

## Supplementary Online Content

Bruch JD, Gondi S, Song Z. Changes in hospital income, use, and quality associated with private equity acquisition. *JAMA Intern Med*. Published online August 24, 2020. doi:10.1001/jamainternmed.2020.3552

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This supplementary material has been provided by the authors to give readers additional information about their work.

**eTable 1. Private Equity Firm Hospital Acquisitions**

Private Equity Firm	Hospitals Acquired Between 2005–2017
Leonard Green & Partners	13
Bain Capital, Kohlberg, Kravis, Roberts & Co., Merrill Lynch Global Private Equity	135
GTCR	18
Cerberus Capital Management	15
Blackstone	11
BlueMountain Capital Management <sup>1</sup>	6
Goldman Sachs Capital Partners (Goldman Sachs)	5
Warburg Pincus	4
TPG Capital	2
Welsh, Carson, Anderson & Stowe	2
Apollo Global Management	1
CCMP Capital Advisors	1
Equity Group Investments	1
Sant Partners	1
ValorBridge Partners	1
Vestar Capital	1
<b>Total</b>	<b>217</b>

<sup>1</sup> BlueMountain Capital Management is a diversified alternative asset manager with private capital investments

**eTable 2. Medicare Cost Report Measures**

<b>Measure</b>	<b>Definition</b>
Net Income per Year (\$)	Total revenue – total expenses
Total Charge per Inpatient Day (\$)	Total inpatient charges / total inpatient days
Emergency Department Charge-to-Cost Ratio	Total charges associated with the emergency department / total costs associated with the emergency department
Total Charge-to-Cost Ratio	Total charges / total costs
Medicare Share of Discharges (%)	Medicare discharges / total discharges per year
Medicaid Share of Discharges (%)	Medicaid discharges / total discharges per year
Total Discharges per Year	All adult and pediatric discharges

**eTable 3. Missing Data for Outcome Measures**

<b>Measure</b>	<b>Missing Observations (%)</b>	<b>Total Observations</b>
Net Income per Year (\$)	72 (1.68)	4,278
Total Charge per Inpatient Day (\$)	71 (1.66)	4,278
Emergency Charge-to-Cost Ratio	71 (1.66)	4,278
Total Charge-to-Cost Ratio	71 (1.66)	4,278
Case Mix Index	79 (1.85)	4,278
Medicare Share of Discharges (%)	71 (1.66)	4,278
Medicaid Share of Discharges (%)	122 (2.85)	4,278
Total Discharges per Year	71 (1.66)	4,278
Quality Measures		
Heart Failure	299 (3.67)	8,158
Acute Myocardial Infarction	208 (7.97)	2,611
Pneumonia	1,325 (13.32)	9,951

**Table 4. Changes in Hospital Income and Use Measures (Excluding Washout Period Time -1 and Time 1)**

	Treatment Hospitals (N=204)			Control Hospitals (N=532)			Differential Change				
	Before Private Equity	After Private Equity	Change	Before Private Equity	After Private Equity	Change	Unadjusted <sub>1</sub>	Adjusted <sub>2</sub>	95% CI	P-Value	Corrected P-Value <sup>3</sup>
Net Income per Year (\$)	8,496,521	13,761,790	5,265,269	6,992,641	10,855,240	3,862,599	1,402,670	2,025,679	(313,020, 3,738,338)	0.02	0.23
Total Charge per Inpatient Day (\$)	5,583	8,048	2,466	5,410	7,115	1,704	761	447	(289, 605)	P<0.001	P<0.001**
Emergency Charge-to- Cost Ratio	3.70	5.92	2.22	3.87	5.18	1.31	0.91	0.79	(0.63, 0.95)	P<0.001	P<0.001**
Total Charge- to-Cost Ratio	4.09	5.15	1.06	3.83	4.45	0.62	0.43	0.36	(0.29, 0.43)	P<0.001	P<0.001**
Case Mix Index	1.41	1.47	0.06	1.36	1.42	0.05	0.01	0.02	(0.01, 0.03)	P<0.001	0.002**
Medicare Share of Discharges	40.73%	36.28%	-4.44%	39.26%	36.86%	-2.40%	-2.05%	-1.27%	(-1.93%, -0.60%)	P<0.001	0.002**
Medicaid Share of Discharges	13.36%	12.32%	-1.04%	15.18%	14.27%	-0.91%	-0.13%	-0.33%	(-1.24%, 0.58%)	0.48	1.00
Total Discharges per Year	8,912	9,274	361	8,489	8,313	-176	537	129	(-77, 334)	0.22	1.00

<sup>1</sup> Treated hospitals were matched to controls at time 0 (time of acquisition). R Package MatchIt was used to generate at most 8 controls per treated hospital. We used nearest neighbor matching on total beds and exact matching on year, ownership, region (Northeast, Midwest, South, and West), and teaching hospital status. Time -1 and Time 1 were dropped. The unadjusted model refers to the mixed effects model, which included a random intercept for the matched group and for the provider group, with no covariates. Values indicate means before and after private equity for treatment and control hospitals and were calculated using the unadjusted model.

<sup>2</sup> The adjusted model included a random intercept term for the matched group and for the provider group and adjusted for calendar year, case mix index, and total hospital beds. Case mix index was not included as a covariate when evaluated as an outcome.

