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Cover Page Footnote

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Abstract

This paper uses patient responses to the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey for three years (2009-2011) from 1,333 acute-care hospitals in fourteen states to analyze patterns in 10 hospital-reported patient experience-of-care scores by 29 characteristics classified as: patient characteristics, payer source, patient severity, hospital characteristics, hospital operations, and market characteristics. We also evaluate how scores have changed over the three-year period. We find significant differences in patient experience-of-care scores by hospital characteristics for 250 out of 290 HCAHPS-hospital characteristic combinations measured. We find fewer significant differences in changes in scores from 2009-2011 (135 out of 290), with hospitals categorized as high scoring also reporting consistently greater improvement. We conclude that patient experience-of-care scores vary by hospital characteristics, although improvements in scores show less variety by hospital categorization.

Keywords

Patient hospital experience, patient satisfaction, value-based purchasing, HCAHPS, hospital quality of care, Affordable Care Act

Note

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Background

There is a growing focus in the U.S. health care system on providing high value care for patients.¹⁻⁴ Part of achieving value for patients is the provision of patient-centered care, defined as “health care that establishes a partnership among practitioners, patients, and their families (when appropriate) to ensure that decisions respect patients’ wants, needs, and preferences and that patients have the education and support they need to make decisions and participate in their own care,” and included by the Institute of Medicine (IOM) as one of six aims for improving quality in health care.^{5,6}

One way of measuring the quality of patient centered care is through patient experience-of-care scores collected through the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey. HCAHPS was designed to: 1) produce comparable data across hospitals on patients’ perspectives on their care; 2) create incentives for hospitals to improve the quality of care provided; and 3) increase transparency in health care.⁷ The survey was first voluntarily implemented in October 2006. By FY 2008, HCAHPS score reporting became tied to the Annual Payment Update (APU) for Inpatient Prospective Payment

System hospitals, with failure to report resulting in an APU reduction of up to 2%.⁸

Beyond receiving APUs conditional upon reporting the HCAHPS data, hospitals now receive increased payment associated with high scores on HCAHPS measures. Enacted by the Affordable Care Act (ACA) in 2010, Medicare's Hospital Value Based Purchasing (VBP) program incentivizes high value care through payment reform.^{4,9} Under VBP, performance on HCAHPS measures accounts for 30% of the payment incentive formula for participating hospitals in FY 2013-2015.¹⁰ There has been debate over the inclusion of patient satisfaction measures in the VBP formula, as initial data was limited as to whether patient satisfaction is an accurate measure of true hospital quality. However, a growing body of literature is finding correlations between patient experience and a variety of quality measures ranging from surgical outcomes to hospital acquired infections to diagnosis-specific process measures.¹¹⁻¹⁵

In addition to the relationship between HCAHPS scores and other measures of quality, numerous studies have found significant relationships between HCAHPS scores and a variety of hospital characteristics, including safety-net status and patient characteristics.^{16,17} Other studies have focused on the relationships between the broader VBP scores and hospital characteristics or hospital quality measures.⁹ While this literature is becoming more robust, most existing studies report relationships for a limited number of publicly available patient or hospital characteristics. One prior study on the factors affecting patients' experience of hospital care in California investigated the relationship between 29 hospital characteristics and 10 HCAHPS scores. It found significant relationships between these hospital characteristics and the HCAHPS scores for 41-79% of comparisons. High performing hospitals tended to be private non-profit, affiliated with a medical school or the Council of Teaching hospitals, in a centralized or moderately centralized health system, medium sized, operating in a moderately or fully competitive market, high-cost, with high nurse-to-bed ratios and more white patients.¹⁸

As initial research identified variation in HCAHPS scores by region, there is reason to believe that relationships between hospital characteristics and HCAHPS scores in California may not be representative of the nation as a whole.¹⁹ Therefore, we seek to build on the existing literature by investigating 290 relationships between a series of 29 hospital characteristics and 10 HCAHPS patient experience-of-care scores across a sample of hospitals from 14 states.

Data and Methodology

Data

The measures used in this study were selected to allow for a broad classification of hospitals according to key features including patient characteristics, market characteristics, hospital structure and ownership, and hospital operations. Our conceptual framework is modeled on prior work and on Donabedian's early research on health care quality, which identified the importance of structures and processes in hospital performance.^{18,20-22} We expect that these process measures also influence patient satisfaction, and therefore will be associated with experience-of-care scores. Specific to patient-centered care, Shaller expanded the Donabedian model to include market characteristics, which have been shown to have a statistically significant effect on patient experiences.^{5,23} The hospital classification measures reported in this study are consistent with prior organizational and hospital research and policy analysis.^{18,20,21,24,25}

We linked 4 data sets to create our database of hospital-level data for 14 states (AZ, AR, CA, CO, FL, IA, MD, MA, NJ, NY, NC, RI, UT, WA) from 2009-2011: HCAHPS experience-of-care scores from the Centers for Medicare & Medicaid Services (CMS) Hospital Compare data; patient characteristics from the U.S. Agency for Healthcare Research and Quality's (AHRQ) Healthcare Cost and Utilization Project State Inpatient Database (HCUP-SIDs); hospital characteristics from the American Hospital Association's (AHA) Annual Survey Database; and market characteristics from the Area Resource File (ARF) from the Health Resources and Services Administration (HRSA).²⁶⁻²⁹ In 2009, our hospital database represented 31% of all the nation's hospitals and 42% of all inpatient discharges.²⁶ HCAHPS experience-of-care scores are taken from Hospital Compare.²⁹ Measures of patient and hospital characteristics including average age, percent female, race/ethnicity, payer source, average number of procedures and diagnoses, and length of stay were collected from HCUP-SIDS and aggregated to the hospital-year level.²⁶ All data on hospital ownership, size, teaching status, systems, location, staffing, and expenses were collected from the AHA Annual Survey and again aggregated to the hospital-year level.²⁸ Finally, market competition was measured for each hospital using data from the ARF.³⁰

Dependent Variables

The dependent variables for this analysis are 10 patient experience-of-care scores from the HCAHPS survey reported through the Hospital Compare database.^{27,29} HCAHPS data are currently available for about 3,900 hospitals, almost 90% of eligible hospitals.⁸

HCAHPS is administered in four modes (mail only, telephone only, mail with telephone follow-up, and active

interactive voice response), takes approximately 7 minutes to complete, and is conducted between 48 hours and 6 weeks after discharge. The basic sampling procedure of HCAHPS is the drawing of a random sample of eligible discharges from a hospital on a monthly basis. Discharges are eligible for individuals who: were 18 years or older at time of admission; had at least one overnight inpatient stay in the hospital; received a non-psychiatric principal diagnosis at discharge; and were alive at the time of discharge. Otherwise eligible patients are excluded if they: were discharged into hospice care, nursing homes, or skilled nursing facilities; were prisoners; had a foreign home address; or were "no-publicity" patients. Survey results are adjusted for patient-mix and mode of data collection, but not for race nor for ethnicity.⁷

The survey consists of 27 items used to construct 10 publicly reported measures; these 10 measures are our dependent variables and include: 6 composite measures ("Hospital staff was responsive", "Doctors always communicated well", "Nurses always communicated well", "Always communicated about medications", "Always communicated about discharge information", and "Pain was always well controlled"); 2 individual items ("Rooms were always quiet" and "Rooms were always clean"); and 2 global ratings ("High overall hospital rating" and "Would definitely recommend hospital to family and friends"). Top-box scores, the percent of surveyed patients who responded "always" or "yes" to a question, are reported for each measure.⁸

Independent Variables

In order to investigate the relationship between HCAHPS patient experience-of-care scores and a variety of hospital characteristics, we selected 29 key independent variable, classified into 5 groups: (1) patient characteristics; (2) payer source & patient severity; (3) hospital characteristics; (4) hospital operations; and (5) market characteristics. These variables were selected based on our conceptual framework and a review of prior literature.^{5,16-19,21,22,31,32}

To capture differences by patient characteristics, we categorized hospitals according to 7 measures: age; (female) gender; white race/ethnicity; black race/ethnicity; Hispanic race/ethnicity; Asian race/ethnicity; and other race/ethnicity. To capture differences by payer source & patient severity, we categorized hospitals according to 7 measures: Medicare payer source; Medicaid payer source; private/HMO payer source; other payer source; mean number of diagnoses; mean number of procedures; and mean number of chronic conditions.

