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# Impact of hospital diagnosis-specific quality measures on patients' experience of hospital care: Evidence from 14 states, 2009-2011

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# Impact of hospital diagnosis-specific quality measures on patients' experience of hospital care: Evidence from 14 states, 2009-2011

## **Cover Page Footnote**

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## Impact of hospital diagnosis-specific quality measures on patients' experience of hospital care: Evidence from 14 states, 2009-2011

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### Abstract

In order to assess consistency across quality measures for United States hospitals, 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 hospital-reported patient experience-of-care scores by diagnosis-specific process and outcome measures for acute myocardial infarction, heart failure, and pneumonia. We also evaluate how scores have changed over the three-year period. We find significant differences in patient experience-of-care scores for 195 out of 230 relationships between HCAHPS patient experience-of-care scores and 23 diagnosis-specific process and outcomes measures. We find nearly no significant differences in changes in scores from 2009-2011 (8 out of 230) when comparing the same experience-of-care and diagnosis-specific quality measures. For the majority of measures, high scores on the quality metrics were associated with high patient experience-of-care scores.

### Keywords

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

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### Background

One of the overarching goals of health care reform in the United States is to provide high value or high quality care, centered at the patient level.<sup>1,2</sup> Achieving value or quality first requires evaluators to be able to define and measure this construct. Defining and measuring quality has challenged the health services researchers for more than half a century.<sup>3</sup> In his seminal work on assessing quality of care, Donabedian identifies three categories of quality measures: structural, process, and outcome.<sup>4</sup> Structural measures capture attributes of the settings in which care is provided; process measures capture the steps and activities of giving and receiving care; and outcome measures capture the effectiveness of care generally or on a specific health metric.<sup>4</sup> While a myriad of measures exist to capture these categories of quality

in health care, there has been a lack of measures of patients' experiences throughout the health care process.

The Institute of Medicine (IOM) identified patient-centeredness as one of six fundamental aims to achieve quality in the US health care system in its 2001 report, *Crossing the Quality Chasm*.<sup>5,6</sup> In order to develop measures of quality able to capture patient-centeredness and the patient perspective in health care, the Centers for Medicaid and Medicare Services (CMS) and the Agency for Healthcare Quality and Research (AHRQ) began to develop the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey in 2002.<sup>7</sup> HCAHPS is designed to: 1) Create data on patients' perspectives of care that is comparable across hospitals 2) Establish incentives for hospitals to improve quality of care and 3) Increase transparency and public accountability in health care.<sup>8,9</sup> The completed

HCAHPS, endorsed by the National Quality Forum (NQF), was first voluntarily implemented by hospitals in October 2006.<sup>10,11,5</sup> It became tied to the Annual Payment Update (APU) for Inpatient Prospective Payment System hospital for FY 2008, with failure to report HCAHPS scores resulting in a APU reduction of up to 2%. HCAHPS data are currently available for about 3,900 hospitals, almost 90% of eligible hospitals.<sup>9</sup>

In 2010, the Affordable Care Act (ACA) established the Hospital Value Based Purchasing (VBP) program in Medicare. This program is designed to incentivize the provision of high-value, high-quality care through payment reform beginning FY2013.<sup>2,12,13</sup> Under VBP, performance on HCAHPS measures accounts for 30 percent of the payment incentive formula for participating hospitals.<sup>13</sup> The inclusion of patient experience-of-care scores in the new payment reforms has led to debate as to whether patient satisfaction is an accurate measure of true hospital quality compared to historically commonly used process and outcomes measures. Evidence that hospitals with specific, and often immutable, characteristics may consistently score higher on measures of patient experience-of-care further questions the value of patient satisfaction as a measure of hospital quality.<sup>14</sup>

By comparing hospital level measures, prior literature has identified associations between quality of care, measured as compliance with diagnosis-specific process measures, and patient satisfaction.<sup>15-17</sup> This paper adds to this growing body of literature by comparing patient experience-of-care scores reported in HCAHPS to 23 diagnosis-specific process and outcomes measures for heart failure, acute myocardial infarction (AMI), and pneumonia. The findings from this analysis will further inform the relationship between two types of quality indicators: process measures and patient satisfaction measures. A better understanding of this relationship is critical, as health policymakers continue to make decisions regarding the appropriate use of patient satisfaction scores in funding formulas and overall quality scores.

## Data and Methodology

### Data

This analysis uses diagnosis-specific process and outcome variables and patient experience-of-care scores from the Centers for Medicare & Medicaid Services (CMS) Hospital Compare website.<sup>11</sup> Hospital Compare is a publicly available database reporting data collected from a variety of sources aggregated to the hospital level. Diagnosis-specific process and outcome variables are reported from Medicare enrollment and claims data and data submitted by hospitals to the QIO Clinical Data Warehouse.<sup>11</sup> Patient experience-of-care scores are

reported from the HCAHPS survey.<sup>10</sup> The details of these datasets are discussed in detail below. Our analytic sample includes data reported for 1333 hospitals in 14 states (AZ, AR, CA, CO, FL, IA, MD, MA, NJ, NY, NC, RI, UT, WA) from 2009-2011. In 2009, our hospital database represented 31% of all the nation's hospitals and 42% of all inpatient discharges.<sup>18</sup>

