=3 177 213)	P value
Male	43.9	42.6	<0.001
Mean age (years)	77.4	78.4	<0.001
Source of admission:			
Physician or clinic referral	68.2	62.3	<0.001
Transfer from another hospital, healthcare facility, or skilled nursing facility	8.3	8.6	
Emergency room	23.2	29.0	
Other	0.3	0.2	
Discharge destination:			
Home	68.6	62.3	<0.001
Long term care	2.0	1.6	
Skilled nursing facility/rehabilitation facility	21.8	26.6	
Hospice	1.8	2.8	
Other	5.7	6.8	
Mean No of Elixhauser comorbidities†	1.6	1.8	<0.001
Median (interquartile range) No of Elixhauser comorbidities	1.0 (1.0-2.0)	1.0 (2.0-3.0)	
Mean predicted mortality*	7.2	7.5	0.36
Median (interquartile range) predicted mortality	9.6 (5.9-11.0)	10.1 (7.6-11.7)	
Mean length of stay (days)	4.6	5.2	<0.001
Median (interquartile range) length of stay (days)	2.0 (3.0-6.0)	2.0 (4.0-6.0)	

*Data from 2009-10. All other data from 2010.

†Based on index of 27 distinct comorbid illnesses.

departments (44 170 admissions (23.2%) v 921 392 admissions (29.0%), $P<0.001$). Patients at POHs were also less likely to be discharged to hospice care (3427 discharges (1.8%) v 8962 discharges (2.8%), $P<0.001$) and more likely to be discharged to home (130 607 (68.6%) v 1 979 404 discharges (62.3%), $P<0.001$, table 2).

We found no clinically or statistically significant differences in patient mix between POHs and non-POHs. For example, POHs and non-POHs admitted similar proportions of Medicare patients (47.1% v 47.2%, $P=0.97$), Medicaid patients (28 368 (14.9%) v 489 291 (15.4%), $P=0.75$) black patients (9710 (5.1%) v 174 747 (5.5%), $P=0.85$), and Hispanic patients (1.4% v 1.0%, $P=0.58$). Mean hospital length of stay was 0.6 days shorter at POHs than at non-POHs (4.6 days v 5.2 days, $P<0.001$). Patients admitted to POHs and non-POHs also had comparable numbers of comorbidities (mean number of Elixhauser comorbidities 1.6 v 1.8) and similar predicted mortality scores (7.2% v 7.5%, $P=0.36$, table 2).

Quality and costs of care

Quality of care

In adjusted comparisons of healthcare quality at POHs and non-POHs, we found generally small differences, inconsistent in direction, and not statistically significant. For example, POHs and non-POHs had similar patient experience scores (74.3% v 74.9%, $P=0.49$) and performed comparably on both disease specific and composite measures of mortality, process measures, and 30 day readmissions for acute myocardial infarction, congestive heart failure, and pneumonia (table 3 and supplementary appendices 3-4). Indeed, in our composite of mortality rates across acute myocardial infarction, congestive heart failure, and pneumonia, 13.9% of patients admitted to both POHs and non-POHs died within 30 days of discharge (deaths from these conditions 12514 in POHs, 772574 in non-POHs; difference 0.1%, $P=0.91$, table 3).

Costs of care

We found small differences in risk adjusted costs and CMS payments to POHs compared with non-POHs. Indirect, standardized composite measures of costs for acute myocardial infarction, congestive heart failure, and pneumonia averaged \$10 113 (£6470; €9145) at POHs and \$10 024 at non-POHs (difference \$88, $P=0.82$). An analogously constructed composite of CMS payments for episodes of care for acute myocardial infarction, congestive heart failure, and pneumonia amounted to \$7217 at POHs and \$7033 at non-POHs (difference -\$183, $P=0.52$, table 3). Adjusting these analyses for hospital characteristics but not for specialty hospital status yielded similar results: POHs and non-POHs had similar costs and payments for episodes of care for acute myocardial infarction, congestive heart failure, and pneumonia (see supplementary appendix 5).