To capture differences by hospital organization and structure, we categorized hospitals according to 10 measures: ownership (government, private not-for-profit, religious, or for-profit); size (<100 beds, 100-199 beds, 200-299 beds, or 300+ beds), teaching status (no teaching,

medical school, interns & residents, membership in the Council of Teaching Hospitals); hospital system (none, centralized, centralized physician/insurance, moderately centralized, decentralized, or independent); percent of hospital staff with an MD; percent of hospital staff with a nursing degree; physicians per bed; nurses per bed; electronic medical record status (none, fully implemented, partially implemented); and location (urban or rural).

To capture differences by hospital operations, we categorized hospitals according to 3 measures: mean total charges; mean total costs; and mean length of stay. To capture differences by market characteristics, we categorized hospitals according to 2 measures: median household income and competition both measured at hospital referral region (HRR) level. The Dartmouth Atlas defines these HRRs as regional market areas for tertiary medical care. Each HRR contains at least one hospital that performs major cardiovascular procedures and neurosurgery.³³ Consistent with prior work, we used the Herfindahl-Hirschman Index (HHI) with Federal Trade Commission (FTC) definitions of concentration to measure market competition, calculated as the sum of the squared market shares of all hospitals in a given local market.¹⁸ This results in market competition reported as unconcentrated, moderately concentrated, or highly concentrated.

Analytic Methodology

We use quartile analysis to compare hospital-level characteristics with patient experience-of-care scores reported at the hospital level. This analytic method divides an array of data into four equally sized sections (quartiles) and allows for the comparison across categories.^{34,35} For most independent variables, hospitals were sorted into three categories: high (top quartile for the measure); medium (middle two quartiles for the measure); and low (bottom quartile for the measure). For structural variables where quartile analysis would have been less meaningful (ownership, size, teaching status, hospital system, EMR status, location, and competition), we used categorical analysis and broke down data into 2-6 categories specific to each variable.

We compared mean patient experience-of-care scores across hospital groups. For most variables, we compared the mean scores across high, medium, and low categorized hospitals for each measure. For categorically constructed variables, we compared mean scores across all categories for a variable. We also compared the three-year change in scores from 2009-2011 across hospital groups. This change was calculated as the single difference between 2011 HCAHPS scores and 2009 scores and is a continuous variable ranging from -100 to 1500 percent change in HCAHPS score. For all comparisons, we tested significance using analysis of variance and reported p-values. As with prior work investigating on the relationship

between hospital characteristics and patient experience-of-care scores, although our analysis is built on a comparative research framework, our results are primarily descriptive.¹⁸

Results

Hospital Characteristics

Table 1 presents the means, standard deviations, and inter-quartile ranges of experience-of-care scores and patient and hospital characteristics for 1,333 hospitals in the 14 states. Across all states, the majority of patients gave their hospital high ratings. The fewest patients, 54.4 percent, reported that “rooms were always quiet,” while the most

patients, 81.8%, reported that their hospital “always communicated about discharge information.” The hospitals in these data provide a diverse sample of patient, hospital, and HSR/HSA characteristics. The average age at time of visit was 52.8 years and 57% of patients were female. The mean race/ethnicity of patients was 71% white, 10% black, 13% Hispanic, 2.5% Asian, and 3% other race. Medicare was the primary payer for 44% of patients, followed by 28% private insurance, 19% Medicaid, and 9% other payment source. The mean number of chronic conditions was 4, mean number of diagnoses was 8.4, and mean number of procedures was 1.3.

Table 1: Hospital Means, Standard Deviations, and Inter-Quartile Ranges for High and Low Designations

	Mean	Standard Deviation	Inter-Quartile Range Definitions		# of Hospitals
			Low <25	High >75	
<u>HCAHPS - Patients' Experience of Care Scores</u>					
High overall hospital rating	66.06%	7.88%	--	--	1333
Would definitely recommend hospital to family and friends	68.82%	8.06%	--	--	1333
Hospital staff was responsive	61.85%	7.80%	--	--	1333
Doctors always communicated well	78.45%	4.50%	--	--	1333
Nurses always communicated well	74.55%	5.41%	--	--	1333
Always communicated about medications	59.52%	5.41%	--	--	1333
Always communicated about discharge information	81.82%	4.17%	--	--	1333
Pain was always well controlled	68.02%	4.56%	--	--	1333
Rooms were always quiet	54.37%	8.39%	--	--	1333
Rooms were always clean	70.03%	6.56%	--	--	1333
<u>Patient Characteristics</u>					
Patient Age	52.8	12.6	45.46	61.35	1544
Female	57.12%	6.44%	54.28%	60.99%	1544
<u>Race/Ethnicity</u>					
% White	71.24%	25.68%	55.77%	92.43%	1539
% Black	10.04%	13.73%	0.90%	13.29%	1539
% Hispanic	13.13%	18.51%	1.38%	17.17%	1539
% Asian	2.49%	5.92%	0.22%	1.87%	1539
% Other	3.10%	7.19%	0.38%	3.02%	1539
<u>Payer Source</u>					
% Medicare	44.31%	18.62%	32.94%	55.29%	1544
% Medicaid	18.62%	14.37%	7.82%	25.33%	1544
% Private/HMO	27.96%	14.41%	18.17%	35.95%	1544
% Other (none, no pay, other)	8.92%	10.01%	4.03%	10.45%	1544
<u>Patient Severity</u>					
Mean number of chronic conditions	4.06	1.48	3.13	4.72	1544
Mean number of diagnoses	8.36	2.95	6.66	9.51	1544
Mean number of procedures	1.34	0.83	0.82	1.76	1544
<u>Hospital Ownership</u>					
Government	22.79%	--	--	--	404
For-Profit	20.25%	--	--	--	359
Not for Profit, Non-Government	47.77%	--	--	--	847
Religious	9.19%	--	--	--	163

Table 1: Hospital Means, Standard Deviations, and Inter-Quartile Ranges for High and Low Designations (continued)

	Mean	Standard Deviation	Inter-Quartile Range Definitions		# of Hospitals
			Low <25	High >75	
<u>Bed Size</u>					
<100	39.50%	--	--	--	702
100-199	22.62%	--	--	--	402
200-299	15.31%	--	--	--	272
>300	22.57%	--	--	--	401
<u>Teaching Status</u>					
No Major Teaching	72.75%	--	--	--	1298
Medical School	4.37%	--	--	--	78
Interns and Residents	14.52%	--	--	--	259
Council of Teaching Hospitals (COTH)	8.35%	--	--	--	149
<u>Health System Status</u>					
Not part of a Health System	37.68%	--	--	--	668
Comprehensive (centralized) health system	5.58%	--	--	--	99
Centralized Physician/Insurance Health System	1.24%	--	--	--	22
Moderately comprehensive (centralized) health system	16.13%	--	--	--	286
Decentralized	23.86%	--	--	--	423
Independent	13.87%	--	--	--	246
<u>Hospital Staffing</u>					
Percent of Hospital Staff with MD	1.88%	2.22%	0.4	2.34	1777
Percent of Hospital Staff with Nurse	28.92%	7.12%	24.85	32.92	1777
FTE MD/Bed	0.15	0.44	0.02	0.13	1777
FTE Nurse/Bed	1.62	0.9	1.02	2.04	1777
<u>Electronic Medical Records</u>					
No EMR	8.88%	--	--	--	94
EMR (Fully Implemented)	55.01%	--	--	--	582
EMR (Partially Implemented)	36.11%	--	--	--	382
<u>Hospital Location</u>					
Urban	57.76%	--	--	--	1024
Rural	42.24%	--	--	--	749
<u>Hospital Operations</u>					
Mean total charges in hospital	\$33,417	\$32,790	\$13,216	\$42,692	1517
Mean total costs in hospital	\$11,188	\$10,204	\$6,979	\$11,394	1515
Mean length of stay	6.21	9.4	3.61	5.14	1544
<u>Household Income</u>					
Median Household Income by HRR	\$57,431.50	\$11,647.83	\$50,531.98	\$63,709.60	1774
<u>Market Competition</u>					
Unconcentrated HRR	55.89%	--	--	--	991
Moderately concentrated HRR	20.47%	--	--	--	363
Highly concentrated HRR	23.64%	--	--	--	419