### Dependent Variables

The HCAHPS survey is administered by hospitals through one of four modes of survey administration: mail only; telephone only; mail with telephone follow-up; and active interactive voice response. The survey takes approximately seven minutes for sampled patients to complete and is conducted between 48 hours and 6 weeks after patient discharge. A random sample of eligible discharges from a hospital is drawn on a monthly basis. Discharges are eligible for inclusion in this random sample for discharged patients 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 for the following reasons: discharge into hospice care, nursing homes, or skilled nursing facilities; prisoner status; foreign home address; and/or "no-publicity" status. Survey results reported on Hospital Compare are adjusted for patient-mix and mode of data collection, but not for race nor for ethnicity.<sup>8</sup>

The HCAHPS survey consists of 27 survey items used to construct 10 measures publicly reported on Hospital Compare; we use these 10 measures as our dependent variables. Of the 10 measures, 6 are 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 are individual survey items: "Rooms were always quiet" and "Rooms were always clean"; and 2 are global ratings: "High overall hospital rating" and "Would definitely recommend hospital to family and friends". We report top-box scores (the percent of surveyed patients who responded "always" or "yes" to a question) for each measure.<sup>9</sup>

### Independent Variables

To examine the relationship between clinical quality and these patient experience-of-care scores, we categorize hospitals according to diagnosis-specific process measures reported in the Hospital Compare database for three diagnoses: 1). heart failure; 2). acute myocardial infarction (AMI); and 3). pneumonia.<sup>11</sup> These measures were selected for public reporting by CMS, the hospital industry, and a range of stakeholders including The Joint Commission (TJC), AHRQ, and NQF.<sup>11</sup> Measures are

not risk adjusted because when calculating receipt of recommended treatment, only patients for whom that treatment is recommended are included. Hospitals with low scores for the outcome measures (30-day mortality and readmission rates) are considered high quality. For the remaining process measures, hospitals with high scores are considered high quality.

For heart failure, we categorized hospitals according to 6 measures: 30 day mortality rate; 30 day readmission rate; patients given discharge instructions; patients given an evaluation of LVS function; patients given ACE inhibitor or ARB for LVSD; and patients given smoking cessation advice/counseling.

For AMI, we categorized hospitals according to 9 measures: 30-day mortality rate; 30-day readmission rate; patients given aspirin at arrival; patients given aspirin at discharge; patients given ACE inhibitor or ARB for LVS; patients given beta blocker at discharge; patients given smoking cessation advice/counseling; patients given fibrinolytic medication within 30 minutes of arrival; and patients given PCI within 90 minutes of arrival.

For pneumonia, we categorized hospitals according to 8 measures: 30 day mortality rate; 30 day readmission rate; patients assessed and given pneumococcal vaccination; patients whose initial emergency room blood culture was performed prior to administration of first hospital dose of antibiotics; patients given smoking cessation advice/counseling; patients given initial antibiotics within 6 hours after arrival; patients given the most appropriate initial antibiotic; and patients assessed and given influenza vaccination.

### **Analytic Methodology**

We compare hospital scores on diagnosis-specific process and outcome measures to patient experience-of-care scores using quartile analysis. This analytic method divides an array of data into four equally sized sections (quartiles) and allows for the comparison across categories.<sup>19,20</sup> Hospitals were sorted into three groups for each independent variable: high (top quartile for the measure); medium (middle two quartiles for the measure); and low (bottom quartile for the measure). The percentage of patients reporting top-box patient experience-of-care scores were then compared across hospitals classified by each diagnosis-specific process and outcome measure. 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 measuring the 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.<sup>21</sup>

## **Results**

### **Hospital Characteristics**

Table 1 presents the means, standard deviations, and inter-quartile ranges of experience-of-care scores and diagnosis-specific process and outcomes measures for 1333 hospitals in the 14 states. Across all states, the majority of patients gave their hospital high ratings. The fewest patients, 54.4%, reported that rooms were always quiet, while the most patients, 81.8%, reported that their hospital always communicated about discharge information.

Mortality rates were highest for AMI patients (15.6%), while readmission rates were highest for heart failure patients (24.8%). The majority of diagnosis-specific process measures were observed at over 90 percent of hospitals with three exceptions: heart failure patients given discharge instructions (87.6%), AMI patients given PCI within 90 minutes of arrival (87.3%), and AMI patients given fibrinolytic medication within 30 minutes of arrival (50.8%).

### **Summary of Results**

We found significant differences in patient experience-of-care scores when hospitals are classified by diagnosis-specific process and outcome measures. We found nearly no significant differences in changes in experience-of-care scores 1999-2011 when the same classification was applied.