Specialty versus general POHs

When we compared the 120 general POHs with the 99 specialty POHs, we found meaningful differences: general POHs were larger, less likely to be located in urban areas, and more likely to provide cardiac or medical intensive care services (see supplementary appendix 6). Patients at general POHs were of comparable age to patients at specialty POHs (72.6 v 72.2 years) but less likely to be male (98 825 (44.1%) v 8280 (46.0%), $P<0.001$). On average, patients at general POHs had more comorbidities (1.7 v 1.3, $P<0.001$), higher predicted mortality scores (9.9% v 5.9%, $P=0.003$), and longer mean lengths of stay (4.9 v 3.4 days, $P<0.001$) than patients at specialty POHs (see supplementary appendix 7). General POHs cared for greater proportions of Medicaid patients (41 233 (18.4%) v 1368 (7.6%), $P<0.001$) and black patients (15 911 (7.1%) v 396 (2.2%), $P=0.17$), and similar percentages of Medicare patients (109 134 (48.7%) v 8442 (46.9%), $P=0.51$).

Table 3 | Quality and cost of care at physician owned hospitals (POHs) and non-POHs. Values are percentages unless stated otherwise

Outcomes	POHs (n=219)	Non-POHs (n=1967)	Difference (95% CI)	P value
Patient experience	74.3	74.9	-0.6 (-2.3 to 1.1)	0.49
Process measures:				
Overall*	92.2	92.3	-0.2 (-1.5 to 1.2)	0.81
Acute myocardial infarction	92.8	93.7	-1.0 (-2.2 to 0.3)	0.12
Congestive heart failure	86.5	87.9	-1.4 (-3.8 to 1.0)	0.26
Pneumonia	88.9	89.4	-0.5 (-2.3 to 1.2)	0.57
Risk adjusted hospital mortality:				
Overall	13.9	13.9	0.1 (-1.0 to 1.1)	0.91
Acute myocardial infarction†	17.7	18.9	-1.2 (-3.7 to 1.3)	0.36
Congestive heart failure‡	12.7	12.7	0.0 (-1.1 to 1.2)	0.95
Pneumonia‡	8.8	8.7	0.1 (-1.1 to 1.1)	0.97
Hospital cost and utilization				
Risk adjusted readmission‡	26.0	25.5	0.5 (-0.5 to 1.5)	0.31
Risk adjusted cost (\$)§	10 113	10 024	88 (-692 to 869)	0.82
Payment (\$)¶	7217	7033	183 (-375 to 741)	0.52

\$1.00 (€0.60; €0.90).

All analyses are weighted and adjusted for hospital structural characteristics (outlined in table 1) and for hospital referral region.

*Composite of process measures for acute myocardial infarction, congestive heart failure, and pneumonia.

†Data from 2009-10. All other data from 2010.

‡Indirect standardized composite measure for acute myocardial infarction, congestive heart failure, and pneumonia.

§Indirect standardized composite measure for hospital costs for acute myocardial infarction, congestive heart failure, and pneumonia.

¶Indirect standardized composite measure for Medicare payments for acute myocardial infarction, congestive heart failure, and pneumonia.

In comparing general POHs with specialty POHs on cost and quality, the findings were mixed. Specialty POHs had higher patient experience scores than general POHs (81.6% v 67.3%, $P<0.001$) and outperformed general POHs on an indirect composite measure of process performance for acute myocardial infarction, congestive heart failure, and pneumonia (94.5% v 91.1%, $P=0.05$). We also observed a non-significant trend towards lower mortality for acute myocardial infarction, congestive heart failure, and pneumonia at specialty POHs. However, specialty POHs had higher risk adjusted readmission rates for acute myocardial infarction, congestive heart failure, and pneumonia (1421 (29.7%) v 189 808 readmissions in general POHs or 23.3%, $P=0.0005$, see supplementary appendix 8).

Discussion

We used contemporary data to examine structural characteristics, patient populations, quality of care, costs, and payments at physician owned hospitals (POHs) compared with other hospitals in their healthcare markets. We found that POHs provide a small proportion of inpatient care in most healthcare markets, on average just over 6%. We found some evidence that POHs treat healthier patients than non-POHs but little evidence that these hospitals select more profitable patients or avoid poorer patients or those from ethnic and racial minority groups. The quality of care provided by POHs was equal to, or in some cases better than, care at other institutions across a range of metrics, including process measures, mortality rates, and readmissions rates. Finally, costs and Medicare payments at POHs were similar to, or lower than, those at non-POHs. Taken

together, our findings suggest that most POHs are not outliers in terms of patients served, the quality of care provided, or their costs to the healthcare system.