The typical hospital was non-governmental and not-for-profit (48%), had fewer than 100 beds (39.5%), had no major teaching activity (73%), and was not a part of a health system (38%). Nearly 30% of hospital staff members were nurses (29%), compared to 1.9% with a medical degree. Hospitals maintained 1.6 nurse to bed and

0.15 physician to bed ratios. More than half of hospitals had fully implemented electronic medical records (EMRs, 55%) and were located in urban areas (58%). Hospitals reported mean total charges of \$33,417, mean total costs of \$11,188, and mean length of stay of 6.21 days. HRR median household income is \$57,431 and more than half

of hospitals are located in unconcentrated competition regions (56%).

Summary of Results

We found that, of 290 relationships studied, significant differences in mean HCAHPS scores were observed for 250 (86%) hospital characteristic–experience-of-care score combinations (Table 2). Results were fairly consistent across the 10 HCAHPS measures, with significant relationships observed 22-26 out of 29 times (76-90%) per HCAHPS measure. Classification by patient characteristics resulted in the most significant relationships with HCAHPS measures (70/70, 100%), followed by market characteristics (19/20, 95%), payer source (37/40, 92.5%), hospital characteristics (84/100, 84%), hospital operations (24/30, 80%), and finally patient severity (16/30, 53%).

Overall, we found fewer significant differences in changes in experience-of-care scores from 2009-2011 by patient and hospital characteristics than significant differences in the three-year mean (Table 3). Of the 290 relationships studied, significant differences in changes in HCAHPS scores were observed for 135 (47%) hospital characteristic – experience-of-care score combinations. Results were fairly consistent across the 10 HCAHPS measures, with significant relationships observed 11-17 out of 29 times (38-59%) per HCAHPS measure. Hospital operations were the characteristics with the most significant relationships with HCAHPS measures (18/30, 60%), followed by patient characteristics (41/70, 59%), payer source (22/40, 55%), hospital characteristics (41/100, 41%), market characteristics (6/20, 30%), and finally patient severity (7/30, 23%).

Tables 4-7 report hospital experience-of-care scores by the full range of hospital characteristics studied. For most characteristics, hospitals are categorized as lowest quartile (low), middle two quartiles (medium), or highest quartile (high). For the remaining characteristics, categorization is characteristic-specific and noted in the table.

Experience-of-Care Scores by Patient Characteristics

We found significant differences in all 10 experience-of-care scores for all 7 patient characteristics reported in Table 4. Hospitals with more older, female, and white patients reported consistently higher scores across measures. Hospitals with more patients of black, Hispanic, Asian, and other race/ethnicity reported consistently lower scores across measures.

Experience-of-Care Scores by Payer Source & Patient Severity

When hospitals were categorized by payer source (Table 5), we found significant differences for all measures and payer source types with 3 exceptions. Differences were not statistically significant for willingness to recommend the hospital by Medicare classification; cleanliness of rooms by

Private/HMP classification; or quietness of rooms by other insurance classification. Among those measures with significant differences, hospitals with more Medicare patients, fewer Medicaid patients, more Private/HMO patients, and fewer other insurance patients reported consistently higher scores.

For statistically significant relationships by patient severity, hospitals with a less severe patient mix (fewer diagnoses, procedures, and chronic conditions) scored consistently higher on patient experience-of-care scores. Categorizing hospitals by mean number of diagnoses resulted in statistically significant differences for 4 of the 10 measures: staff responsiveness, nurse communication, quietness of rooms, and cleanliness of rooms. Hospitals with fewer diagnoses reported higher scores than those with more diagnoses. Hospitals with fewer numbers of procedures reported significantly higher scores on all measures. Categorizing hospitals by mean number of chronic conditions resulted in statistically significant differences for 2 of the 10 measures: doctor communication and discharge information. Hospitals with fewer chronic conditions reported higher scores for doctor communication and the middle category of mean number of chronic conditions reported the highest scores for discharge information

Experience-of-Care Scores by Hospital Characteristics

Overall, high scoring hospitals were: owned by government or religious groups, had fewer than 100 beds, had no teaching activities, were in centralized physician/insurance health systems, had a low percentage of hospital staff with a nursing degree, and were located in urban areas (Table 6). For-profit hospitals reported significantly lower scores while government and religious hospitals reported significantly higher scores. Smaller hospitals reported significantly higher scores than larger hospitals. Non-teaching hospitals reported significantly higher scores across measures except for willingness to recommend the hospital or discharge information, which were not significant. Hospitals categorized as centralized physician/insurance health system reported the highest scores across measures, while independent hospital system hospitals reported the lowest scores. Differences were not significant for overall hospital rating.

Across the four measures of hospital staffing (percent of hospital staff with a medical degree, percent of hospital staff with a nursing degree, physicians per bed, and nurses per bed), we observed statistically different results for all 10 measures with the exception of willingness to recommend the hospital for percent of hospital staff with a nursing degree. Scores are consistently higher for hospitals with a low percentage of hospital staff with a nursing degree. Hospitals categorized in the middle for the remaining measures consistently reported the lowest

scores. Hospitals located in urban areas scored significantly higher except for insignificant differences for the scores doctor communication or cleanliness of rooms. We observed no statistically significant differences when hospitals are categorized by electronic medical record (EMR) implementation status.

Experience-of-Care Scores by Hospital Operations & Market Characteristics

When categorized by operations measures, hospitals with lower total charges and shorter length of stay reported higher scores, while results for categorization by total costs varied by HCAHPS measure (Table 7). Hospitals with lower total charges and shorter length of stay report higher scores across all 10 measures. Hospitals with higher total costs reported higher scores for overall rating and willingness to recommend the hospital, but lower scores for doctor communication and quietness of rooms. Remaining scores were not significantly difference by total costs.

Hospitals located in HRRs with lower median incomes reported significantly higher scores across HCAHPS measures except for willingness to recommend the hospital, which was not significantly different. High market concentration was significantly associated with higher scores for all 10 measures.

2009-2011 Changes in Experience-of-Care Scores by Patient Characteristics

Across significantly different changes in experience-of-care scores, measures improved more for hospitals with older and more female patients. We found significant differences by age in changes in experience-of-care scores for 3 of the 10 measures (Table 4): staff responsiveness, nurse communication, and cleanliness of rooms. Differences were significant by gender for 3 of the 10 measures: doctor communication, discharge information, and pain control.

Across significantly different changes in experience-of-care scores, hospitals with more white patients and fewer black, Hispanic, Asian or other race patients experienced greater increases in scores than those with more other race patients. For white race, we found significant differences in all changes except for quietness of rooms. All changes in experience-of-care measures were significantly different by black race. All changes were significantly different for Hispanic and Asian race, except for overall rating of the hospital and willingness to recommend the hospital. For other race, we found significant differences in changes in experience-of-care scores for all measures except for willingness to recommend the hospital.

