Journal of the American College of Cardiology Vol. 50, No. 15, 2007

Published by Elsevier Inc.
ISSN 0735-1097/07/$32.00
doi:10.1016/j.jacc.2007.07.012

The Impact of For-Profit Hospital Status on the Care and Outcomes of Patients With Non–ST-Segment Elevation Myocardial Infarction

Results From the CRUSADE Initiative

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Objectives We sought to determine whether for-profit status influenced hospitals' care or outcomes among non–ST-segment elevation myocardial infarction (NSTEMI) patients.

Background While for-profit hospitals potentially have financial incentives to selectively care for younger, healthier patients, perform highly reimbursed procedures, reduce costs by limiting access to expensive medications, and encourage shorter in-patient length of stay, there are limited data available to investigate these issues objectively.

Methods Using data from the CRUSADE (Can Rapid risk stratification of Unstable angina patients Suppress ADverse outcomes with Early implementation of the American College of Cardiology/American Heart Association guidelines) Initiative, we investigated whether for-profit status influenced hospitals' patient case mix, care, or outcomes among 145,357 patients with NSTEMI treated between January 1, 2001, and December 31, 2005, at 532 U.S. hospitals. Impact of for-profit status on care and outcomes was analyzed overall and after adjustment for clinical and facility factors using regression modeling.

Results Patients (n = 11,658) treated at 58 for-profit hospitals were of similar age and gender, but were more likely to be nonwhite (black, Asian, Hispanic, and other) and have health maintenance organization/private insurance, diabetes mellitus, congestive heart failure, hypertension, and renal insufficiency compared with 133,699 patients treated at 474 nonprofit hospitals. For-profit hospitals were less likely to use discharge beta-blockers, but all other treatments were similar including the use of interventional procedures (cardiac catheterization and revascularization procedures) compared with nonprofit centers. In-hospital length of stay and mortality were also similar by hospital type.

Conclusions We found no evidence that for-profit hospitals selectively treat less sick patients, provide less evidence-based care, limit in-hospital stays, or have patients with worse acute outcomes than nonprofit centers. (J Am Coll Cardiol 2007;50:1462–8) © 2007 by the American College of Cardiology Foundation

Hospitals in the U.S. can be broadly defined by their financial status as being for-profit or nonprofit, with the latter receiving tax-preferred status from the federal government for providing uncompensated care to the uninsured and underinsured (1). For-profit hospitals are subject to increased public scrutiny given concern that they may preferentially select healthier and better insured patients without providing better quality of care or outcomes (2–7). For-profit hospitals have an incentive to maximize financial margins from patient care. This strategy could occur by selecting younger patients with fewer comorbidities, performing highly reimbursed procedures (e.g., coronary revascularization), limiting use of expensive medical therapies, or decreasing length of stay (LOS).

Acute coronary syndrome (ACS) presents an ideal condition for a comparison of medical treatment between for-profit and nonprofit centers. First, American College of Cardiology/American Heart Association (ACC/AHA)

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Manuscript received February 5, 2007; revised manuscript received June 21, 2007, accepted July 9, 2007.

consensus guidelines specify the proper evidenced-based therapies and procedures for patients with ACS (8), and the use of these clinical guidelines has been associated with better outcomes (9). Second, high transfer rates of patients with ACS make patient identification and selection straightforward. Third, treatment of ACS involves the use of expensive technologies, such as cardiac catheterization, percutaneous coronary intervention (PCI), and coronary artery bypass graft (CABG) surgery. Acute coronary syndrome populations also tend to be heterogeneous, and the length of stay for these patients would be expected to vary based on comorbid conditions and characteristics of the treating center. Given these factors, the differences in treatment and outcomes for non–ST-segment elevation myocardial infarction (NSTEMI) may be different between for-profit and nonprofit hospitals given differences in financial strategy, resource allocation, and rates of expensive procedures between the 2 hospital types.

Using data from the CRUSADE (Can Rapid risk stratification of Unstable angina patients Suppress ADverse outcomes with Early implementation of the ACC/AHA guidelines) National Quality Improvement Initiative (10), we examined the differences in case mix, medication and procedure use, and outcomes to assess potential differences in care between the for-profit and nonprofit hospitals.