Comparison with other studies

Our study, which includes 219 POHs, is one of the largest and most comprehensive examinations of such hospitals to date. The next largest analysis, performed by the Office of the Inspector General in 2008, included 109 specialty POHs but was narrowly focused on the ability of these hospitals to respond to medical emergencies.²⁵ We found some evidence that patients at POHs may be somewhat healthier than those at non-POHs,²⁶ although the differences were small, and patients at POHs and non-POHs had equivalent numbers of chronic comorbidities and similar predicted mortality rates for common conditions. One potential explanation for these seemingly discrepant results is that differences in age, emergency department admissions, and discharge destination were not of a large enough magnitude to produce clinically significant differences in measures of illness severity. Alternatively, it is possible that claims data may not fully capture meaningful differences in illness acuity between patients at POHs and those at non-POHs.²⁷ Differences in comorbidity coding practices between POHs and non-POHs, for instance, could also have influenced these comparisons.

It is unclear if the modestly higher rate of POH admissions that were initiated by referrals from outpatient clinics is evidence of inappropriate utilization. Certainly, most cases of pneumonia and acute myocardial infarction in Medicare patients warrant admission to hospital. None the less, our results suggest that any self referrals that did occur were modest and did not result in substantial differences in outcomes for patients at POHs and non-POHs, or their proportions of patients from ethnic and racial minority groups and those using Medicaid. Indeed, we found that patients at POHs and non-POHs were equally likely to have Medicaid insurance and to be from racial or ethnic minority groups. These findings depart substantially from most previous research, which has generally shown that specialty hospitals, including specialty POHs, preferentially select patients with more profitable insurance plans and have lower proportions of patients with Medicaid than surrounding hospitals.^{7 28-30} This difference between our study and previous work may stem from our inclusion of all POHs, rather than specialty POHs, the focus of almost all previous studies of POHs. In this context we found meaningful differences in the patients served by general POHs versus specialty POHs, which may not be surprising since specialty hospitals in general (including specialty POHs) tend to care for healthier, and generally wealthier, patients. It may be that general POHs, as with other general hospitals, are not able to selectively treat less disadvantaged patients and still maintain adequate patient volumes. These findings underscore that the policy intervention, which targets all POHs, may have been too broadly cast.

Consistent with previous work, we found that POHs and non-POHs have similar mortality rates for common

medical conditions.^{57,29} The results of our cost comparisons are also consistent with previous research, which has generally found that POHs have costs of care that are equivalent to, and occasionally higher than, costs at non-POHs.^{57,31} POHs did have significantly shorter lengths of stay than non-POHs though, raising the possibility that some POHs may be more focused on discharging patients early than non-POHs. We did not find that these shorter lengths of stay were associated with more readmissions or worse clinical outcomes. In the aggregate, given that POHs and non-POHs appear to receive similar reimbursements from the Centers for Medicare and Medicaid Services for common conditions, it seems unlikely that these institutions are engaging in excessive billing or upcoding. Furthermore, previous research examining the impact of POHs on the financial viability of surrounding hospitals has largely failed to substantiate concerns that POHs affect inpatient volume, revenues, or profits at competing hospitals.^{3,32,33} Based on our finding that POHs comprise, on average, just 6.3% of Medicare admissions in any given market, it seems less likely that POHs are having a meaningful impact on the financial viability of non-POHs.

What accounts for the differences between our findings and those of previous studies, and particularly the analyses by the Medicare Payment Advisory Commission (MedPAC)? One potential explanation is that the populations of specialty POHs included in previous studies are not representative of POHs more broadly. For example, the studies by MedPAC—which remain the two largest ones of case mix, quality of care, and costs of care at POHs conducted to date—primarily focused on cardiac, orthopedic, and surgical specialty hospitals, most of which were small institutions. Indeed, in MedPAC's study on orthopedic and surgical POHs there was a median 14 inpatient beds.^{7,28} In contrast, in our study, which included many more POHs, nearly 60% of POHs had more than 100 beds. Furthermore, the MedPAC studied specialty hospitals owned by physicians, whereas we analyzed all POHs, including both specialty and general POHs. Fundamentally then our analysis and those performed by MEDPAC included different sets of hospitals. Whether these differences reflect the influence of public policies designed to reduce cherry picking, the opening of new and larger POHs since the MedPAC studies were conducted, systematic differences between specialty and general POHs, or other factors is unclear.