2009-2011 Changes in Experience-of-Care Scores by Payer Source & Patient Severity

Across all measures, hospitals with more Medicare patients, more private/HMO insured patients, and fewer

Medicaid patients reported greater increases in scores. We found no significant differences in changes in experience-of-care scores by other insurance status (Table 5). For Medicare classification, we found significant differences in changes in experience-of-care scores for 3 of the 10 measures: staff responsiveness, nurse communication, and cleanliness of rooms. For Medicaid classification, changes for all measures were significant. By private/HMO classification, differences in changes in experience-of-care scores were significant for all measures except for cleanliness of rooms.

Hospitals with a medium number of diagnoses improved the most, followed closely by those with a high number of diagnoses for discharge information. Hospitals with a greater mean number of procedures reported greater improvement for overall hospital rating and willingness to recommend the hospital, while hospitals with a smaller mean number of procedures reported more improvement for the other measures. These differences were significant for 6 measures: overall hospital rating, willingness to recommend the hospital, staff responsiveness, doctor communication, quietness of rooms, and cleanliness of rooms. There were no statistically significant differences in score changes by number of chronic conditions classification.

2009-2011 Changes in Experience-of-Care Scores by Hospital Characteristics

Private not for profit hospitals consistently reported the greatest improvement in scores across 6 measures: overall hospital rating, willingness to recommend the hospital, staff responsiveness, nurse communication, pain control, and cleanliness of rooms (Table 6).

Small hospitals reported the greatest improvements in scores except for willingness to recommend the hospital, for which large hospitals reported the largest increase in score, and overall hospital rating and discharge information, which were not significant.

The scores of medical schools increased the most when hospitals were categorized by teaching status, with statistically significant differences in changes for all scores except discharge information. Centralized health systems reported the greatest improvements in scores for overall rating, recommendation, staff responsiveness, and pain control, while independent hospital system hospitals reported the greatest increase for discharge communication. Differences in the remaining 5 measures were not significantly different.

Medium hospitals reported greater increases than those with high or low percentages on cleanliness of rooms. There were no statistically significant changes in scores percentage of hospital staff with a nursing degree or physicians per hospital bed. The greatest score

improvements were for hospitals with high nurse per bed ratios, except for staff responsiveness, for which scores for low ratio hospitals were the most improved and for discharge information and cleanliness of rooms, for which differences were not significant.

Score improvement was greater for urban hospitals than for rural hospitals for the measures nurse communication, medication communication, discharge information, and pain control. There were no statistically significant differences in change in experience-of-care scores for hospitals when categorized by EMR implementation status.

2009-2011 Changes in Experience-of-Care Scores by Hospital Operations & Market Characteristics

Hospitals with higher total charges reported greater improvements in scores for recommendation of the hospital, but smaller increases in scores for the other significant measures: staff responsiveness, doctor communication, nurse communication, and quietness of rooms. Hospitals with higher mean total costs reported greater improvements for overall hospital, willingness to recommend the hospital, nurse communication, and discharge information. Hospitals categorized as having short lengths of stay reported greater increases for all measures except for willingness to recommend the hospital, for which differences were not significant.

High median household income hospitals saw the greatest improvement for recommendation, while low hospitals saw the greatest improvement for doctor communication. Remaining measures were not significantly different. Hospitals in unconcentrated HRRs experienced the smallest improvements for the four measures significantly different by HRR: doctor communication, nurse communication, pain control, and cleanliness of rooms.

Discussion

We observed significant differences in patient experience-of-care scores when hospitals are classified by patient characteristics, payer source, hospital characteristics, market characteristics, and diagnosis-specific process and outcome measures. High scoring hospitals tend to have older, female, white patients who undergo fewer procedures and have either Medicare or private health insurance. High scoring hospitals are government or religiously owned, have fewer than 100 beds, are urban, members of centralized health systems, and not teaching hospitals. They have lower charges, shorter lengths of stay, and operate in high competition markets with low median household incomes. We did not find differences in experience-of-care scores by EMR status, and differences for hospital costs, mean number of diagnoses, and number of chronic conditions were limited to fewer than half of the HCAHPS measures. Our results identifying high

scoring hospitals as those with higher percentages of white patients, urban location, high nurse to bed ratio, and fewer Medicaid patients are consistent with prior literature. Our findings that high scoring hospitals are primarily government or religiously owned, small sized, nonteaching, and more Medicare patients differ from prior findings, and while we find higher scores for smaller hospitals, prior findings were divided.^{10,11,31,36}

Consistent with prior literature, we find that patient experience-of-care scores increased across categorizations of hospitals from 2009-2011.^{22,23} When considering changes from 2009-2011 rather than overall scores, fewer differences exist by hospital categorization. Among characteristics with significant relationships, the effects were more mixed than for overall scores. Where differences were significant, hospital categories with higher mean scores from 2009-2011 also reported the greatest increase in scores from 2009-2011.

When compared to our earlier analysis of the relationship between hospital characteristics and patient experience-of-care scores in the state of California¹⁸, our current results find more significant relationships (86% compared to 60%). We also found more hospital characteristic–experience-of-care relationships to be significant across all 10 HCAHPS measures (18 categorizations compared to 2 categorizations). Among categorizations that were significant in both studies, the direction of the effect was consistent with one exception: we find hospitals with more procedures reported lower, not higher, HCAHPS scores. Whereas the California study found no effect for these categorizations, we find that hospitals with older, more female, more Medicare patients, and no teaching status scored higher.

Although both studies find fewer changes over the 2009-2011 period to be statistically significant by the 10 HCAHPS dimensions when compared to the mean scores for those dimensions (Table 2 vs. Table 3), we do find a higher number of significant relationships for these dimensions for the 14 states than the California study (47% compared to 22%). The direction of the change identified was consistent across studies, with both reporting that nearly all changes in HCAHPS scores 2009-2011 were increases. This may suggest that hospitals in other states have not been as quick or as successful as California in responding to the patient-centered initiatives in the ACA legislation and, consequently, there are more than double the number of significant differences over the three-year study period in these other states than in California. Since the VBP incentives didn't begin until fall of 2012, after our study period, it is possible that the hospitals in these states have improved their scores but our evidence indicates they still have work to do.

Despite these important contributions, our study has

limitations. As noted in prior work, the 34% average response rate to the HCAHPS post-discharge survey leads to the possibility of non-response bias.^{18,19} However, a growing body of literature has found HCAHPS to provide highly reliable measurement of patient experiences, particularly when the recommended sample size of 200 completed surveys is met.¹⁶ Beyond the HCAHPS data, we are limited to the use of administrative data which have been documented to have shortcomings in generalizability, complexity, and differing definitions across datasets.^{18,37} Finally, despite the findings of statistical significance, we are unable to determine causation. While hospitals with specific characteristics may consistently score higher on measures of patient experience-of-care, we cannot conclude that those characteristics led to the higher scores.

As hospital performance on HCAHPS scores now accounts for 30% of the Value Based Purchasing formula, it is important to understand the patterns of these scores across different types of hospitals. Certain types of hospitals classified by largely immutable patient, hospital, and market characteristics may be at risk of losing money due to low scores. Despite these patterns of lower scores, we observe that nearly all scores improved for the 2009-2011 time period.