Of the 230 relationships studied, significant differences in mean HCAHPS scores were observed for 195 (85%) disease-specific process and outcomes measure – patient experience-of-care score combinations ( 2). Significant differences in experience-of-care scores by hospital characteristics were observed fairly consistently across the 10 HCAHPS measures, with significant relationships observed 16-22 out of 23 times (70-90%) per HCAHPS measure. Significant differences were observed the least often for discharge communication and the most often for staff responsiveness. Heart failure quality measures had the most significant relationships with HCAHPS scores (56/60, 85 percent), followed by pneumonia quality measures (65/80, 81 percent), and AMI quality measures (74/90, 82 percent).

**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	
<b><u>HCAHPS - Patients' Experience of Care Scores</u></b>					
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
<b><u>Heart Failure Outcome and Process Measures</u></b>					
Heart Failure mortality rate	11.20%	1.12%	10.47%	11.90%	1339
Heart Failure readmission rate	24.77%	1.46%	23.80%	25.63%	1344
Patients Given Discharge Instructions	87.58%	13.51%	85.17%	95.67%	1360
Patients Given an Evaluation of LVS Function	94.65%	11.39%	96.00%	99.67%	1360
Patients Given ACE Inhibitor or ARB for LVSD	93.12%	9.90%	92.00%	98.33%	1341
Patients Given Smoking Cessation Advice/Counseling	95.05%	14.84%	97.67%	100.00%	1328
<b><u>Acute Myocardial Infarction (AMI) Outcomes and Process Measures</u></b>					
AMI mortality rate	15.59%	1.19%	14.87%	16.30%	1156
AMI readmission rate	19.88%	1.19%	19.10%	20.60%	1095
Patients Given Aspirin at Arrival	97.35%	7.37%	97.67%	100.00%	1276
Patients Given Aspirin at Discharge	96.46%	9.06%	97.00%	100.00%	1265
Patients Given ACE Inhibitor or ARB for LVS	95.16%	10.43%	94.67%	100.00%	1185
Patients Given Beta Blocker at Discharge	96.02%	10.32%	96.67%	100.00%	1266
Patients Given Smoking Cessation Advice/Counseling	98.03%	9.86%	100.00%	100.00%	1144
Patients Given Fibrinolytic Medication Within 30 Minutes Of Arrival	50.77%	41.52%	0	100.00%	342
Patients Given PCI Within 90 Minutes Of Arrival	87.28%	14.67%	84.50%	96.00%	845
<b><u>Pneumonia Outcomes and Process Measures</u></b>					
Pneumonia mortality rate	11.74%	1.32%	10.83%	12.57%	1354
Pneumonia readmission rate	18.52%	1.19%	17.65%	19.27%	1355
Patients Assessed and Given Pneumococcal Vaccination	91.78%	9.56%	90.00%	97.00%	1367
Patients Whose Initial Emergency Room Blood Culture Was Performed Prior to Administration of First Hospital Dose of Antibiotics	94.74%	6.03%	93.67%	97.67%	1363
Patients Given Smoking Cessation Advice/Counseling	94.05%	12.93%	95.00%	100.00%	1363
Patients Given Initial Antibiotic(s) within 6 Hours After Arrival	94.76%	6.79%	93.67%	97.67%	1366
Patients Given the Most Appropriate Initial Antibiotic(s)	92.33%	6.12%	90.67%	96.00%	1368
Patients Assessed and Given Influenza Vaccination	90.03%	10.55%	87.33%	96.50%	1363

We found nearly no significant differences in changes in experience-of-care scores from 2009-2011 by diagnosis-specific process and outcome measures (Table 3). Out of the 230 relationships studied, significant differences

in changes in HCAHPS scores were observed for only 8 (3.5%) disease-specific process and outcomes measure – patient experience-of-care score combinations. No significant differences in changes in HCAHPS scores

**Table 2. Summary of Mean Experience of Care Score Results 2009-2011 by Diagnosis**

HCAHPS Measure	Overall Significance	Heart Failure	AMI	Pneumonia
High Overall Rating of the Hospital	19/23	6/6	6/9	7/8
Patient Would Definitely Recommend Hospital	21/23	5/6	8/9	8/8
Hospital Staff Was Responsive	22/23	6/6	8/9	8/8
Doctors Always Communicated Well	21/23	6/6	8/9	7/8
Nurses Always Communicated Well	18/23	6/6	7/9	5/8
Always Communicated About Meds	19/23	6/6	8/9	5/8
Always Communicated About Discharge Information	16/23	4/6	6/9	6/8
Pain Was Always Well Controlled	18/23	5/6	8/9	5/8
Rooms Were Always Quiet	21/23	6/6	8/9	7/8
Rooms Were Always Clean	20/23	6/6	7/9	7/8
<b>Total</b>	195/230	56/60	74/90	65/80

were observed for heart failure (0/60, 0%), while only a few were found for AMI (6/90, 7%) and pneumonia (2/80, 2.5%) measures.

***Experience-of-Care Scores by Hospital Diagnosis-Specific Process and Outcome Measures***

Tables 4-7 report hospital experience-of-care scores by diagnosis-specific process and outcome measures. For each measure, hospitals are categorized as lowest quartile (low), middle two quartiles (medium), or highest quartile (high).