<sup>3</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \**P*<.05, \*\**P*<.01

**eTable 5. Changes in Hospital Performance on Quality Measures (Excluding Washout Period Time -1 and Time 1)<sup>1</sup>**

	Treatment Hospitals (N=179)			Control Hospitals (N=404)			Differential Change				
	Before Private Equity	After Private Equity	Change	Before Private Equity	After Private Equity	Change	Unadjusted <sub>2</sub>	Adjusted <sub>3</sub>	95% CI	P-Value	Corrected P-Value <sup>4</sup>
Heart Failure <sup>5</sup>	73.1	95.5	22.5	75.7	91.3	15.6	6.9	0.8	(-1.1, 2.7)	0.40	1.00
Acute Myocardial Infarction <sup>6</sup>	88.5	97.5	9.1	90.2	93.8	3.6	5.5	4.3	(2.2, 6.4)	P<0.001	0.001**
Pneumonia <sup>7</sup>	70.7	97.1	26.3	75.5	93.1	17.5	8.8	3.2	(1.8, 4.7)	P<0.001	P<0.001**

<sup>1</sup> The aggregate quality measures are the weighted averages of individual measures within each condition category. Values correspond to the proportion (%) of eligible patients for a measure who met quality performance for the measure.

<sup>2</sup> Treated hospitals were matched to controls at time 0 (time of acquisition). R Package MatchIt was used to generate at most 8 controls per treated hospital. We used nearest neighbor matching on total beds and exact matching on year, ownership, region (Northeast, Midwest, South, and West), and teaching hospital status. Time -1 and Time 1 were dropped. The unadjusted model refers to the mixed effects model, which included a random intercept for the matched group and for the provider group, with no covariates. Values indicate means before and after private equity for treatment and control hospitals and were calculated using the unadjusted model.

<sup>3</sup> The adjusted model included a random intercept term for the matched group and for the provider group and adjusted for calendar year, case mix index, and total hospital beds.

<sup>4</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \**P*<.05, \*\**P*<.01

<sup>5</sup> Heart Failure included Hf1 (2004-2014), Hf2 (2004-2015), and Hf3 (2004-2014). Hf1 represents patients with heart failure given discharge instructions. Hf2 represents patients with heart failure given an assessment of left ventricular function. Hf3 represents patients with heart failure given an ACE inhibitor or ARB for left ventricular systolic dysfunction.

<sup>6</sup> Acute Myocardial Infarction included Ami2 (2004-2014). Ami2 represents patients with an acute myocardial infarction given aspirin at discharge.

<sup>7</sup> Pneumonia included Pn2 (2004-2011), Pn3 (2004-2012), Pn5 (2004-2011), and Pn6 (2004-2015). Pn2 represents patients with pneumonia assessed and given pneumococcal vaccination. Pn3 represents patients with pneumonia who received a blood culture performed prior to first antibiotic received in hospital. Pn5 represents patients with pneumonia given initial antibiotic(s) within 4 hours after arrival. Pn6 represents patients with pneumonia given the most appropriate initial antibiotic(s).

**eTable 6. Changes in Hospital Income and Use Measures (Including Hospital Referral Region and Year Interactions)**

	Treatment Hospitals (N=204)			Control Hospitals (N=532)			Differential Change				
	Before Private Equity	After Private Equity	Change	Before Private Equity	After Private Equity	Change	Unadjusted <sub>1</sub>	Adjusted <sub>2</sub>	95% CI	P-Value	Corrected P-Value <sup>3</sup>
Net Income per Year (\$)	8,527,119	12,861,680	4,334,561	7,655,125	10,092,820	2,437,695	1,896,866	2,814,382	(642,694, 4,986,070)	0.01	0.12
Total Charge per Inpatient Day (\$)	5,789	7,766	1,978	5,583	6,928	1,345	633	351	(200, 503)	P<0.001	0.001**
Emergency Charge-to-Cost Ratio	3.81	5.52	1.71	4.00	5.03	1.02	0.69	0.63	(0.49, 0.76)	P<0.001	0.001**
Total Charge-to-Cost Ratio	4.17	5.02	0.85	3.90	4.38	0.48	0.37	0.38	(0.33, 0.44)	P<0.001	0.001**
Case Mix Index	1.42	1.47	0.05	1.36	1.41	0.05	0.00	0.02	(0.01, 0.03)	P<0.001	0.005**
Medicare Share of Discharges	40.28%	36.75%	-3.53%	39.09%	37.12%	-1.97%	-1.56%	-0.69%	(-1.27%, -0.13%)	0.09	0.98
Medicaid Share of Discharges	13.24%	12.24%	-1.00%	15.20%	14.27%	-0.93%	-0.07%	0.08%	(-0.68%, 0.82%)	0.87	1.00
Total Discharges per Year	8,948	9,181	233	8,504	8,353	-151	384	288	(100, 475)	0.03	0.37

<sup>1</sup> Treated hospitals were matched to controls at time 0 (time of acquisition). R Package MatchIt was used to generate at most 8 controls per treated hospital. We used nearest neighbor matching on total beds and exact matching on year, ownership, region (Northeast, Midwest, South, and West), and teaching hospital status. The unadjusted model refers to the mixed effects model, which included a random intercept for the matched group and for the provider group, with no covariates. Values indicate means before and after private equity for treatment and control hospitals and were calculated using the unadjusted model.

<sup>2</sup> The adjusted model included a random intercept term for the matched group and for the provider group and adjusted for case mix index, total hospital beds, and interactions between Hospital Referral Region and calendar year. Case mix index was not included as a covariate when evaluated as an outcome.

<sup>3</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \*P<.05, \*\*P<.01

**eTable 7. Changes in Hospital Performance on Quality (Including Hospital Referral Region and Year Interactions)<sup>1</sup>**

	Treatment Hospitals (N=179)			Control Hospitals (N=404)			Differential Change				
	Before Private Equity	After Private Equity	Change	Before Private Equity	After Private Equity	Change	Unadjusted <sub>2</sub>	Adjusted <sub>3</sub>	95% CI	P-Value	Corrected P-Value <sup>4</sup>
Heart Failure <sup>5</sup>	75.2	93.6	18.4	76.7	89.4	12.7	5.7	0.2	(-2.0, 2.6)	0.90	1.00
Acute Myocardial Infarction <sup>6</sup>	89.3	97.5	8.2	89.8	93.6	3.8	4.4	2.0	(-0.3, 4.1)	0.21	1.00
Pneumonia <sup>7</sup>	73.7	95.4	21.7	77.2	91.4	14.2	7.5	2.9	(1.4, 4.6)	0.001	0.02*

<sup>1</sup> The aggregate quality measures are the weighted averages of individual measures within each condition category. Values correspond to the proportion (%) of eligible patients for a measure who met quality performance for the measure.