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Table 2. Summary of Mean Experience of Care Score Results 2009-2011 by Hospital Categorization

HCAHPS Measure	Overall Significance	Patient Characteristics	Payer Source	Patient Severity	Hospital Characteristics	Hospital Operations	Market Characteristics
High Overall Rating of the Hospital	25/29	7/7	4/4	1/3	8/10	3/3	2/2
Patient Would Definitely Recommend Hospital	22/29	7/7	3/4	1/3	7/10	3/3	1/2
Hospital Staff Was Responsive	26/29	7/7	4/4	2/3	9/10	2/3	2/2
Doctors Always Communicated Well	26/29	7/7	4/4	2/3	8/10	3/3	2/2
Nurses Always Communicated Well	26/29	7/7	4/4	2/3	9/10	2/3	2/2
Always Communicated About Meds	25/29	7/7	4/4	1/3	9/10	2/3	2/2
Always Communicated About Discharge Information	25/29	7/7	4/4	2/3	8/10	2/3	2/2
Pain Was Always Well Controlled	25/29	7/7	4/4	1/3	9/10	2/3	2/2
Rooms Were Always Quiet	26/29	7/7	3/4	2/3	9/10	3/3	2/2
Rooms Were Always Clean	24/29	7/7	3/4	2/3	8/10	2/3	2/2
Total	250/290	70/70	37/40	16/30	84/100	24/30	19/20

Table 3. Summary of Changes in Experience of Care Score Results 2009-2011 by Hospital Categorization

HCAHPS Measure	Overall Significance	Patient Characteristics	Payer Source	Patient Severity	Hospital Characteristics	Hospital Operations	Market Characteristics
High Overall Rating of the Hospital	11/29	2/7	2/4	1/3	4/10	2/3	0/2
Patient Would Definitely Recommend Hospital	13/29	2/7	2/4	1/3	5/10	2/3	1/2
Hospital Staff Was Responsive	16/29	5/7	3/4	1/3	5/10	2/3	0/2
Doctors Always Communicated Well	15/29	5/7	2/4	1/3	3/10	2/3	2/2
Nurses Always Communicated Well	17/29	5/7	3/4	0/3	5/10	3/3	1/2
Always Communicated About Meds	11/29	4/7	2/4	0/3	4/10	1/3	0/2
Always Communicated About Discharge Information	12/29	5/7	2/4	1/3	2/10	2/3	0/2
Pain Was Always Well Controlled	15/29	5/7	2/4	0/3	6/10	1/3	1/2
Rooms Were Always Quiet	11/29	3/7	2/4	1/3	3/10	2/3	0/2
Rooms Were Always Clean	14/29	5/7	2/4	1/3	4/10	1/3	1/2
Total	135/290	41/70	22/40	7/30	41/100	18/30	6/20

Table 4. Patients' Experience-of-Care Scores by Patient Characteristics (2009-2010)

HCAHPS Measure	Statistic	Patient Age			Patient Gender: Female			Patient Race/Ethnicity: White			Patient Race/Ethnicity: Black			Patient Race/Ethnicity: Hispanic			Patient Race/Ethnicity: Asian			Patient Race/Ethnicity: Other		
		Low (386)	Med. (772)	High (386)	Low (386)	Med. (772)	High (386)	Low (385)	Med. (770)	High (384)	Low (384)	Med. (771)	High (384)	Low (384)	Med. (771)	High (384)	Low (384)	Med. (771)	High (384)	Low (385)	Med. (770)	High (384)
High Overall Rating of the Hospital	3 yr mean	65.1 ^c	65.7	68.0	64.2 ^c	65.8	67.7	63.0 ^c	65.9	69.6	70.0 ^c	65.3	63.4	68.6 ^c	66.1	63.4	69.2 ^c	65.1	65.0	68.1 ^c	65.9	64.4
	% chg	5.4	5.7	9.0	4.6	6.0	7.6	2.1 ^c	7.6	8.2	7.3 ^c	7.7	2.1	8.0	6.0	5.1	7.9	5.5	6.3	9.0 ^a	6.5	3.4
Patient Would Definitely Recommend Hospital	3 yr mean	68.0 ^b	68.7	70.4	67.8 ^a	68.8	69.7	65.9 ^c	69.1	71.4	71.6 ^c	68.6	66.5	70.4 ^c	69.4	66.3	70.6 ^c	68.0	68.8	69.9 ^b	68.9	67.8
	% chg	4.4	4.1	7.4	4.0	4.3	6.0	0.1 ^c	6.9	5.6	5.1 ^a	6.2	1.5	5.1	5.5	2.9	3.8	4.6	5.6	6.3	5.1	2.8
Hospital Staff Was Responsive	3 yr mean	59.5 ^c	61.5	65.3	59.5 ^c	61.7	63.3	57.7 ^c	61.3	66.9	67.0 ^c	60.6	58.7	65.6 ^c	61.8	57.8	67.2 ^c	60.8	58.5	64.5 ^c	61.5	59.5
	% chg	1.9 ^c	5.2	9.8	4.1	4.4	7.3	1.7 ^c	5.5	8.9	8.8 ^c	6.4	-0.2	9.1 ^b	3.9	4.5	11.6 ^c	4.1	2.9	11.3 ^c	5.1	0.7
Doctors Always Communicated Well	3 yr mean	77.2 ^c	78.4	80.0	77.1 ^c	78.3	79.5	76.7 ^c	78.0	81.1	80.9 ^c	77.6	77.6	80.6 ^c	78.4	76.3	81.1 ^c	77.8	77.0	79.9 ^c	78.2	77.4
	% chg	0.6	1.3	2.1	-0.1 ^b	1.2	2.4	0.1 ^c	1.3	3.0	3.1 ^c	1.4	-0.3	3.5 ^c	0.4	1.3	3.8 ^c	0.6	0.9	3.0 ^b	1.2	0.2
Nurses Always Communicated Well	3 yr mean	72.7 ^c	74.6	76.3	72.8 ^c	74.7	75.3	71.6 ^c	74.3	77.9	77.3 ^c	73.9	73.0	77.1 ^c	74.9	71.2	77.6 ^c	74.2	72.4	75.9 ^c	74.5	73.2
	% chg	1.6 ^c	3.7	6.2	2.2	3.7	4.3	0.8 ^c	4.1	6.0	5.5 ^c	4.4	0.4	6.0 ^b	3.3	2.3	6.6 ^c	3.4	2.0	6.0 ^c	3.9	1.1
Always Communicated About Meds	3 yr mean	58.3 ^c	59.4	61.0	58.0 ^c	59.3	60.6	57.0 ^c	59.0	62.8	62.6 ^c	58.7	57.8	61.9 ^c	59.5	56.9	62.6 ^c	58.8	57.7	61.1 ^c	59.3	58.2
	% chg	4.1	4.7	6.7	3.6	4.4	6.6	3.2 ^a	4.9	7.2	8.2 ^c	5.2	1.7	7.5 ^a	3.7	5.2	10.1 ^c	4.1	3.0	9.2 ^c	5.0	1.4
Always Communicated About Discharge Information	3 yr mean	80.9 ^c	82.0	82.2	80.8 ^c	82.0	82.1	79.5 ^c	81.9	83.9	83.5 ^c	81.7	80.2	83.4 ^c	82.0	79.7	83.0 ^c	81.7	80.8	82.3 ^c	81.8	81.2
	% chg	3.1	2.8	3.5	1.7 ^a	3.1	3.8	1.0 ^c	3.5	4.5	4.2 ^c	3.6	0.8	4.2 ^a	2.9	2.3	4.7 ^b	2.7	2.4	4.3 ^b	3.2	1.6
Pain Was Always Well Controlled	3 yr mean	66.8 ^c	67.9	69.5	66.7 ^c	68.1	68.6	66.0 ^c	68.0	70.1	70.0 ^c	67.6	66.7	69.5 ^c	68.1	66.2	70.3 ^c	67.5	66.8	68.9 ^c	68.0	67.1
	% chg	1.1	2.8	3.7	0.6 ^a	2.6	3.7	-0.2 ^c	3.2	4.6	4.1 ^c	3.2	-0.1	4.6 ^a	2.1	1.8	5.3 ^b	2.1	1.5	5.1 ^c	2.7	0.3
Rooms Were Always Quiet	3 yr mean	52.4 ^c	54.0	57.4	52.9 ^c	54.1	55.5	51.6 ^c	53.9	57.8	57.5 ^c	52.6	54.4	58.1 ^c	54.4	50.3	58.6 ^c	54.3	50.3	56.3 ^c	54.2	52.6
	% chg	3.7	5.6	7.0	6.0	4.6	6.5	6.5	3.9	7.4	8.2 ^a	4.0	5.9	9.6 ^b	3.5	5.7	10.1 ^b	4.4	4.1	10.5 ^c	4.3	3.7
Rooms Were Always Clean	3 yr mean	68.3 ^c	69.8	72.6	68.0 ^c	69.8	71.6	67.2 ^c	69.1	74.6	75.1 ^c	68.9	67.1	73.0 ^c	69.6	67.7	73.9 ^c	69.1	68.1	73.0 ^c	69.6	68.0
	% chg	1.1 ^c	4.2	7.0	1.9	4.3	4.4	1.4 ^c	3.9	7.1	7.2 ^c	4.6	-0.1	6.5 ^b	2.8	3.9	8.6 ^c	3.3	1.9	8.3 ^c	3.8	0.9