Conclusions and policy implications

Our study has several important policy implications. Firstly, our work suggests that some of the major criticisms of POHs, including that they select more profitable patients, provide lower value care, and threaten the financial viability of surrounding hospitals, may no longer be valid. To be clear, by a few measures, patients at POHs do seem to be somewhat healthier than those at non-POHs, which certainly lends credence to concerns that POHs might select less critically ill patients. However, POHs were nearly identical to non-POHs in almost every other metric that we examined, including their proportions of Medicaid patients and those from ethnic and racial minority groups. Furthermore, in certain

circumstances it may even be appropriate for POHs to care for healthier patients because many of these hospitals are smaller and have fewer of the advanced capabilities and subspecialty expertise necessary to care for complex and critically ill patients. Thus, taken together our findings call into question whether policies that broadly target all POHs are still necessary. Secondly, because we cannot rule out that some POHs may still engage in untoward behaviors, additional research is necessary to identify subgroups of hospitals that do systematically engage in them. Existing policies targeting all POHs could then be revised to focus on these select institutions. Of course an alternative, and possibly better, way to reduce cherry picking is to further reduce payment amounts in ways that reduce financial incentives to selectively care for healthier patients. General POHs, which account for more than 80% of all Medicare admissions to a POH and do not seem to systematically engage in cherry picking, could be exempted from these regulations.

Our findings may also have important implications for understanding patterns of access to care, healthcare quality, and costs of care in other countries where physicians own clinics and hospitals—including India, Brazil, Colombia, and several other countries in South America and other parts of the developing world.^{34,35} However, our results may not be generalizable to these nations, and additional studies are necessary to determine how physician ownership of hospitals influences clinical outcomes in these regions.

Strengths and limitations of this study

Our study has important limitations. Though we examined sources of patient admission at POHs and other hospitals, we did not directly investigate referral patterns by physician owners of POHs. None the less, that POHs and non-POHs treated similar proportions of patients with Medicaid and those from ethnic and racial minority groups suggests that the owners of POHs did not engage in self referrals of more well off patients with better insurance policies often enough to meaningfully reduce the proportions of minority and disadvantaged patients treated by POHs. Moreover, we did not evaluate long term total costs for episodes of care, which may vary more between POHs and non-POHs than do costs for the episode of care itself. We also did not examine outcomes for major procedures, such as coronary artery bypass grafting or joint replacement surgeries, which are performed routinely at some specialty POHs. Furthermore, our findings may not extend to patients without Medicare or to care for other types of illnesses. However, we have previously found that performance on metrics for acute myocardial infarction, congestive heart failure, and pneumonia broadly predicts care patterns at a hospital.³⁶ In addition, though the percentage of a hospital owned by physicians has been previously associated with cherry picking, we could not evaluate how this variable influenced our outcomes of interest.⁶ Put another way, it is possible that physician ownership stake is positively correlated with cherry picking patients, although any such correlation is likely to be small given that overall we found no effect. Importantly, however, the purpose of this study was to assess the

appropriateness of the broader policy approach that treats physician ownership as a bimodal outcome (that is, a hospital is either physician owned or not physician owned). Thus, from a public policy standpoint, failing to account for percentage of physician ownership should not alter the relevance or validity of our findings. Finally, our results, as with those of all observational studies, are subject to confounding by unmeasured variables. While we tried our best to identify and account for potential confounders, any such effort is inherently imperfect.

Conclusion

Using a comprehensive list of POHs across the United States and contemporary data, we found no evidence that POHs systematically avoid poorer patients or those from ethnic and racial minority groups. POHs also performed equally to non-POHs on a wide array of measures of quality of care, costs, and payments for care. These findings indicate a need to re-examine existing public policies that target all hospitals with physician owners.

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Data sharing: No additional data available.

Transparency: The lead author (DMB) affirms that this manuscript is an honest, accurate and transparent account of the study being reported, that no aspects of the study have been omitted, and that any discrepancies from the study as planned have been explained.

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Web appendix: access, quality, and costs at US physician owned hospitals