***Experience-of-Care Scores by Outcome Measures***

We categorized hospitals by their performance on 30 day mortality and 30 day readmission rates for each diagnosis: heart failure, AMI, and pneumonia (Table 4). Differences were significant for all 10 patient satisfaction measures when categorized by readmissions rates for all three diagnoses and by heart failure mortality rate. For AMI mortality rate, differences were significant for willingness to recommend the hospital,

medication communication, and quietness of rooms. When classified by pneumonia mortality rate, for willingness to recommend the hospital, staff responsiveness, doctor communication, and medication communication.

Hospitals with lower AMI, heart failure, and pneumonia readmission rates scored higher across measures. For AMI and heart failure mortality rates, hospitals with higher rates reported higher scores across all measures. Hospitals with low pneumonia mortality rates reported higher scores for willingness to recommend the hospital, but the highest scores for staff responsiveness, doctor communication, and medication communication were all for hospitals with high mortality rates.

***Experience-of-Care Scores by Heart Failure Process and Outcome Measures***

We categorized hospitals by their performance on 4 process measures for heart failure (Table 5) and found that differences were significant for all 10 measures

**Table 3. Summary of Changes in Experience of Care Score Results 2009-2011 by Diagnosis**

HCAHPS Measure	Overall Significance	Heart Failure	AMI	Pneumonia
High Overall Rating of the Hospital	1/23	0/6	1/9	0/8
Patient Would Definitely Recommend Hospital	1/23	0/6	1/9	0/8
Hospital Staff Was Responsive	3/23	0/6	1/9	2/8
Doctors Always Communicated Well	0/23	0/6	0/9	0/8
Nurses Always Communicated Well	1/23	0/6	1/9	0/8
Always Communicated About Meds	0/23	0/6	0/9	0/8
Always Communicated About Discharge Information	1/23	0/6	1/9	0/8
Pain Was Always Well Controlled	0/23	0/6	0/9	0/8
Rooms Were Always Quiet	1/23	0/6	1/9	0/8
Rooms Were Always Clean	0/23	0/6	0/9	0/8
<b>Total</b>	8/230	0/60	6/90	2/80

when categorizing 30 day mortality, 30 day readmission rate, ACE Inhibitor or ARB for LVS Dysfunction, or smoking cessation advice/counseling. Hospitals with either low- or high-compliance with ACE Inhibitor or ARB for LVS Dysfunction and with smoking cessation advice/counseling reported higher scores than those in the middle category.

When categorized by performance of evaluation of LVS function, we found significant differences for 9 of the 10 measures: differences were not significant for discharge communication. Hospitals with either low- or high- compliance reported higher scores than those in the middle category; those categorized as low-compliance scored the highest for most measures. Finally, classification of hospitals by discharge instructions resulted in 7 of 10 significant differences by category: differences were not significant for willingness to recommend, discharge communication, and pain control. Low-compliance hospitals reported the highest scores across all 7 measures.

#### ***Experience-of-Care Scores by AMI Process and Outcome Measures***

We next categorized hospitals by their performance on 7 process measures for AMI (Table 6). When categorized by administration of aspirin at arrival and at discharge, all 10 measures were significantly different; high-compliance hospitals also had higher experience-of-care scores. When categorized by ACE inhibitor or ARB for LVS dysfunction, 7 of 10 measures were significantly different: differences were not significant for overall hospital rating, nurse communication, and discharge communication. High-compliance hospitals had the highest scores (except for willingness to recommend, for which the middle category had the highest score.)

When categorized by beta blocker at discharge or fibrinolytic medication within 30 minutes of arrival, all 10 measures were significantly different and, again, high-compliance hospitals reported higher experience-of-care scores (except for fibrinolytic medication and room quietness, for which low-compliance hospitals scored higher). For PCI within 90 minutes of hospital arrival, 7 of 10 measures were significant: differences were not significant for medication communication, quietness of rooms, and cleanliness of rooms. Patient experience-of-care scores were higher for high-compliance hospitals. Finally, when categorized by smoking cessation advice/counseling, 7 of 10 measures were significantly different; differences were not significant for overall hospital rating, willingness to recommend, and discharge communication. Hospitals that did *not* provide smoking cessation services scored highest on patient experience-of-care scores.

#### ***Experience-of-Care Scores by Pneumonia Process and Outcome Measures***

In Table 7, we categorized hospitals by their performance on 6 process measures for pneumonia. We found significant differences in experience-of-care scores for all 10 HCAHPS measures when hospitals were categorized by smoking cessation advice/counseling, and initial antibiotic timing. Hospitals with low provision of smoking cessation services, and high compliance with the initial antibiotic timing process measure all reported consistently higher scores across experience-of-care measures.

When categorized by compliance with pneumococcal vaccination, 7 of 10 measures were significantly different; differences were not significant for nurse communication, medication communication, and pain control. Differences in scores by this classification were inconsistent: high-compliance hospitals reported higher scores for overall hospital rating, willingness to recommend hospital, and communication about discharge information, but lower scores for doctor communication and cleanliness and quietness of rooms. When categorized by compliance with influenza vaccination, 7 of 10 measures were significantly different; differences were not significant for doctor communication, nurse communication, and medication communication. High-compliance hospitals reported higher scores for all measures except room cleanliness, which was highest for low-compliance hospitals.