Abbreviations and Acronyms

ACC = American College of Cardiology
ACS = acute coronary syndrome
AHA = American Heart Association
CABG = coronary artery bypass graft
CHF = congestive heart failure
HMO = health maintenance organization
LOS = length of stay
NSTEMI = non–ST-segment elevation myocardial infarction
PCI = percutaneous coronary intervention
STEMI = ST-segment elevation myocardial infarction

Methods

Patients, inclusion criteria, and data collection. The CRUSADE Initiative is an observational registry that identifies patients with ischemic symptoms at rest within 24 h before presentation and high-risk ACS features, including ST-segment depression, transient ST-segment elevation, or positive cardiac markers (elevated troponin I or T and/or creatine kinase-MB greater than the upper limit of normal for the local laboratory assay). Data for patients meeting these criteria are collected anonymously during the hospitalization without informed consent and with institutional review board approval of each participating institution. Data collected include baseline patient characteristics, use of acute (within 24 h of hospital arrival) medications, use and timing of invasive cardiac procedures, laboratory results, in-hospital clinical outcomes, and discharge therapies and interventions. Contraindications to class IA or IB therapeutic recommendations by the ACC/AHA guidelines are recorded (11). The treating physician makes decisions regarding the use of invasive procedures. Race and/or ethnicity classification are recorded by chart review at each participating site using provided definitions. Hospital profit status in the CRUSADE Initiative was obtained using American Hospital Association registration data.

Analysis cohort. Between January 1, 2001 and December 31, 2005, 159,561 patients from 532 hospitals presented with NSTEMI. Unstable angina patients with ischemic ST-segment changes but without positive cardiac biomarkers (n = 14,204) were excluded from our analysis. Among the remaining NSTEMI patients (n = 145,357), 11,658 (8.02%) were from 58 for-profit hospitals, which compares with the approximately 18% of for-profit hospitals registered with the American Hospital Association as of October 20, 2006 (12).

Statistical analysis. Baseline patient characteristics and signs and symptoms at presentation were compared between for-profit and nonprofit centers. For patients transferred out, baseline patient characteristics and hospital characteristics were analyzed to characterize any differences between the 2 hospital types. The chi-square test was used for categorical variables, and the Wilcoxon rank-sum test was used for continuous variables. The mean with standard deviation and percentages were reported to describe the distribution of continuous and categorical variables, respectively. Patients were excluded from the final analyses if they had contraindications to evidence-based therapies within 24 h of presentation or at discharge, or were transferred out. Patients who died were excluded from analysis of discharge medications. Patients transferred out were excluded from the analyses of in-hospital clinical events. Patients with contraindications to cardiac catheterization, PCI, or CABG were excluded in the procedural analyses, and only hospitals with PCI or CABG services were included in procedural analyses. Any patients transferred in or out were excluded from LOS analyses.

Multivariate regression analyses using generalized estimating equations methods were performed to determine whether for-profit was an independent factor that influenced the use of medications within 24 h and at discharge, in-hospital clinical events, in-hospital procedures, or LOS. This model evaluated the differences between for-profit and nonprofit hospitals, adjusting for possible confounding factors. These variables included age, male gender, white race, body mass index, insurance status (health care maintenance organization/private, Medicare, Medicaid, self/none), family history of coronary artery disease, hypertension, diabetes mellitus, current/recent smoker (within 6 weeks of hospitalization), hypercholesterolemia, prior myocardial infarction, prior PCI, prior CABG, prior congestive heart failure (CHF), prior stroke, renal insufficiency (serum creatinine >2.0 mg/dl, calculated creatinine clearance <30 ml/min, or need for renal dialysis), electrocardiographic findings at admission (ST-segment depression, transient ST-segment elevation, or both), signs of CHF, heart rate, systolic blood pressure at admission, admitting physician (cardiologist vs.

noncardiologist), number of hospital beds, region (Northeast, South, West, Midwest), teaching status (academic vs. nonacademic hospital), and facility type (no services, catheterization lab only, PCI lab only but no surgery, and surgery). Length of stay data were continuous and skewed to the right, and were log transformed with the ratio of adjusted LOS reported.

A p value of <0.05 was considered significant for all tests. All analyses were performed using SAS software (version 8.2, SAS Institute, Inc., Cary, North Carolina).