Column N indicated in parentheses; Significance Levels: a =<0.05 b =< 0.01 c =< 0.001

Table 5. Patients' Experience-of-Care Scores by Payer Source & Patient Severity (2009-2010)

HCAHPS Measure	Statistic	Payer Source: Medicare			Payer Source: Medicaid			Payer Source: Private/HMO			Payer Source: Other			Mean Number of Diagnoses			Mean Number of Procedures			Mean Number Chronic Conditions		
		Low (386)	Med. (772)	High (386)	Low (386)	Med. (772)	High (386)	Low (386)	Med. (772)	High (386)	Low (386)	Med. (772)	High (386)	Low (386)	Med. (772)	High (386)	Low (386)	Med. (772)	High (386)	Low (386)	Med. (772)	High (386)
High Overall Rating of the Hospital	3 yr mean	65.6 ^b	65.7	67.6	68.6 ^c	66.4	63.3	64.2 ^c	66.0	67.7	67.7 ^c	66.1	64.4	66.4	66.0	65.8	69.2 ^c	64.9	66.1	66.5	66.1	65.3
	% chg	5.6	6.3	6.5	13.7 ^c	5.9	1.5	0.6 ^c	4.5	13.8	8.2	6.1	4.9	4.9	6.7	5.9	2.8 ^b	5.5	9.3	4.8	6.6	6.3
Patient Would Definitely Recommend Hospital	3 yr mean	68.5	68.7	69.7	71.4 ^c	69.3	65.9	66.2 ^c	68.7	71.3	70.3 ^c	69.1	67.1	68.4	69.0	68.9	70.3 ^c	67.8	70.2	68.5	69.2	68.3
	% chg	4.6	4.8	4.7	12.8 ^c	4.7	-0.8	-3.3 ^c	3.4	13.5	7.7	4.3	3.6	3.3	5.5	3.8	-1.1 ^c	3.8	9.6	2.7	5.6	4.6
Hospital Staff Was Responsive	3 yr mean	59.9 ^c	61.4	65.0	64.6 ^c	62.2	58.7	60.9 ^c	62.2	61.5	63.5 ^c	61.7	60.3	62.8 ^a	61.5	61.4	67.7 ^c	60.4	60.1	62.3	61.6	61.3
	% chg	2.3 ^a	5.8	7.1	10.5 ^c	5.1	1.7	3.3 ^a	4.7	7.4	5.4	4.9	5.4	5.5	5.3	4.4	9.2 ^a	4.7	4.0	4.3	5.2	5.9
Doctors Always Communicated Well	3 yr mean	77.3 ^c	78.4	79.8	79.8 ^c	78.7	76.7	77.9 ^a	78.5	78.7	79.7 ^c	78.4	77.4	79.1	78.4	77.7	81.6 ^c	77.7	77.6	78.9 ^b	78.4	77.8
	% chg	0.6	1.6	1.2	3.6 ^c	1.2	-0.2	-0.8 ^c	1.2	3.0	1.5	1.2	1.3	1.5	1.5	0.5	3.0 ^a	0.8	1.4	1.8	1.4	0.5
Nurses Always Communicated Well	3 yr mean	73.0 ^c	74.6	76.1	76.1 ^c	75.1	72.0	73.1 ^c	74.9	74.9	75.6 ^c	74.7	73.2	74.7 ^c	74.6	74.1	77.7 ^c	73.8	73.7	74.4	74.7	74.2
	% chg	1.8 ^b	4.0	4.8	7.6 ^c	3.6	0.9	1.1 ^c	3.3	6.1	4.3	3.8	2.7	2.1	4.1	3.6	4.5	3.3	3.7	2.4	3.7	4.3
Always Communicated About Meds	3 yr mean	58.6 ^c	59.3	60.9	60.9 ^c	59.8	57.6	58.5 ^b	59.7	59.6	60.3 ^c	59.6	58.4	59.9	59.4	59.1	62.6 ^c	58.7	58.7	59.8	59.4	59.1
	% chg	4.4	4.9	5.4	8.2 ^b	4.7	2.9	2.7 ^b	4.4	7.5	5.0	4.1	6.4	5.4	5.1	3.7	6.9	4.6	4.4	5.2	4.9	4.5
Always Communicated About Discharge Information	3 yr mean	81.0 ^c	82.0	82.3	82.4 ^c	82.4	80.2	80.2 ^c	82.2	82.3	82.6 ^c	82.0	80.7	81.3	81.9	82.0	83.0 ^c	81.5	81.5	81.3 ^a	82.1	81.6
	% chg	2.5	3.1	3.4	4.3 ^b	3.2	1.8	1.0 ^c	3.0	4.4	3.2	2.7	3.6	1.5 ^a	3.5	3.2	1.7	3.1	3.3	1.9	3.3	3.4
Pain Was Always Well Controlled	3 yr mean	67.2 ^c	67.8	69.4	69.5 ^c	68.3	66.3	67.0 ^c	68.3	68.2	68.4 ^c	68.2	67.2	68.0	68.1	67.8	70.2 ^c	67.5	67.4	67.9	68.1	67.8
	% chg	1.1	3.1	2.7	5.9 ^c	2.5	0.3	-0.3 ^c	2.3	5.2	3.5	2.5	1.9	1.5	3.0	2.3	2.6	2.3	3.0	2.1	2.5	2.9
Rooms Were Always Quiet	3 yr mean	52.8 ^c	54.0	57.0	56.5 ^c	54.7	51.7	54.4	54.3	54.1	55.0	54.0	54.2	55.5 ^a	53.9	54.1	59.6 ^c	53.3	52.4	54.6	54.1	54.3
	% chg	5.1	5.8	4.0	8.3 ^a	5.3	3.5	4.1 ^b	4.1	8.7	6.8	4.4	6.3	6.6	5.8	3.2	10.0 ^a	4.3	5.3	5.8	5.5	4.4
Rooms Were Always Clean	3 yr mean	68.4 ^c	69.7	72.7	72.1 ^c	70.2	67.8	69.7	70.2	69.9	71.9 ^c	69.9	68.6	71.1 ^b	69.7	69.5	74.4 ^c	69.0	68.8	70.5	69.9	69.6
	% chg	1.3 ^b	4.4	6.0	6.8 ^c	4.2	1.3	3.4	3.3	5.4	4.1	3.8	3.8	3.3	3.8	4.5	6.6 ^a	4.0	2.4	3.0	3.8	5.0

Column N indicated in parentheses; Significance Levels: a =<0.05 b =< 0.01 c =< 0.001

Table 6. Patients' Experience-of-Care Scores by Hospital Characteristics (2009-2011)