<sup>2</sup> Treated hospitals were matched to controls at time 0 (time of acquisition). R Package MatchIt was used to generate at most 8 controls per treated hospital. We used nearest neighbor matching on total beds and exact matching on year, ownership, region (Northeast, Midwest, South, and West), and teaching hospital status. The unadjusted model refers to the mixed effects model, which included a random intercept for the matched group and for the provider group, with no covariates. Values indicate means before and after private equity for treatment and control hospitals and were calculated using the unadjusted model.

<sup>3</sup> The adjusted model included a random intercept term for the matched group and for the provider group and adjusted for case mix index, total hospital beds, and interactions between Hospital Referral Region and calendar year.

<sup>4</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \* $P < .05$ , \*\* $P < .01$

<sup>5</sup> Heart Failure included Hf1 (2004-2014), Hf2 (2004-2015), and Hf3 (2004-2014). Hf1 represents patients with heart failure given discharge instructions. Hf2 represents patients with heart failure given an assessment of left ventricular function. Hf3 represents patients with heart failure given an ACE inhibitor or ARB for left ventricular systolic dysfunction.

<sup>6</sup> Acute Myocardial Infarction included Ami2 (2004-2014). Ami2 represents patients with an acute myocardial infarction given aspirin at discharge.

<sup>7</sup> Pneumonia included Pn2 (2004-2011), Pn3 (2004-2012), Pn5 (2004-2011), and Pn6 (2004-2015). Pn2 represents patients with pneumonia assessed and given pneumococcal vaccination. Pn3 represents patients with pneumonia who received a blood culture performed prior to first antibiotic received in hospital. Pn5 represents patients with pneumonia given initial antibiotic(s) within 4 hours after arrival. Pn6 represents patients with pneumonia given the most appropriate initial antibiotic(s).



**eTable 8. Changes in Hospital Income and Use Measures (Removing Case Mix Index and Total Beds as Covariates)**

	Treatment Hospitals (N=204)			Control Hospitals (N=532)			Differential Change				
	Before Private Equity	After Private Equity	Change	Before Private Equity	After Private Equity	Change	Unadjusted <sub>1</sub>	Adjusted <sub>2</sub>	95% CI	P-Value	Corrected P-Value <sup>3</sup>
Net Income per Year (\$)	8,527,119	12,861,680	4,334,561	7,655,125	10,092,820	2,437,695	1,896,866	2,521,784	(1,184,866, 3,858,702)	P<0.001	P<0.001**
Total Charge per Inpatient Day (\$)	5,789	7,766	1,978	5,583	6,928	1,345	633	442	(332, 553)	P<0.001	P<0.001**
Emergency Charge-to- Cost Ratio	3.81	5.52	1.71	4.00	5.03	1.02	0.69	0.62	(0.50, 0.74)	P<0.001	P<0.001**
Total Charge- to-Cost Ratio	4.17	5.02	0.85	3.90	4.38	0.48	0.37	0.32	(0.27, 0.37)	P<0.001	P<0.001**
Case Mix Index	1.42	1.47	0.05	1.36	1.41	0.05	0.00	0.02	(0.01, 0.02)	P<0.001	0.004**
Medicare Share of Discharges	40.28%	36.75%	-3.53%	39.09%	37.12%	-1.97%	-1.56%	-0.93%	(-1.43%, -0.44%)	P<0.001	0.003**
Medicaid Share of Discharges	13.24%	12.24%	-1.00%	15.20%	14.27%	-0.93%	-0.07%	-0.19%	(-0.88%, 0.50%)	0.59	1.00
Total Discharges per Year	8,948	9,181	233	8,504	8,353	-151	384	171	(7, 335)	0.04	0.46

<sup>1</sup> Treated hospitals were matched to controls at time 0 (time of acquisition). R Package MatchIt was used to generate at most 8 controls per treated hospital. We used nearest neighbor matching on total beds and exact matching on year, ownership, region (Northeast, Midwest, South, and West), and teaching hospital status. The unadjusted model refers to the mixed effects model, which included a random intercept for the matched group and for the provider group, with no covariates. Values indicate means before and after private equity for treatment and control hospitals and were calculated using the unadjusted model.

<sup>2</sup> The adjusted model included a random intercept term for the matched group and for the provider group and adjusted for calendar year.

<sup>3</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \**P*<.05, \*\**P*<.01

**eTable 9. Changes in Hospital Performance on Quality Measures (Removing Case Mix Index and Total Beds as Covariates)<sup>1</sup>**

	Treatment Hospitals (N=179)			Control Hospitals (N=404)			Differential Change				
	Before Private Equity	After Private Equity	Change	Before Private Equity	After Private Equity	Change	Unadjusted <sub>2</sub>	Adjusted <sub>3</sub>	95% CI	P-Value	Corrected P-Value <sup>4</sup>
Heart Failure <sup>5</sup>	75.2	93.6	18.4	76.7	89.4	12.7	5.7	1.5	(0.0, 2.9)	0.04	0.42
Acute Myocardial Infarction <sup>6</sup>	89.3	97.5	8.2	89.8	93.6	3.8	4.4	3.4	(1.7, 5.1)	P<0.001	0.001**
Pneumonia <sup>7</sup>	73.7	95.4	21.7	77.2	91.4	14.2	7.5	2.9	(1.9, 3.9)	P<0.001	P<0.001**

<sup>1</sup> The aggregate quality measures are the weighted averages of individual measures within each condition category. Values correspond to the proportion (%) of eligible patients for a measure who met quality performance for the measure.