When categorized by compliance with a process measure of blood cultures, differences were significant for 8 of 10 measures; differences were not significant for medication communication and pain control. High-compliance hospitals reported higher scores for all measures except for hospital staff responsiveness and doctor communication, for which low-compliance hospitals scored the highest (high-compliance hospitals were still higher scoring than the middle category). Finally, when categorized by compliance with antibiotic selection, differences were significant for 9 of 10 measures; differences were not significant for discharge communication. Low-compliance hospitals reported the highest scores across measures, except for hospital recommendation, for which high-compliance hospitals reported the highest scores (low-compliance hospitals still reported higher scores than the middle category).

#### ***2009-2011 Changes in Experience-of-Care Scores by Outcome Measures***

There were no statistically significant differences in change in experience-of-care scores for hospitals when categorized by mortality for heart failure or AMI or readmission rates for heart failure, AMI, or pneumonia (Table 4). When categorized by mortality rate for pneumonia, improvements in scores for staff

responsiveness were statistically greater for low mortality hospitals.

#### ***2009-2011 Changes in Experience-of-Care Scores by Heart Failure Process and Outcome Measures***

There were no statistically significant differences in change in experience-of-care scores for hospitals when categorized by any of the 4 heart failure process measures (Table 5).

#### ***2009-2011 Changes in Experience-of-Care Scores by AMI Process and Outcome Measures***

There were no statistically significant differences in changes in experience-of-care scores for hospitals when categorized by fibrinolytic medication within 30 minutes of arrival, PCI received within 90 minutes of arrival, or smoking cessation advice/counseling for AMI patients (Table 6). When categorized by aspirin at arrival, improvements in scores for willingness to recommend

were statistically greater for low-compliance hospitals. When categorized by aspirin at discharge, improvements in scores for staff responsiveness were statistically greater for low-compliance hospitals. When categorized by ACE inhibitor or ARB for LVS dysfunction, improvements in scores for nurse communication and quietness of rooms were statistically greater for low-compliance hospitals. When categorized by beta blocker at discharge, improvements in scores for overall rating and discharge communication were statistically greater for low-compliance hospitals.

#### ***2009-2011 Changes in Experience-of-Care Scores by Pneumonia Process and Outcome Measures***

There were no statistically significant differences in change in experience-of-care scores for hospitals when categorized by pneumococcal vaccination, blood culture, antibiotic selection, smoking cessation advice/counseling, or antibiotic timing for pneumonia patients (Table 7). When categorized by influenza vaccine, improvements in scores for staff responsiveness were statistically greater for low-compliance hospitals.

## **Discussion**

We observed significant differences in patient experience-of-care scores when hospitals are classified by diagnosis-specific process and outcome measures. For the majority of measures, high scores on the quality metrics were associated with high patient scores, however some relationships were mixed. Overall, hospitals with high scores for process quality measures also score high for patient satisfaction measures. Considering changes from 2009-2011 rather than overall scores, there were almost no significant differences in

changes among diagnosis-specific process and outcome measures.

Despite these important contributions, our study has limitations. As noted in prior work, the 34 percent average response rate to the HCAHPS post-discharge survey leads to the possibility of non-response bias.<sup>21,22</sup> 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.<sup>23</sup> While we analyze 23 measures of clinical quality, these measures are limited to three conditions: heart failure, AMI, and pneumonia. Therefore, our results may not be generalizable to measures for other conditions, surgical quality, or general clinical quality. Finally, despite the findings of statistical significance, we are unable to determine causation. While hospitals with high scores on diagnosis-specific measures consistently score higher on measures of patient experience-of-care, we cannot assess the nature or causality of this relationship.

These findings support prior literature, which has found associations between high quality hospitals and high patient satisfaction scores.<sup>15-17</sup> Though we are unable to establish causality, the correlation between patient satisfaction and clinical quality suggests that patients may be able to discern, and report accurately, the quality of hospital care they receive. It is also possible, however, that these high patient satisfaction scores are unrelated to the clinical quality of care received.

The lack of significant improvements in patient satisfaction scores by clinical quality measures suggests that patient scores may not be impacted by clinical quality. However, this analysis compares three-year mean clinical quality scores to changes in patient satisfaction. More informative analysis would compare changes in clinical quality scores to changes in patient satisfaction to assess how patients react to changes in clinical quality.

Consistent confirmation of the relationship between clinical quality and patient satisfaction provides support for the inclusion of HCAHPS patient experience-of-care scores in the VBP formula, as hospitals traditionally viewed as high-quality are receiving similarly high scores from patients. Further research is necessary, however, to determine if patient scores are influenced by the clinical quality of care received.