Results

Patient selection. The average age of the cohort was 67.3 ± 14 years (Table 1). Women and white patients comprised 39.3% and 80.6% of the study population, respectively. The majority of patients (81.8%) were initially evaluated in an emergency room. Patients presenting with NSTEMI at for-profit hospitals were more likely to have health maintenance organization (HMO)/private insurance, be nonwhite (black, Asian, Hispanic, and other), and have a slightly lower body mass index. Patients treated at for-profit hospitals had a higher prevalence of diabetes mellitus, CHF, hypertension, renal insufficiency, prior stroke, and prior revascularization with either CABG or PCI. Additionally, patients presenting at for-profit hospitals were more likely to present with CHF and to have ST-segment depression, transient ST-segment elevation, or both at initial presentation.

Hospital characteristics. Table 2 shows the characteristics of the hospitals in the study cohort. In general, nonprofit centers were more likely to be located in the Northeast and Midwest of the U.S. and were larger in size. For-profit centers were more likely to be located in the Southern U.S. and less likely to have an academic affiliation.

Patient transfers. Tables 3 and 4 compare patient and hospital characteristics between nonprofit and for-profit

Table 1 Patient Characteristics

Characteristics	Overall (n = 145,357)	For-Profit (n = 11,658)	Nonprofit (n = 133,699)	p Value
Age, yrs*	67.3 ± 14.2	67.6 ± 14.3	67.3 ± 14.2	0.02
BMI, kg/m^2*	28.7 ± 6.8	28.4 ± 6.6	28.7 ± 6.8	<0.001
Female gender	39.3	38.9	39.3	0.42
Race				<0.001
White	80.6	74.8	81.1	
Black	10.5	14.0	10.2	
Asian	1.1	0.5	1.2	
Hispanic	3.6	7.3	3.3	
Other	2.6	1.4	2.7	
Insurance				<0.001
HMO/private	43.8	45.8	43.6	
Medicare	42.2	40.5	42.3	
Military/VAMC	0.73	0.40	0.76	
Medicaid	6.09	6.45	6.06	
Self/none	6.31	6.07	6.33	
Family history of CAD	34.4	34.1	34.5	0.76
History of hypertension	69.3	70.9	69.2	<0.001
Diabetes mellitus	33.0	33.8	32.9	0.01
Current/recent smoking†	27.2	26.9	27.3	0.61
Dyslipidemia	48.4	48.4	48.4	0.49
Prior MI	29.4	27.9	29.6	0.002
Prior PCI	20.2	20.1	20.3	0.85
Prior CABG	19.1	19.7	19.0	0.03
Any prior revascularization	33.3	32.9	32.2	0.03
Prior CHF	17.9	19.5	17.8	<0.001
Prior stroke	10.5	11.2	10.5	0.01
Renal insufficiency‡	13.9	15.4	13.7	<0.001
Presentation features				
ST-segment depression	30.3	34.9	29.9	<0.001
Transient ST-segment elevation	6.0	9.3	5.7	
Signs of CHF at presentation	23.8	24.7	23.8	0.01
Emergency department presentation	81.8	82.3	81.7	<0.001

Data are presented as percentages, except as indicated. *Presented as mean ± SD; †recent smoking defined as within the last 6 weeks before hospitalization; ‡known serum creatinine >2.0 mg/dl, calculated creatinine clearance <30 ml/min, or need for renal dialysis.

BMI = body mass index; CABG = coronary artery bypass graft; CAD = coronary artery disease; CHF = congestive heart failure; HMO = health maintenance organization; MI = myocardial infarction; PCI = percutaneous coronary intervention; VAMC = Veterans Administration Medical Center.

Table 2 Hospital Characteristics

Characteristics	Overall (n = 145,357)	For-Profit (n = 11,658)	Nonprofit (n = 133,699)	p Value
Region				
West	12.2	13.5	12.1	<0.001
Northeast	22.2	4.3	23.7	
Midwest	32.8	6.6	35.1	
South	32.8	75.6	29.1	
Type of hospital				
No services	5.64	0.03	6.12	<0.001
Cath lab only	9.1	10.7	9.0	
PCI, no surgery	6.1	9.8	5.8	
PCI, with surgery	79.2	79.4	79.1	
Teaching hospital*				
Academic	28.3	10.7	29.8	<0.001
Total hospital beds†	404 ± 219	298 ± 112	414 ± 223	<0.001

Data are presented as percentages except as indicated. *Membership in Council of Teaching Hospitals; †presented as mean ± SD.
PCI = percutaneous coronary intervention.

centers that were transferred to other facilities. Of the total patients initially evaluated, 10.3% of patients at for-profit hospitals and 12.2% of patients at nonprofit hospitals were transferred out. Patients transferred out from for-profit hospitals were older and more likely to have CHF, hypertension, renal insufficiency, signs of CHF at admission, and electrocardiogram changes, but less likely to have a family history of CAD and prior PCI. Nonprofit hospitals that transferred patients were more likely not to have cardiac catheterization or surgical services, whereas for-profit hospitals were more likely to have PCI services without surgical services.