<sup>2</sup> Treated hospitals were matched to controls at time 0 (time of acquisition). R Package MatchIt was used to generate at most 8 controls per treated hospital. We used nearest neighbor matching on total beds and exact matching on year, ownership, region (Northeast, Midwest, South, and West), and teaching hospital status. The unadjusted model refers to the mixed effects model, which included a random intercept for the matched group and for the provider group, with no covariates. Values indicate means before and after private equity for treatment and control hospitals and were calculated using the unadjusted model.

<sup>3</sup> The adjusted model included a random intercept term for the matched group and for the provider group and adjusted for calendar year.

<sup>4</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \* $P < .05$ , \*\* $P < .01$

<sup>5</sup> Heart Failure included Hf1 (2004-2014), Hf2 (2004-2015), and Hf3 (2004-2014). Hf1 represents patients with heart failure given discharge instructions. Hf2 represents patients with heart failure given an assessment of left ventricular function. Hf3 represents patients with heart failure given an ACE inhibitor or ARB for left ventricular systolic dysfunction.

<sup>6</sup> Acute Myocardial Infarction included Ami2 (2004-2014). Ami2 represents patients with an acute myocardial infarction given aspirin at discharge.

<sup>7</sup> Pneumonia included Pn2 (2004-2011), Pn3 (2004-2012), Pn5 (2004-2011), and Pn6 (2004-2015). Pn2 represents patients with pneumonia assessed and given pneumococcal vaccination. Pn3 represents patients with pneumonia who received a blood culture performed prior to first antibiotic received in hospital. Pn5 represents patients with pneumonia given initial antibiotic(s) within 4 hours after arrival. Pn6 represents patients with pneumonia given the most appropriate initial antibiotic(s).

**eTable 10. Changes in Hospital Income and Use Measures (Matching on Pre-Intervention Outcomes)**

	Treatment Hospitals (N=200)			Control Hospitals (N=529)			Differential Change				
	Before Private Equity	After Private Equity	Change	Before Private Equity	After Private Equity	Change	Unadjusted 1	Adjusted 2	95% CI	P-Value	Corrected P-Value <sup>3</sup>
Net Income per Year (\$)	8,782,449	13,410,220	4,627,771	9,254,164	11,540,470	2,286,306	2,341,465	2,917,266	(1,504,451, 4,330,080)	P<0.001	0.001**
Total Charge per Inpatient Day (\$)	5,816	7,807	1,991	5,589	6,909	1,321	670	419	(310, 529)	P<0.001	P<0.001**
Emergency Charge-to- Cost Ratio	3.82	5.56	1.74	3.91	4.94	1.04	0.71	0.60	(0.48, 0.72)	P<0.001	P<0.001**
Total Charge- to-Cost Ratio	4.20	5.06	0.86	3.95	4.42	0.47	0.38	0.32	(0.27, 0.37)	P<0.001	P<0.001**
Case Mix Index	1.42	1.47	0.05	1.37	1.41	0.04	0.01	0.02	(0.01, 0.03)	P<0.001	P<0.001**
Medicare Share of Discharges	40.16%	36.69%	-3.48%	39.58%	37.71%	-1.88%	-1.60%	-0.90%	(-1.4%, -0.4%)	P<0.001	0.005**
Medicaid Share of Discharges	13.30%	12.20%	-1.10%	15.48%	14.47%	-1.01%	-0.09%	-0.08%	(-0.77%, 0.61%)	0.81	1.00
Total Discharges per Year	9,114	9,328	214	8,674	8,614	-59	273	79	( -70.22, 227.21)	0.30	1.00

<sup>1</sup> Treated hospitals were matched to controls at time 0 (time of acquisition). R Package MatchIt was used to generate at most 8 controls per treated hospital. we performed exact matching on year, ownership, region, and teaching status and performed nearest neighbor matching on net income, total inpatient charges per day, charge-to-cost ratio, case mix index, total proportion of discharges with public health insurance (Medicare and Medicaid discharges), and hospital discharges. The unadjusted model refers to the mixed effects model, which included a random intercept for the matched group and for the provider group, with no covariates. Values indicate means before and after private equity for treatment and control hospitals and were calculated using the unadjusted model.

<sup>2</sup> The adjusted model included a random intercept term for the matched group and for the provider group and adjusted for calendar year, case mix index, and total hospital beds. Case mix index was not included as a covariate when evaluated as an outcome.

<sup>3</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \**P*<.05, \*\**P*<.01

**eTable 11. Changes in Hospital Performance on Quality Measures (Matching on Pre-Intervention Outcomes)<sup>1</sup>**

	Treatment Hospitals (N=179)			Control Hospitals (N=391)			Differential Change				
	Before Private Equity	After Private Equity	Change	Before Private Equity	After Private Equity	Change	Unadjusted <sub>2</sub>	Adjusted <sub>3</sub>	95% CI	P-Value	Corrected P-Value <sup>4</sup>
Heart Failure <sup>5</sup>	74.9	93.6	18.7	75.3	88.5	13.2	5.5	0.9	(-0.6, 2.4)	0.24	1.00
Acute Myocardial Infarction <sup>6</sup>	89.1	97.4	8.3	89.1	93.3	4.2	4.1	2.9	(1.2, 4.7)	0.001	0.01*
Pneumonia <sup>7</sup>	73.6	95.2	21.6	76.1	90.5	14.4	7.3	2.7	(1.6, 3.7)	P<0.001	P<0.001**

<sup>1</sup> The aggregate quality measures are the weighted averages of individual measures within each condition category. Values correspond to the proportion (%) of eligible patients for a measure who met quality performance for the measure.