HCAHPS Measure	Statistic	Hospital Ownership Status				Hospital Size (Beds)				Hospital Teaching Status				Hospital System Classification					
		Gov. (404)	NFP (847)	Relig. (163)	For-Profit (359)	<100 (702)	100-199 (402)	200-299 (272)	300+ (401)	No Teaching (1298)	Medical School (78)	Interns & Residents (259)	COTH (149)	None (668)	Central. Health Sys (99)	Central Phys/Ins (22)	Mod. Central. (286)	De-central. (423)	Ind. (246)
High Overall Rating of the Hospital	3 yr mean	67.3 ^c	66.1	67.4	63.5	69.9 ^c	64.5	63.8	64.4	66.5 ^a	63.9	65.7	64.9	65.9	65.6	66.7	66.8	66.6	64.3
	% chg	1.8 ^c	8.2	4.7	3.1	7.6	3.6	6.6	6.8	5.3 ^a	13.3	7.0	6.6	5.2 ^a	14.2	5.6	5.0	6.3	6.5
Patient Would Definitely Recommend Hospital	3 yr mean	69.3 ^c	69.1	70.2	66.1	71.4 ^c	67.2	67.2	68.3	68.8	67.9	69.4	68.8	68.4 ^a	69.8	70.3	69.5	69.2	66.5
	% chg	0.5 ^b	6.8	3.6	1.4	4.6 ^b	1.1	5.2	7.7	3.2 ^b	12.7	5.4	9.1	3.4 ^a	14.0	4.4	3.6	5.4	3.6
Hospital Staff Was Responsive	3 yr mean	63.5 ^c	62.0	62.0	59.2	67.8 ^c	60.1	58.9	58.3	62.8 ^c	59.6	59.8	59.3	62.4 ^b	60.2	63.4	62.5	61.9	59.7
	% chg	3.0 ^a	6.5	1.1	4.9	11.5 ^c	4.6	4.3	0.6	6.4 ^c	10.3	2.2	-2.3	6.5 ^a	9.9	0.5	3.1	3.7	7.6
Doctors Always Communicated Well	3 yr mean	79.7 ^c	78.6	78.4	76.5	81.2 ^c	77.6	76.9	77.0	78.8 ^b	77.2	77.9	77.7	78.9 ^c	77.7	79.4	79.0	78.3	76.7
	% chg	0.2	1.8	0.3	1.1	3.6 ^c	0.3	1.7	-0.1	1.5 ^b	4.2	0.4	-0.3	1.4	3.8	-2.4	1.0	1.3	1.8
Nurses Always Communicated Well	3 yr mean	75.5 ^c	74.9	75.1	71.8	77.8 ^c	73.3	73.0	72.9	74.9 ^b	73.3	73.8	73.6	74.8 ^c	74.4	76.8	75.5	74.2	72.2
	% chg	1.2 ^b	4.6	2.6	2.5	6.1 ^c	3.2	3.3	1.8	4.1 ^c	6.6	2.4	-0.1	3.4	7.5	2.9	3.1	3.1	4.8
Always Communicated About Meds	3 yr mean	60.3 ^c	59.9	59.7	56.9	62.9 ^c	58.3	57.7	57.8	59.9 ^b	58.4	58.8	58.6	59.9 ^c	59.0	61.3	60.3	59.3	57.4
	% chg	4.7	5.7	1.9	3.8	7.6 ^b	4.7	4.6	2.7	5.5 ^a	8.0	2.3	2.2	4.6	9.9	1.2	3.8	5.0	5.9
Always Communicated About Discharge Information	3 yr mean	81.6 ^c	82.1	83.1	80.0	83.5 ^c	81.3	81.0	80.8	81.9	81.9	81.8	81.4	81.8 ^c	81.4	82.7	82.4	82.2	80.1
	% chg	2.5	3.0	3.0	3.3	3.4	3.6	3.0	1.9	3.2	4.4	1.5	2.5	1.9 ^a	4.1	3.5	3.0	4.1	4.4
Pain Was Always Well Controlled	3 yr mean	68.5 ^c	68.2	68.2	66.7	70.4 ^c	67.3	66.7	66.8	68.3 ^b	67.7	67.4	67.0	68.2 ^c	67.9	69.5	68.8	67.7	66.5
	% chg	0.5 ^b	3.5	0.2	2.2	4.1 ^a	2.4	2.3	1.2	2.7 ^b	7.0	1.6	-0.2	1.8 ^a	6.3	1.7	2.9	2.1	4.8
Rooms Were Always Quiet	3 yr mean	56.1 ^b	53.9	53.9	54.3	59.3 ^c	53.0	51.9	51.5	55.4 ^c	51.1	52.6	51.5	54.3 ^a	53.2	54.6	55.1	55.0	51.9
	% chg	3.6	5.7	3.0	7.5	13.1 ^c	2.4	3.3	3.0	6.1 ^a	8.9	4.4	0.5	5.1	7.2	1.8	5.9	5.7	5.7
Rooms Were Always Clean	3 yr mean	71.0 ^c	70.1	70.6	68.3	74.7 ^c	69.0	67.5	67.1	70.8 ^c	68.7	68.2	67.7	70.6 ^b	68.6	71.9	70.1	70.1	68.2
	% chg	2.0 ^a	5.0	1.6	3.4	8.2 ^c	3.6	4.3	0.3	5.1 ^c	8.1	0.7	-1.5	4.1	4.8	2.1	3.5	3.4	5.2

Column N indicated in parentheses; Significance Levels: a =<0.05 b =< 0.01 c =< 0.001

Table 6. Patients' Experience-of-Care Scores by Hospital Characteristics (2009-2011) (continued)