Therapies, event rates, and outcomes. Multivariate analyses for differences among medical therapies, hospital event rates, and outcomes are shown in Tables 5 to 7. For-profit hospitals were less likely to discharge patients with beta-blocker therapy; otherwise, the use of evidence-based therapies was not statistically different between the 2 hospital types. No differences in the rates of diagnostic catheterization, PCI, or CABG were found. In-hospital incidences of CHF, cardiogenic shock, stroke, death, bleeding complications, or transfusion requirements were also similar between the 2 hospital types. Length of stay was also similar between the 2 hospital types.

Discussion

This analysis demonstrates that for-profit centers did not selectively care for patients who were younger or healthier than patients treated at nonprofit hospitals. There was no significant difference in the use of evidence-based therapies, LOS, in-hospital outcomes, and rates of revascularization for patients with NSTEMI between the 2 hospital types.

Prior studies have examined the impact of hospital ownership structure on procedure rates, quality measures, and outcomes in a variety of patient populations. For-profit centers have a different financial resource allocation than nonprofit hospitals (13–15), and previous studies have demonstrated higher rates of expensive technology use and increased mortality when compared with nonprofit facilities (4,5,14,16,17). Most of these studies, however, have examined broad patient populations where care varies based on the admitting diagnosis, thus confounding identifiable sources of differences in care and outcomes between the 2 hospital types. Therefore, it has been difficult to ascertain whether differences in the care and outcomes seen between these hospital types are real or reflect patient diagnosis or illness severity. Patients presenting with ACS are an ideal study cohort to examine these differences. The clinical diagnosis relies on common laboratory and diagnostic tests, and treatment is based on widely disseminated guidelines that have been shown to positively influence outcomes (9). Therefore, any differences in treatment or outcomes in an ACS population would reflect fundamental differences in resource allocation, processes, or preferences for particular treatments or patient characteristics.

In the analysis of an ACS population, Sloan et al. (7) examined care processes and outcomes from a Medicare population presenting with ACS. Similar to Sloan et al. (7), we found no evidence that for-profit hospitals care for younger or healthier patients. However, we examined a broader ACS population in terms of age and reimbursement and were able to identify that treatment patterns at for-profit centers were not influenced by the patient's insurance status. Unlike their findings, we could not find any differences in the use of expensive procedures and discharge use of aspirin and angiotensin-converting enzyme inhibitors between the 2 hospital types. These differences could be the result of the fact that their analysis examined patients with ST-segment elevation myocardial infarction (STEMI) and NSTEMI exclusively in a Medicare population. However, given that most of the guidelines for care (beyond acute reperfusion) are similar for STEMI and NSTEMI, we would not have expected differences in the utilization rates of evidence-based therapies between the 2 analyses. Fur-

Table 3 Characteristics of Patients Transferred Out

Characteristics	Overall (n = 17,561)	For-Profit (n = 1,200)	Nonprofit (n = 16,361)	p Value
Age, yrs*	65.9 ± 13.2	67.8 ± 13.5	65.7 ± 13.2	<0.001
BMI, kg/m^2*	29.0 ± 6.6	28.9 ± 7.0	29.1 ± 6.6	0.11
Female gender	36.8	36.5	36.8	0.87
Race				0.003
White	82.7	83.3	82.7	
Black	7.6	9.5	7.4	
Asian	0.95	0.58	0.97	
Hispanic	4.4	3.7	4.5	
Other	2.8	1.7	2.9	
Insurance				0.003
HMO/private	46.4	43.9	46.6	
Medicare	39.7	44.0	39.4	
Military/VAMC	0.69	0.33	0.72	
Medicaid	5.5	5.6	5.5	
Self/none	6.6	4.9	6.8	
Family history of CAD	38.3	33.0	38.6	<0.001
History of hypertension	66.8	69.9	66.5	0.003
Diabetes mellitus	33.2	35.0	33.1	0.06
Current/recent smoking†	28.3	25.2	28.5	0.03
Dyslipidemia	47.6	48.1	47.5	0.52
Prior MI	26.6	26.0	26.6	0.98
Prior PCI	18.7	15.8	18.9	0.02
Prior CABG	15.7	16.8	15.7	0.19
Any prior revascularization	28.7	28.1	28.7	0.95
Prior CHF	13.3	16.8	13.1	<0.001
Prior stroke	8.7	9.5	8.7	0.20
Renal insufficiency‡	9.8	12.0	9.7	0.004
Presentation features				
ST-segment depression	32.7	44.8	31.8	<0.001
Transient ST-segment elevation	21.7	12.7	5.1	
Signs of CHF at presentation	23.8	25.9	21.4	<0.001
Emergency department presentation	92.2	87.2	92.6	0.05