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**Table 4. Experience-of-Care Scores by Outcomes Measures for Heart Failure, AMI, and Pneumonia (2009-2011)**

HCAHPS Measure	Statistic	30 Day Mortality Heart Failure			30 Day Readmission Rate Heart Failure			30 Day Mortality AMI			30 Day Readmission Rate AMI			30 Day Mortality Pneumonia			30 Day Readmission Rate Pneumonia		
		Low (350)	Med. (665)	High (324)	Low (353)	Med. (648)	High (343)	Low (293)	Med. (598)	High (265)	Low (283)	Med. (544)	High (268)	Low (330)	Med. (688)	High (336)	Low (339)	Med. (690)	High (326)
High Overall Rating of the Hospital	3 yr mean	63.6 <sup>c</sup>	66.6	67.1	68.9 <sup>c</sup>	66.5	61.9	65.4	64.9	64.8	68.2 <sup>c</sup>	64.5	61.9	66.2	65.9	65.7	68.8 <sup>c</sup>	66.1	62.5
	% chg	7.3	5.8	5.5	7.5	5.6	5.8	6.1	5.6	6.8	3.0	6.8	6.8	6.8	6.4	4.9	7.2	6.1	5.1
Patient Would Definitely Recommend Hospital	3 yr mean	67.0 <sup>c</sup>	69.2	69.4	71.5 <sup>c</sup>	69.1	65.0	69.3 <sup>b</sup>	68.0	67.2	71.6 <sup>c</sup>	67.7	65.3	69.8 <sup>b</sup>	68.5	67.9	71.2 <sup>c</sup>	68.8	66.0
	% chg	5.8	4.4	3.9	4.8	4.9	4.2	5.3	4.4	4.8	1.8	5.1	6.3	5.1	5.3	3.1	5.6	4.8	3.6
Hospital Staff Was Responsive	3 yr mean	58.4 <sup>c</sup>	62.2	64.2	64.2 <sup>c</sup>	62.2	58.2	59.9	60.3	60.9	62.1 <sup>c</sup>	59.9	57.9	60.3 <sup>c</sup>	62.0	62.5	64.5 <sup>c</sup>	61.8	58.7
	% chg	6.9	4.5	4.2	4.9	5.6	4.4	3.8	5.4	5.5	2.4	5.9	5.2	6.4 <sup>a</sup>	5.7	2.5	5.8	4.9	4.9
Doctors Always Communicated Well	3 yr mean	76.8 <sup>c</sup>	78.5	79.9	79.6 <sup>c</sup>	78.6	76.8	77.5	77.8	77.9	78.7 <sup>c</sup>	77.6	76.5	77.6 <sup>c</sup>	78.5	79.0	79.6 <sup>c</sup>	78.4	77.2
	% chg	1.4	1.0	1.8	1.7	1.7	0.3	0.7	1.3	1.5	0.6	1.3	1.3	1.1	1.4	1.4	2.2	1.3	0.6
Nurses Always Communicated Well	3 yr mean	72.5 <sup>c</sup>	74.7	76.1	76.2 <sup>c</sup>	74.7	72.4	73.7	73.9	73.8	75.2 <sup>c</sup>	73.5	72.5	74.0	74.6	74.7	76.0 <sup>c</sup>	74.5	73.0
	% chg	3.6	3.5	3.5	3.7	3.7	3.2	3.1	3.3	4.2	2.1	4.1	3.3	3.6	4.0	2.5	3.9	3.4	3.5
Always Communicated About Meds	3 yr mean	57.3 <sup>c</sup>	59.7	61.1	60.9 <sup>c</sup>	59.8	57.2	58.2 <sup>a</sup>	58.6	59.2	59.8 <sup>c</sup>	58.5	57.2	58.5 <sup>b</sup>	59.6	60.0	61.0 <sup>c</sup>	59.4	57.8
	% chg	4.9	4.8	4.7	4.5	5.6	3.7	4.1	4.9	5.4	3.0	5.2	5.6	4.6	5.3	3.9	4.9	5.0	4.4
Always Communicated About Discharge Information	3 yr mean	80.4 <sup>c</sup>	82.0	82.8	83.3 <sup>c</sup>	81.9	79.9	81.3	81.4	81.9	82.6 <sup>c</sup>	81.4	80.3	81.6	81.9	81.7	82.7 <sup>c</sup>	81.9	80.4
	% chg	2.9	3.1	2.6	2.6	3.1	3.1	3.2	3.2	2.3	2.6	2.8	3.4	2.7	3.1	3.0	3.0	3.1	2.7
Pain Was Always Well Controlled	3 yr mean	66.4 <sup>c</sup>	68.3	69.0	69.0 <sup>c</sup>	68.3	66.2	67.3	67.5	67.4	68.5 <sup>c</sup>	67.4	66.2	67.8	68.1	67.9	69.2 <sup>c</sup>	68.1	66.5
	% chg	2.9	2.5	1.9	2.8	2.7	2.0	2.1	2.3	3.2	1.8	2.8	2.5	2.6	3.0	1.5	2.8	2.5	2.3
Rooms Were Always Quiet	3 yr mean	52.1 <sup>c</sup>	54.9	55.1	56.4 <sup>c</sup>	54.5	51.6	52.3 <sup>a</sup>	53.5	53.8	54.6 <sup>c</sup>	53.1	50.7	53.6	54.4	54.7	55.9 <sup>c</sup>	54.5	52.1
	% chg	5.8	6.2	3.1	5.1	6.5	3.7	5.2	4.9	6.5	3.6	6.0	5.1	6.2	5.9	3.6	5.9	5.2	5.3
Rooms Were Always Clean	3 yr mean	67.6 <sup>c</sup>	70.3	71.7	71.8 <sup>c</sup>	70.3	67.4	68.6	68.6	69.4	70.1 <sup>c</sup>	68.6	66.8	69.2	70.1	70.4	72.3 <sup>c</sup>	70.0	67.3
	% chg	4.3	3.4	4.4	4.6	4.1	2.9	2.9	4.0	4.1	1.7	4.3	4.5	4.7	3.7	3.5	5.4	3.5	3.3