<sup>2</sup> Treated hospitals were matched to controls at time 0 (time of acquisition). R Package MatchIt was used to generate at most 8 controls per treated hospital. we performed exact matching on year, ownership, region, and teaching status and performed nearest neighbor matching on net income, total inpatient charges per day, charge-to-cost ratio, case mix index, total proportion of discharges with public health insurance (Medicare and Medicaid discharges), and hospital discharges. The unadjusted model refers to the mixed effects model, which included a random intercept for the matched group and for the provider group, with no covariates. Values indicate means before and after private equity for treatment and control hospitals and were calculated using the unadjusted model.

<sup>3</sup> The adjusted model included a random intercept term for the matched group and for the provider group and adjusted for calendar year, case mix index, and total hospital beds.

<sup>4</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \**P*<.05, \*\**P*<.01

<sup>5</sup> Heart Failure included Hf1 (2004-2014), Hf2 (2004-2015), and Hf3 (2004-2014). Hf1 represents patients with heart failure given discharge instructions. Hf2 represents patients with heart failure given an assessment of left ventricular function. Hf3 represents patients with heart failure given an ACE inhibitor or ARB for left ventricular systolic dysfunction.

<sup>6</sup> Acute Myocardial Infarction included Ami2 (2004-2014). Ami2 represents patients with an acute myocardial infarction given aspirin at discharge.

<sup>7</sup> Pneumonia included Pn2 (2004-2011), Pn3 (2004-2012), Pn5 (2004-2011), and Pn6 (2004-2015). Pn2 represents patients with pneumonia assessed and given pneumococcal vaccination. Pn3 represents patients with pneumonia who received a blood culture performed prior to first antibiotic received in hospital. Pn5 represents patients with pneumonia given initial antibiotic(s) within 4 hours after arrival. Pn6 represents patients with pneumonia given the most appropriate initial antibiotic(s).

**eTable 12. Changes in Hospital Income and Use Measures (Fixed Effects Model)**

	Treatment Hospitals (N=204)			Control Hospitals (N=532)			Differential Change				
	Before Private Equity	After Private Equity	Change	Before Private Equity	After Private Equity	Change	Unadjusted <sub>1</sub>	Adjusted <sub>2</sub>	95% CI	P-Value	Corrected P-Value <sup>3</sup>
Net Income per Year (\$)	8,503,044	12,859,980	4,356,936	7,405,023	8,779,318	1,374,295	2,982,639	2,322,593	(976541, 3668645)	0.02	0.17
Total Charge per Inpatient Day (\$)	5,789	7,692	1,903	5,437	6,971	1,534	369	420	(308, 531)	P<0.001	0.001**
Emergency Charge-to-Cost Ratio	3.81	5.44	1.63	3.97	5.16	1.19	0.43	0.60	(0.48, 0.72)	P<0.001	P<0.001**
Total Charge-to-Cost Ratio	4.17	4.98	0.82	4.00	4.56	0.55	0.27	0.32	(0.26, 0.37)	P<0.001	P<0.001**
Case Mix Index	1.42	1.46	0.05	1.36	1.40	0.04	0.01	0.02	(0.01, 0.02)	0.04	0.40
Medicare Share of Discharges	40.25%	36.73%	-3.51%	39.64%	37.04%	-2.60%	-0.92%	-0.99%	(-1.49%, -0.49%)	0.03	0.33
Medicaid Share of Discharges	13.21%	12.24%	-0.97%	16.45%	15.69%	-0.75%	-0.22%	-0.22%	(-0.92%, 0.48%)	0.72	1.00
Total Discharges per Year	8,949	9,245	296	8,129	8,135	6	290	121	(-30, 272)	0.35	1.00

<sup>1</sup> Treated hospitals were matched to controls at time 0 (time of acquisition). R Package MatchIt was used to generate at most 8 controls per treated hospital. We used nearest neighbor matching on total beds and exact matching on year, ownership, region (Northeast, Midwest, South, and West), and teaching hospital status. Within matched groups, we weighted each target as one and assigned controls weights that summed to one. The unadjusted difference is the weighted arithmetic difference-in-differences or the change from before private equity to after private equity for the control hospitals subtracted from the change from before private equity to after private equity for the treatment hospitals

<sup>2</sup> The adjusted model included fixed effects for the matched group and for the provider group and adjusted for calendar year, case mix index, and total beds. Standard errors were clustered at the provider group level.

<sup>3</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \*P<.05, \*\*P<.01

**eTable 13. Changes in Hospital Performance on Quality Measures (Fixed Effects Model)<sup>1</sup>**

	Treatment Hospitals (N=179)			Control Hospitals (N=404)			Differential Change				
	Before Private Equity	After Private Equity	Change	Before Private Equity	After Private Equity	Change	Unadjusted <sub>2</sub>	Adjusted <sub>3</sub>	95% CI	P-Value	Corrected P-Value <sup>4</sup>
Heart Failure <sup>5</sup>	75.3	93.2	17.9	74.6	90.1	15.5	2.4	1.3	(-0.1, 2.8)	0.21	1.00
Acute Myocardial Infarction <sup>6</sup>	89.1	97.5	8.4	88.3	93.5	5.1	3.2	2.9	(1.2, 4.6)	0.01	0.13
Pneumonia <sup>7</sup>	73.6	94.1	20.5	75.0	91.7	16.6	3.9	2.7	(1.7, 3.8)	P<0.001	0.004**

<sup>1</sup> The aggregate quality measures are the weighted averages of individual measures within each condition category. Values correspond to the proportion (%) of eligible patients for a measure who met quality performance for the measure.