Data are presented as percentages except as indicated. *Presented as mean ± SD; †recent smoking defined as within the last weeks before hospitalization; ‡known serum creatinine >2.0 mg/dl, calculated creatinine clearance <30 ml/min, or need for renal dialysis.
Abbreviations as in Table 1.

Table 4 Hospital Characteristics for Patients Transferred Out

Characteristics	Overall (n = 17,561)	For-Profit (n = 1,200)	Nonprofit (n = 16,361)	p Value
Region				
West	11.1	3.5	11.7	<0.001
Northeast	31.2	0.4	33.5	
Midwest	12.5	1.75	13.3	
South	45.2	94.3	41.6	
Type of hospital				
No services	24.6	0.08	26.4	<0.001
Cath lab only	35.5	32.7	35.7	
PCI, no surgery	21.8	50.3	19.8	
PCI, with surgery	18.0	17.0	18.1	
Teaching hospital*				
Academic	7.1	3.3	7.3	<0.001
Total hospital beds†	255 ± 158	225 ± 85	258 ± 161	0.01

Data are presented as percentages except as indicated. *Membership in Council of Teaching Hospitals; †presented as mean ± SD.
PCI = percutaneous coronary intervention.

Table 5 Guideline-Based Medication and Invasive Procedure Use

Outcome	For-Profit (n = 11,658)	Nonprofit (n = 133,699)	Adjusted OR (95% CI)	p Value
Acute aspirin	93.2	93.8	0.91 (0.70–1.17)	0.46
Acute beta-blocker	81.4	85.3	0.80 (0.62–1.03)	0.09
Acute clopidogrel	49.1	46.7	1.17 (0.95–1.45)	0.15
Acute heparin (UFH or LMWH)	86.3	86.7	0.90 (0.70–1.16)	0.43
Acute GP IIb/IIIa	41.3	43.2	0.89 (0.71–1.10)	0.29
Catheterization (overall)	72.3	75.9	0.93 (0.63–1.37)	0.71
Catheterization within 48 h of arrival	51.3	54.8	1.13 (0.88–1.46)	0.35
PCI	46.5	47.1	1.14 (0.95–1.38)	0.17
PCI within 48 h of arrival	35.3	35.1	1.16 (0.97–1.39)	0.10
CABG	13.2	13.6	0.88 (0.71–1.10)	0.27

Data are presented as percentages. The odds ratios (ORs) compare for-profit with nonprofit hospitals.
CI = confidence interval; GP = glycoprotein; LMWH = low-molecular-weight heparin; UFH = unfractionated heparin; other abbreviations as in Table 1.

thermore, Sloan et al. (7) restricted their analysis to a Medicare population, yet our conclusions regarding the similarity in care and outcomes by center type remain robust even when our analysis was limited to those age 65 years or older (data not presented). Additionally, it remains unclear as to whether these study differences reflect the fact that we had access to more contemporary clinical data.

Previous studies have shown that for-profit organizations have similar or increased usage rates of procedures with high reimbursement potential including, but not restricted to, cardiac catheterization, CABG, and PCI (7,18). We did not find any difference in the rates of these procedures in our analysis, which is contrary to the expectation that for-profit hospitals may limit the use of these procedures, especially to Medicare beneficiaries and the under- or uninsured, as a strategy to enhance their profitability. Similarly, we found no evidence that for-profit centers were less likely to use pharmacologic treatments recommended by the ACC/AHA guidelines for patients with NSTEMI. The only significant difference we found between the 2 hospital types was the lower adjusted rate of beta-blockers given at discharge at for-profit hospitals. The findings may represent a type I statistical error, given that there were no significant differences among the other similar therapies measured. Beta-blocker therapy is relatively inexpensive and, unlike procedures, has no large financial impact that would drive a difference in its use between the 2 hospital types.