Table 5. Experience-of-Care Scores by Heart Failure Process Measures (2009-2011)

HCAHPS Measure	Statistic	Evaluation of LVS Function			ACE Inhibitor or ARB for LVSD			Discharge Instructions			Smoking Cessation Advice/Counseling		
		Low (346)	Med. (783)	High (231)	Low (360)	Med. (609)	High (372)	Low (344)	Med. (680)	High (336)	Low (336)	Med. (229)	High (763)
High Overall Rating of the Hospital	3 yr mean	67.8 <sup>c</sup>	64.9	67.2	66.4 <sup>c</sup>	64.6	67.5	67.1 <sup>a</sup>	65.6	65.7	66.6 <sup>c</sup>	63.4	66.3
	% chg	5.3	6.1	7.3	7.0	5.9	6.1	6.1	6.0	6.7	5.3	7.0	6.2
Patient Would Definitely Recommend Hospital	3 yr mean	69.0 <sup>c</sup>	68.1	70.6	68.4 <sup>c</sup>	68.0	70.3	68.8	68.7	68.8	68.8 <sup>c</sup>	66.9	69.2
	% chg	4.2	4.7	5.5	6.1	4.5	4.1	4.5	4.4	5.7	3.8	5.0	5.1
Hospital Staff Was Responsive	3 yr mean	66.3 <sup>c</sup>	60.0	61.3	63.4 <sup>c</sup>	59.8	63.0	64.7 <sup>c</sup>	60.9	60.5	63.3 <sup>c</sup>	58.2	61.8
	% chg	4.2	5.0	6.7	4.5	5.6	4.7	5.6	4.7	5.5	5.3	5.1	5.0
Doctors Always Communicated Well	3 yr mean	80.5 <sup>c</sup>	77.6	78.1	79.2 <sup>c</sup>	77.4	79.1	79.8 <sup>c</sup>	78.0	77.9	79.3 <sup>c</sup>	76.6	78.4
	% chg	1.3	1.0	2.4	1.3	1.3	1.4	1.4	1.2	1.5	1.3	2.2	1.0
Nurses Always Communicated Well	3 yr mean	76.3 <sup>c</sup>	73.8	74.4	75.3 <sup>c</sup>	73.5	75.1	75.6 <sup>c</sup>	74.3	73.8	75.2 <sup>c</sup>	72.5	74.6
	% chg	3.8	3.2	4.4	3.7	3.6	3.4	4.2	3.4	3.3	4.0	3.6	3.3
Always Communicated About Meds	3 yr mean	61.6 <sup>c</sup>	58.6	59.2	60.4 <sup>c</sup>	58.5	59.8	60.9 <sup>c</sup>	59.2	58.6	60.4 <sup>c</sup>	57.6	59.4
	% chg	3.9	4.7	6.3	5.3	4.7	4.5	4.6	4.5	5.6	4.7	5.2	4.7
Always Communicated About Discharge Information	3 yr mean	82.0	81.5	82.2	81.8 <sup>a</sup>	81.4	82.2	81.7	81.9	81.6	82.0 <sup>c</sup>	80.7	81.9
	% chg	3.8	2.8	2.7	3.4	3.0	2.5	3.5	2.9	2.7	3.9	2.9	2.6
Pain Was Always Well Controlled	3 yr mean	69.1 <sup>c</sup>	67.4	68.3	68.2 <sup>c</sup>	67.3	68.7	68.5	67.8	67.7	68.2 <sup>c</sup>	66.4	68.2
	% chg	2.4	2.2	3.9	2.8	2.7	2.0	3.2	2.2	2.6	3.1	2.6	2.2
Rooms Were Always Quiet	3 yr mean	57.6 <sup>c</sup>	53.1	53.7	55.5 <sup>c</sup>	52.8	55.2	57.0 <sup>c</sup>	53.3	53.4	55.4 <sup>c</sup>	51.2	54.3
	% chg	4.9	5.1	7.2	4.9	5.2	6.2	5.3	5.2	6.1	3.8	4.8	6.2
Rooms Were Always Clean	3 yr mean	73.9 <sup>c</sup>	68.6	69.0	71.6 <sup>c</sup>	68.3	70.8	72.7 <sup>c</sup>	69.1	69.0	71.9 <sup>c</sup>	66.8	69.7
	% chg	3.1	4.2	3.6	3.2	4.4	3.8	4.9	3.6	3.9	3.3	4.9	3.8