<sup>2</sup> Treated hospitals were matched to controls at time 0 (time of acquisition). R Package MatchIt was used to generate at most 8 controls per treated hospital. We used nearest neighbor matching on total beds and exact matching on year, ownership, region (Northeast, Midwest, South, and West), and teaching hospital status. Within matched groups, we weighted each target as one and assigned controls weights that summed to one. The unadjusted difference is the weighted arithmetic difference-in-differences or the change from before private equity to after private equity for the control hospitals subtracted from the change from before private equity to after private equity for the treatment hospitals

<sup>3</sup> The adjusted model included fixed effects for the matched group and for the provider group and adjusted for calendar year, case mix index, and total beds. Standard errors were clustered at the provider group level.

<sup>4</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \**P*<.05, \*\**P*<.01

<sup>5</sup> Heart Failure included Hf1 (2004-2014), Hf2 (2004-2015), and Hf3 (2004-2014). Hf1 represents patients with heart failure given discharge instructions. Hf2 represents patients with heart failure given an assessment of left ventricular function. Hf3 represents patients with heart failure given an ACE inhibitor or ARB for left ventricular systolic dysfunction.

<sup>6</sup> Acute Myocardial Infarction included Ami2 (2004-2014). Ami2 represents patients with an acute myocardial infarction given aspirin at discharge.

<sup>7</sup> Pneumonia included Pn2 (2004-2011), Pn3 (2004-2012), Pn5 (2004-2011), and Pn6 (2004-2015). Pn2 represents patients with pneumonia assessed and given pneumococcal vaccination. Pn3 represents patients with pneumonia who received a blood culture performed prior to first antibiotic received in hospital. Pn5 represents patients with pneumonia given initial antibiotic(s) within 4 hours after arrival. Pn6 represents patients with pneumonia given the most appropriate initial antibiotic(s).

**eTable 14. Differences in Pre-Acquisition Trends <sup>1</sup>**

	Interaction Between Treatment and Time -2 Estimate (95% CI; P-value; Corrected P-value)	Interaction Between Treatment and Time -1 Estimate (95% CI; P-value; Corrected P-value)	<i>F</i> (P-value; Corrected P-value) <sup>2</sup>
Net Income per Year (\$)	-1,174,554 (-3,443,630, 1,094,522; 0.31; 1.00)	-2,372,650 (-4,665,191, -80,109; 0.04; 0.47)	4.12 (0.13; 1.00)
Total Charge per Inpatient Day (\$)	-7 (-194,179; 0.94; 1.00)	96 (-93,285; 0.32; 1.00)	1.41 (0.49; 1.00)
Emergency Charge-to-Cost Ratio	0.02 (-0.18,0.22; 0.87; 1.00)	0.03 (-0.17,0.24; 0.74; 1.00)	0.11 (0.95; 1.00)
Total Charge-to-Cost Ratio	0.04 (-0.05,0.13; 0.39; 1.00)	0.07 (-0.03,0.16; 0.16; 1.00)	2.03 (0.36; 1.00)
Case Mix Index	0 (-0.02, 0.01; 0.57; 1.00)	0.01 (-0.01, 0.02; 0.48; 1.00)	1.59 (0.45; 1.00)
Medicare Share of Discharges (%)	-0.63 (-1.46, 0.21; 0.14; 1.00)	-0.99 (-1.83, - .14; 0.02; 0.25)	5.33 (0.07; 0.77)
Medicaid Share of Discharges (%)	0.47 (-0.71, 1.64; 0.44; 1.00)	-0.17 (-1.35, 1.02; 0.78; 1.00)	1.18 (0.56; 1.00)
Total Discharges per Year	-54 (-310, 202; 0.68; 1.00)	-99 (-358,159; 0.45; 1.00)	0.56 (0.75; 1.00)
Heart Failure	--	-1.2 (-3.4, 1.0; 0.29; 1.00)	--
Acute Myocardial Infarction	--	0.8 (-1.9, 3.4; 0.56; 1.00)	--
Pneumonia	--	0.1 (-1.4,1.7; 0.87;1.00)	--

<sup>1</sup> We tested for differences in pre-acquisition trends between the treatment hospitals and control hospitals by performing joint *F*-tests of the hypothesis that pre-intervention interactions between the treatment and *time* indicators are zero for *time* -2 and -1 (*time* -3 acts as reference) for hospital income and use outcomes. For quality measures, we tested if the interaction between treatment and *time* -1 (*time* -2 acts as reference) was zero.

$$Outcome_{ijk} = \alpha + \tau(Treatment)_{jk} + \sum \theta(Time)_{ijk} + \sum \beta(Treatment * Time)_{ijk} + \omega(Case\ Mix\ Index)_{ijk} + \omega(Total\ Beds)_{ijk} + v_{jk} + \gamma_k + \varepsilon_{ijk}$$

In this model, Outcome denotes an outcome of interest such as total hospital discharges or quality measure for year *i* in hospital *j* in matched group *k*. The adjusted difference-in-difference estimates are denoted by the coefficients  $\beta$  on the interaction term Treatment\*Time. *v* is the random intercept for each provider group and  $\gamma$  is the random intercept for each matched group.

<sup>2</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \**P*<.05, \*\**P*<.01

**eTable 15. Characteristics of HCA Acquired Hospitals and Non-HCA Acquired Hospitals<sup>1</sup>**

	HCA Acquired Hospitals (N=129)	Non-HCA Acquired Hospitals (N=75)
Hospital Ownership		
Nonprofit	2%	49.30%
Government	0%	7.51%
For-Profit	98%	43.19%
Geographic Region	--	--
South	75.60%	40.38%
West	17.24%	17.84%
Northeast	1.59%	24.88%
Midwest	5.57%	16.90%
Size	--	--
Small	27.06%	34.27%
Medium	58.36%	52.11%
Large	14.59%	13.62%
Teaching Hospital	22.55%	38.50%
Net Income per Year (\$)	13,230,630	779,463
Total Charge per Inpatient Day (\$)	5,501	6,239
Emergency Charge-to-Cost Ratio	3.36	4.58
Total Charge-to-Cost Ratio	4.24	4.06
Case Mix Index	1.43	1.39
Medicare Share of Discharges	39.99%	40.93%
Medicaid Share of Discharges	12.14%	15.39%
Total Discharges per Year	10,120	7,179

<sup>1</sup> Averages were calculated using data from years prior to acquisition (Time -3, Time -2, and Time -1). For the purposes of this table, we show hospital by size. Hospitals with total beds under 150 were classified as small in size, hospitals with total beds 150-350 were classified as medium in size, and hospitals with 351 beds or greater were classified as large in size.