Our analysis is the first to compare the characteristics of patients transferred and transferring hospitals. Both nonprofit and for-profit hospitals had similar rates of transferring patients. The characteristics of patients transferred out from for-profit and nonprofit hospitals were similar in regards to comorbidities and features at presentation as those not transferred. However, for-profit hospitals with PCI services, but without surgical back-up, were more likely to transfer patients to other hospitals that could presumably provide the more advanced care that these patients may require.

Study limitations. There are several issues that should be considered in the interpretation of the results of this study. First, we did not include measures of physician ownership in our analysis of for-profit hospitals, given the difficulty in identifying this data. We would expect that these hospitals might have increased procedure use compared with nonphysician-owned hospitals and to be more selective of the patients they treat. Also, for patients transferred out, we neither have data for the reason for transfer nor the type of hospital to which they were transferred limiting our ability to make further conclusions on these observations.

In our analysis, we limited our scope to a single diagnosis, NSTEMI. There could be other conditions that influence or affect this diagnosis that may not have been captured by the data. Additionally, the CRUSADE Initiative does not provide information for long-term care or outcomes for patients, effectively limiting any conclusions between the 2 hospital types in this regard. However, given the similarities in acute care and outcomes, long-term differences maybe less likely.

Table 6 Guideline-Based Discharge Therapies

Discharge Therapies	For-Profit (n = 11,658)	Nonprofit (n = 133,699)	Adjusted OR (95% CI)	p Value
Aspirin	91.9	92.3	0.97 (0.75–1.26)	0.84
Beta-blocker	84.6	88.5	0.76 (0.59–0.99)	0.04
ACE inhibitor	59.9	63.7	0.86 (0.70–1.04)	0.12
Clopidogrel	64.0	63.3	1.14 (0.94–1.39)	0.18
Lipid-lowering agent	81.5	84.4	0.91 (0.69–1.19)	0.50

Data are presented as percentages. The ORs compare for-profit with nonprofit hospitals.
ACE = angiotensin-converting enzyme; other abbreviations as in Table 5.

Table 7 In-Hospital Outcomes

Outcome	For-Profit (n = 11,658)	Nonprofit (n = 133,699)	Adjusted OR (95% CI)	p Value
Death	5.1	4.7	1.00 (0.83–1.21)	0.99
Death or MI	7.4	6.9	1.12 (0.85–1.49)	0.42
Cardiogenic shock	2.5	2.8	0.90 (0.71–1.15)	0.40
RBC transfusion*	9.2	9.6	0.97 (0.80–1.18)	0.76
Major bleeding*†	10.0	9.9	1.06 (0.85–1.32)	0.60
LOS, days‡	5.8	5.7	1.01 (0.96–1.06)	0.68

Data are presented as percentages. The ORs compare for-profit to nonprofit hospitals. *In patients not receiving coronary artery bypass graft surgery; †major bleeding is defined as: 1) absolute hematocrit drop of ≥12% (baseline hematocrit − nadir hematocrit ≥12%); 2) intracranial hemorrhage stroke; 3) retroperitoneal witnessed bleeding event; 4) baseline hematocrit ≥28% and red blood cell (RBC) transfusion; and 5) baseline hematocrit <28% and RBC transfusion and witnessed bleeding event; ‡length of stay (LOS) is log transformed, and ratio of adjusted LOS reported.
MI = myocardial infarction; other abbreviations as in Table 5.

Hospital participation in the CRUSADE Initiative is voluntary, and hospitals in the program most likely self-select for those most interested in improving quality of care. Both the care and outcomes are self-reported, yet these data have been audited and validated (9). Furthermore, these data are not linked to external public or financial incentives; thus, sites have less motivation for false reporting.

Conclusions

We found that adjusted in-hospital outcomes for NSTEMI patients at for-profit hospitals were similar to nonprofit hospitals. Despite organizational differences that may exist in fiscal strategy and resource allocations, no differences were found in quality measures, in-hospital outcomes, or procedure utilization. We also could not find any care-shifting as these hospitals treated patients with more comorbidities, similar insurance status, and similar demographics as nonprofit hospitals. However, further studies are needed to evaluate whether patient characteristics, treatment patterns, and clinical outcomes differ at specialty cardiac hospitals and physician-owned hospitals.

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