HCAHPS Measure	Statistic	% FTE MD			%FTE RN			FTE MD/ Bed			FTE RN/ Bed			EMR Status			Location	
		Low (444)	Med. (889)	High (444)	Low (445)	Med. (887)	High (445)	Low (445)	Med. (887)	High (445)	Low (444)	Med. (889)	High (444)	None (94)	Full (582)	Partial (382)	Rural (749)	Urban (1024)
High Overall Rating of the Hospital	3 yr mean	68.0 ^c	64.5	66.7	67.3 ^a	65.8	65.7	67.9 ^c	64.3	66.9	66.0 ^c	65.0	68.2	65.2	67.0	67.1	65.2 ^c	66.7
	% chg	7.6	5.4	5.7	5.9	6.7	5.2	7.1	4.7	7.5	4.4 ^c	4.3	10.6	4.6	7.0	6.5	4.7	7.0
Patient Would Definitely Recommend Hospital	3 yr mean	70.6 ^c	67.5	69.2	69.4	68.7	68.7	70.3 ^c	67.4	69.5	67.9 ^c	67.8	71.0	67.9	69.6	70.0	68.1 ^b	69.3
	% chg	7.1	3.5	4.2	4.6	5.0	4.2	6.4	3.2	5.5	2.1 ^c	2.9	9.4	1.0	6.3	5.6	3.2	5.6
Hospital Staff Was Responsive	3 yr mean	63.1 ^c	60.4	63.1	65.0 ^c	61.7	60.1	63.1 ^c	60.3	63.0	64.4 ^c	60.6	63.1	62.6	63.3	62.2	61.2 ^a	62.3
	% chg	3.4	6.5	4.1	6.1	5.6	3.8	3.3	5.6	6.1	7.5 ^a	3.8	7.0	4.3	4.1	3.5	3.9	5.9
Doctors Always Communicated Well	3 yr mean	78.9 ^c	77.6	79.5	80.1 ^c	78.5	77.4	78.9 ^c	77.6	79.3	79.6 ^c	77.8	79.1	78.7	79.3	78.8	78.4	78.5
	% chg	1.9	1.1	0.8	1.5	1.4	1.0	1.9	0.8	1.3	3.2 ^c	0.5	2.2	1.3	1.5	0.5	0.9	1.5
Nurses Always Communicated Well	3 yr mean	75.5 ^c	73.4	75.6	76.6 ^c	74.6	73.3	75.4 ^c	73.3	75.5	75.4 ^c	73.9	75.5	75.0	75.7	75.4	74.0 ^b	75.0
	% chg	3.9	3.7	2.8	3.4	3.9	3.0	3.6	3.3	3.9	4.2 ^b	2.6	5.4	3.5	3.5	3.3	2.2 ^b	4.4
Always Communicated About Meds	3 yr mean	60.4 ^c	58.4	60.5	61.7 ^c	59.4	58.3	60.4 ^c	58.3	60.6	60.4 ^c	58.8	60.6	60.0	60.5	60.2	58.9 ^c	60.0
	% chg	5.5	5.0	3.6	3.7	5.3	4.6	5.4	4.5	4.7	5.7 ^a	3.8	6.6	3.2	5.2	4.8	3.2 ^a	5.8
Always Communicated About Discharge Information	3 yr mean	82.3 ^c	81.2	82.4	83.4 ^c	81.8	80.9	82.2 ^c	81.0	82.6	81.9 ^c	81.3	82.7	81.7	82.6	82.5	80.9 ^c	82.5
	% chg	3.3	3.0	2.4	2.4	2.8	3.5	3.2	3.0	2.7	2.4	2.6	3.9	1.7	2.9	3.0	1.5 ^c	3.9
Pain Was Always Well Controlled	3 yr mean	68.7 ^c	67.3	68.5	69.3 ^c	67.9	67.4	68.7 ^c	67.2	68.6	68.2 ^c	67.6	68.7	68.0	68.5	68.5	67.6 ^b	68.3
	% chg	3.1	2.5	1.6	2.7	2.3	2.7	2.8	2.2	2.8	2.6 ^b	1.6	4.3	2.6	2.9	1.6	1.2 ^b	3.3
Rooms Were Always Quiet	3 yr mean	55.6 ^c	53.1	55.3	56.8 ^c	53.8	53.9	55.8 ^c	53.0	55.0	56.6 ^c	53.6	54.8	56.4	55.3	55.0	53.7 ^b	54.9
	% chg	6.9	5.4	3.4	4.7	5.7	5.3	6.5	5.0	5.1	6.1 ^a	4.0	8.3	7.4	4.8	4.2	6.5	4.7
Rooms Were Always Clean	3 yr mean	71.2 ^c	68.9	70.8	72.5 ^c	69.9	68.8	71.2 ^c	68.8	70.7	72.6 ^c	69.0	70.9	70.6	71.1	70.0	70.1	70.0
	% chg	3.0 ^a	5.1	2.4	4.0	4.7	2.6	3.4	4.1	4.2	6.2	3.5	4.0	2.4	3.5	2.8	4.0	3.9

Column N indicated in parentheses; Significance Levels: a =<0.05 b =< 0.01 c =< 0.001

Table 7. Patients' Experience-of-Care Scores by Hospital Operations & Market Characteristics (2009-2011)

HCAHPS Measure	Statistic	Mean Total Charges			Mean Total Costs			Mean Length of Stay			Median Household Income			Market Competition		
		Low (379)	Med. (758)	High (380)	Low (378)	Med. (758)	High (379)	Low (386)	Med. (772)	High (386)	Low (441)	Med. (870)	High (463)	Uncompetitive (991)	Moderately Competitive (363)	Highly Competitive (419)
High Overall Rating of the Hospital	3 yr mean	68.8 ^c	65.2	65.2	65.2 ^b	65.9	67.4	69.4 ^c	65.3	62.7	67.43 ^c	66.07	64.50	64.45 ^c	66.94	68.83
	% chg	5.5	5.1	7.7	2.5 ^c	5.7	10.0	8.9 ^a	5.6	3.7	5.94	5.32	7.72	5.57	5.86	7.84
Patient Would Definitely Recommend Hospital	3 yr mean	70.2 ^b	68.1	69.0	67.3 ^c	68.6	71.4	71.2 ^c	68.5	66.2	69.47	68.65	68.39	67.60 ^c	69.43	70.95
	% chg	2.4 ^a	3.5	7.7	-0.2 ^c	4.0	11.0	6.2	4.3	4.0	4.26 ^a	3.25	7.71	4.27	4.44	6.02
Hospital Staff Was Responsive	3 yr mean	66.8 ^c	60.9	58.7	62.7	61.6	61.2	66.5 ^c	60.4	58.4	64.12 ^c	61.90	59.26	59.83 ^c	62.34	65.94
	% chg	8.3 ^a	3.7	4.9	5.0	4.4	5.9	10.2 ^c	4.1	0.8	7.37	4.26	4.80	3.90	6.96	6.71
Doctors Always Communicated Well	3 yr mean	81.5 ^c	77.8	76.8	79.1 ^b	78.2	78.3	80.5 ^c	77.8	77.0	79.79 ^c	78.30	77.33	77.44 ^c	78.98	80.26
	% chg	3.2 ^c	0.2	1.9	1.0	0.8	2.4	3.7 ^c	0.8	-0.9	2.13 ^a	0.62	1.74	0.49 ^b	2.38	2.31
Nurses Always Communicated Well	3 yr mean	77.8 ^c	74.1	72.6	75.0	74.6	74.0	77.0 ^c	73.9	72.3	76.12 ^c	74.28	73.41	73.18 ^c	75.18	77.05
	% chg	4.7 ^a	2.6	4.4	2.3 ^a	3.3	5.1	5.9 ^c	3.4	0.6	4.63	3.01	3.64	2.63 ^b	4.52	5.17
Always Communicated About Meds	3 yr mean	62.5 ^c	59.0	57.5	59.6	59.6	59.1	62.3 ^c	58.6	57.4	60.95 ^c	59.51	57.97	58.25 ^c	59.93	61.98
	% chg	6.6	3.9	5.3	4.8	4.2	6.3	8.8 ^c	3.9	2.2	6.44	3.88	5.18	3.86	5.89	6.44
Always Communicated About Discharge Information	3 yr mean	83.4 ^c	81.6	80.5	81.5	81.9	81.9	83.4 ^c	81.4	80.3	82.59 ^c	81.61	81.39	81.02 ^c	81.94	83.48
	% chg	2.7	2.6	3.7	2.8 ^a	2.5	4.3	4.2 ^a	2.8	1.7	3.44	2.63	3.17	2.58	3.68	3.28
Pain Was Always Well Controlled	3 yr mean	69.9 ^c	67.6	67.0	68.0	68.0	67.9	69.8 ^c	67.7	66.0	68.97 ^c	67.80	67.42	67.12 ^c	68.31	69.77
	% chg	3.0	1.8	3.2	1.5	2.2	4.1	4.8 ^c	2.4	-0.8	3.42	1.81	2.91	1.61 ^a	3.73	3.64
Rooms Were Always Quiet	3 yr mean	58.7 ^c	54.0	51.1	56.1 ^c	54.3	52.7	58.4 ^c	53.0	51.6	56.71 ^c	54.84	50.81	52.56 ^c	55.30	57.53
	% chg	8.7 ^b	3.6	6.2	3.9	5.4	6.1	11.0 ^c	3.5	3.2	6.78	5.14	4.70	4.98	6.43	5.56
Rooms Were Always Clean	3 yr mean	73.7 ^c	69.3	68.1	70.3	70.0	69.8	73.6 ^c	68.8	67.8	71.30 ^c	70.36	67.95	68.38 ^c	70.25	73.52
	% chg	5.8	3.1	3.6	3.0	4.3	2.8	6.5 ^b	3.4	1.5	5.49	3.81	2.76	3.21 ^a	3.58	6.32

Column N indicated in parentheses; Significance Levels: a =<0.05 b =< 0.01 c =< 0.001