**eTable 16. Changes in Hospital Income and Use Measures (HCA Hospitals)**

	Treatment Hospitals (N=129)			Control Hospitals (N=176)			Differential Change				
	Before Private Equity	After Private Equity	Change	Before Private Equity	After Private Equity	Change	Unadjusted <sub>1</sub>	Adjusted <sub>2</sub>	95% CI	P-Value	Corrected P-Value <sup>3</sup>
Net Income per Year (\$)	13,100,080	17,522,650	4,422,570	6,928,473	7,664,925	736,452	3,686,118	3,518,868	(2,131,697, 4,906,040)	P<0.001	P<0.001**
Total Charge per Inpatient Day (\$)	5,506	7,971	2,465	5,031	6,642	1,611	854	811	(681, 942)	P<0.001	P<0.001**
Emergency Charge-to- Cost Ratio	3.36	5.29	1.93	3.64	4.80	1.16	0.77	0.81	(0.64, 0.97)	P<0.001	P<0.001**
Total Charge- to-Cost Ratio	4.23	5.24	1.01	4.00	4.53	0.53	0.48	0.48	(0.42, 0.55)	P<0.001	P<0.001**
Case Mix Index	1.43	1.47	0.04	1.33	1.36	0.02	0.02	0.03	(0.02, 0.04)	P<0.001	P<0.001**
Medicare Share of Discharges	39.85%	35.80%	-4.04%	41.32%	37.93%	-3.40%	-0.64%	-0.58%	(-1.3%, 0.14%)	0.12	1.00
Medicaid Share of Discharges	12.03%	11.13%	-0.90%	17.03%	16.37%	-0.67%	-0.23%	-0.13%	(-1.0%, 0.73%)	0.76	1.00
Total Discharges per Year	10,052	10,567	515	7,728	7,877	150	365	308	(74, 542)	0.01	0.12

<sup>1</sup> Treated hospitals were matched to controls at time 0 (time of acquisition). R Package MatchIt was used to generate at most 8 controls per treated hospital. We used nearest neighbor matching on total beds and exact matching on year, ownership, region (Northeast, Midwest, South, and West), and teaching hospital status. Only HCA hospitals were included. The unadjusted model refers to the mixed effects model, which included a random intercept for the matched group and for the provider group, with no covariates. Values indicate means before and after private equity for treatment and control hospitals and were calculated using the unadjusted model.

<sup>2</sup> The adjusted model included a random intercept term for the matched group and for the provider group and adjusted for calendar year, case mix index, and total hospital beds. Case mix index was not included as a covariate when evaluated as an outcome.

<sup>3</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \*P<.05, \*\*P<.01

**eTable 17. Changes in Hospital Performance on Quality Measures (HCA Hospitals)<sup>1</sup>**

	Treatment Hospitals (N=129)			Control Hospitals (N=175)			Differential Change				
	Before Private Equity	After Private Equity	Change	Before Private Equity	After Private Equity	Change	Unadjusted <sub>2</sub>	Adjusted <sub>3</sub>	95% CI	P-Value	Corrected P-Value <sup>4</sup>
Heart Failure <sup>5</sup>	71.3	93.9	22.6	70.2	88.5	18.3	4.3	3.2	(1.2, 5.3)	0.002	0.02*
Acute Myocardial Infarction <sup>6</sup>	89.0	98.1	9.1	88.0	92.9	4.9	4.2	4.1	(2.0, 6.3)	P<0.001	0.002**
Pneumonia <sup>7</sup>	69.4	94.4	25.0	70.8	90.9	20.2	4.8	3.8	(2.4, 5.2)	P<0.001	P<0.001**

<sup>1</sup> The aggregate quality measures are the weighted averages of individual measures within each condition category. Values correspond to the proportion (%) of eligible patients for a measure who met quality performance for the measure.

<sup>2</sup> Treated hospitals were matched to controls at time 0 (time of acquisition). R Package MatchIt was used to generate at most 8 controls per treated hospital. We used nearest neighbor matching on total beds and exact matching on year, ownership, region (Northeast, Midwest, South, and West), and teaching hospital status. Only HCA hospitals were included. The unadjusted model refers to the mixed effects model, which included a random intercept for the matched group and for the provider group, with no covariates. Values indicate means before and after private equity for treatment and control hospitals and were calculated using the unadjusted model.

<sup>3</sup> The adjusted model included a random intercept term for the matched group and for the provider group and adjusted for calendar year, case mix index, and total hospital beds.

<sup>4</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \* $P < .05$ , \*\* $P < .01$

<sup>5</sup> Heart Failure included Hf1 (2004-2014), Hf2 (2004-2015), and Hf3 (2004-2014). Hf1 represents patients with heart failure given discharge instructions. Hf2 represents patients with heart failure given an assessment of left ventricular function. Hf3 represents patients with heart failure given an ACE inhibitor or ARB for left ventricular systolic dysfunction.

<sup>6</sup> Acute Myocardial Infarction included Ami2 (2004-2014). Ami2 represents patients with an acute myocardial infarction given aspirin at discharge.

<sup>7</sup> Pneumonia included Pn2 (2004-2011), Pn3 (2004-2012), Pn5 (2004-2011), and Pn6 (2004-2015). Pn2 represents patients with pneumonia assessed and given pneumococcal vaccination. Pn3 represents patients with pneumonia who received a blood culture performed prior to first antibiotic received in hospital. Pn5 represents patients with pneumonia given initial antibiotic(s) within 4 hours after arrival. Pn6 represents patients with pneumonia given the most appropriate initial antibiotic(s).

**eTable 18. Changes in Hospital Income and Use Measures (Non-HCA Hospitals)**

	Treatment Hospitals (N=75)			Control Hospitals (N=356)			Differential Change				
	Before Private Equity	After Private Equity	Change	Before Private Equity	After Private Equity	Change	Unadjusted <sub>1</sub>	Adjusted <sub>2</sub>	95% CI	P-Value	Corrected P-Value <sup>3</sup>
Net Income per Year (\$)	635,419	4,647,100	4,011,682	7,717,497	11,065,790	3,348,293	663,389	324,424	(-2,072,452, 2,721,300)	0.79	1.00
Total Charge per Inpatient Day (\$)	6285	7266	981	5992	7195	1203	-222	-252	(-433, -72)	0.006	0.07
Emergency Charge-to- Cost Ratio	4.60	5.86	1.26	4.34	5.28	0.95	0.31	0.30	(0.12, 0.48)	0.001	0.02*
Total Charge- to-Cost Ratio	4.08	4.61	0.53	3.78	4.24	0.46	0.08	0.07	(-0.02, 0.15)	0.13	1.00
Case Mix Index	1.39	1.46	0.07	1.39	1.45	0.06	0.00	0.00	(-0.01, 0.02)	0.74	1.00
Medicare Share of Discharges	41.02%	38.55%	-2.47%	37.56%	36.36%	-1.20%	-1.27%	-1.15%	(-1.88%, -0.43%)	0.002	0.02*
Medicaid Share of Discharges	15.33%	14.18%	-1.15%	13.95%	12.86%	-1.08%	-0.07%	-0.12%	(-1.26%, 1.02%)	0.84	1.00
Total Discharges per Year	7,053	6,699	-354	8,675	8,364	-311	-43	-164	(-371, 42)	0.12	1.00

<sup>1</sup> Treated hospitals were matched to controls at time 0 (time of acquisition). R Package MatchIt was used to generate at most 8 controls per treated hospital. We used nearest neighbor matching on total beds and exact matching on year, ownership, region (Northeast, Midwest, South, and West), and teaching hospital status. Only non-HCA hospitals were included. The unadjusted model refers to the mixed effects model, which included a random intercept for the matched group and for the provider group, with no covariates. Values indicate means before and after private equity for treatment and control hospitals and were calculated using the unadjusted model.

<sup>2</sup> The adjusted model included a random intercept term for the matched group and for the provider group and adjusted for calendar year, case mix index, and total hospital beds. Case mix index was not included as a covariate when evaluated as an outcome.

<sup>3</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \* $P < .05$ , \*\* $P < .01$

**eTable 19. Changes in Hospital Performance on Quality Measures (Non-HCA Hospitals)<sup>1</sup>**

	Treatment Hospitals (N=50)			Control Hospitals (N=229)			Differential Change				
	Before Private Equity	After Private Equity	Change	Before Private Equity	After Private Equity	Change	Unadjusted <sub>2</sub>	Adjusted <sub>3</sub>	95% CI	P-Value	Corrected P-Value <sup>4</sup>
Heart Failure <sup>5</sup>	86.2	91.5	5.3	83.8	91.9	8.1	-2.8	-3.3	(-5.3, -1.3)	0.001	0.01*
Acute Myocardial Infarction <sup>6</sup>	90.1	95.4	5.3	91.8	94.7	2.9	2.4	2.4	(-0.7, 5.4)	0.13	1.00
Pneumonia <sup>7</sup>	85.8	94.8	9.0	85.7	94.1	8.4	0.6	0.2	(-1.4, 1.7)	0.85	1.00

<sup>1</sup> The aggregate quality measures are the weighted averages of individual measures within each condition category. Values correspond to the proportion (%) of eligible patients for a measure who met quality performance for the measure.

<sup>2</sup> Treated hospitals were matched to controls at time 0 (time of acquisition). R Package MatchIt was used to generate at most 8 controls per treated hospital. We used nearest neighbor matching on total beds and exact matching on year, ownership, region (Northeast, Midwest, South, and West), and teaching hospital status. Only non-HCA hospitals were included. The unadjusted model refers to the mixed effects model, which included a random intercept for the matched group and for the provider group, with no covariates. Values indicate means before and after private equity for treatment and control hospitals and were calculated using the unadjusted model.

<sup>3</sup> The adjusted model included a random intercept term for the matched group and for the provider group and adjusted for calendar year, case mix index, and total hospital beds.

<sup>4</sup> We use the Bonferroni Correction to correct for multiple comparisons testing. \* $P < .05$ , \*\* $P < .01$

<sup>5</sup> Heart Failure included Hf1 (2004-2014), Hf2 (2004-2015), and Hf3 (2004-2014). Hf1 represents patients with heart failure given discharge instructions. Hf2 represents patients with heart failure given an assessment of left ventricular function. Hf3 represents patients with heart failure given an ACE inhibitor or ARB for left ventricular systolic dysfunction.

<sup>6</sup> Acute Myocardial Infarction included Ami2 (2004-2014). Ami2 represents patients with an acute myocardial infarction given aspirin at discharge.

<sup>7</sup> Pneumonia included Pn2 (2004-2011), Pn3 (2004-2012), Pn5 (2004-2011), and Pn6 (2004-2015). Pn2 represents patients with pneumonia assessed and given pneumococcal vaccination. Pn3 represents patients with pneumonia who received a blood culture performed prior to first antibiotic received in hospital. Pn5 represents patients with pneumonia given initial antibiotic(s) within 4 hours after arrival. Pn6 represents patients with pneumonia given the most appropriate initial antibiotic(s).