**Table 6. Experience-of-Care Scores by AMI Process Measures (2009-2011)**

HCAHPS Measure	Statistic	Aspirin at Arrival			Aspirin at Discharge			ACE Inhibitor or ARB for LVS			Beta Blocker at Discharge			Fibrinolytic Medication Within 30 Minutes of Arrival		PCI Within 90 Minutes of Arrival			Smoking Cessation Advice/Counseling		
		Low (326)	Med. (593)	High (357)	Low (354)	Med. (542)	High (369)	Low (302)	Med. (384)	High (499)	Low (322)	Med. (583)	High (361)	Low (110)	Med. (232)	Low (213)	Med. (441)	High (191)	Low (28)	Med. (232)	High (884)
High Overall Rating of the Hospital	3 yr mean	64.1 <sup>c</sup>	64.9	67.9	63.9 <sup>c</sup>	65.5	66.9	64.2	65.2	65.3	64.1 <sup>c</sup>	65.1	67.2	63.1 <sup>c</sup>	63.4	64.2 <sup>a</sup>	65.4	66.0	64.2	64.0	65.2
	% chg	8.7	5.1	5.7	6.8	6.4	5.1	8.1	5.4	5.5	8.9 <sup>a</sup>	4.9	5.9	9.0	9.5	4.7	5.6	6.4	3.3	7.2	6.0
Patient Would Definitely Recommend Hospital	3 yr mean	66.3 <sup>c</sup>	68.5	70.3	66.0 <sup>c</sup>	69.3	69.3	67.1 <sup>b</sup>	69.1	68.1	66.1 <sup>c</sup>	68.7	69.8	65.9 <sup>c</sup>	66.5	67.5 <sup>b</sup>	69.3	69.4	66.6	67.8	68.3
	% chg	8.0 <sup>a</sup>	3.0	4.8	5.7	4.5	4.1	6.0	4.6	4.1	7.6	3.4	4.3	6.7	8.6	1.7	4.5	5.0	-0.8	6.3	4.7
Hospital Staff Was Responsive	3 yr mean	61.2 <sup>c</sup>	59.3	64.1	60.8 <sup>c</sup>	59.5	63.7	60.4 <sup>c</sup>	59.3	61.4	60.8 <sup>c</sup>	59.6	63.7	58.3 <sup>c</sup>	58.5	58.9 <sup>a</sup>	59.4	60.6	63.2 <sup>c</sup>	58.5	60.5
	% chg	6.9	4.4	4.8	6.9 <sup>a</sup>	5.7	2.1	7.1	4.6	4.4	6.3	4.8	4.5	8.5	8.3	6.9	3.6	5.2	5.1	5.7	5.0
Doctors Always Communicated Well	3 yr mean	78.1 <sup>c</sup>	77.2	79.7	77.9 <sup>c</sup>	77.2	79.4	77.6 <sup>c</sup>	77.2	78.3	78.2 <sup>c</sup>	77.2	79.4	76.6 <sup>c</sup>	76.7	76.8 <sup>a</sup>	77.3	77.7	79.6 <sup>c</sup>	76.8	77.8
	% chg	1.9	0.9	1.3	1.0	1.8	0.5	1.7	1.2	1.0	1.1	1.3	1.3	0.7	2.5	1.4	1.3	0.7	0.5	2.2	1.1
Nurses Always Communicated Well	3 yr mean	73.8 <sup>c</sup>	73.2	75.9	73.6 <sup>c</sup>	73.4	75.5	73.6	73.5	74.1	73.6 <sup>c</sup>	73.4	75.6	71.7 <sup>c</sup>	72.2	72.7 <sup>a</sup>	73.6	73.9	74.5 <sup>b</sup>	72.8	73.9
	% chg	5.0	3.1	2.8	3.8	3.8	2.6	5.0 <sup>a</sup>	3.4	2.7	4.3	3.2	3.4	5.8	4.9	4.1	2.9	3.7	3.5	4.1	3.4
Always Communicated About Meds	3 yr mean	58.8 <sup>c</sup>	58.2	60.9	58.6 <sup>c</sup>	58.3	60.5	58.6 <sup>b</sup>	58.2	59.2	58.8 <sup>c</sup>	58.4	60.4	57.1 <sup>c</sup>	57.4	57.8	58.4	58.7	60.4 <sup>a</sup>	57.9	58.7
	% chg	6.3	3.8	5.5	6.3	4.8	3.2	6.2	4.4	4.2	6.3	4.3	4.2	6.4	8.0	5.1	3.7	5.4	0.8	4.7	4.9
Always Communicated About Discharge Information	3 yr mean	81.1 <sup>c</sup>	81.2	82.9	81.0 <sup>c</sup>	81.5	82.4	81.2	81.4	81.7	80.7 <sup>c</sup>	81.5	82.5	80.0 <sup>c</sup>	80.4	80.7 <sup>b</sup>	81.7	81.7	82.3	81.0	81.5
	% chg	3.7	2.5	3.1	3.2	2.7	3.1	3.6	2.9	2.5	4.3 <sup>b</sup>	2.3	2.8	3.9	4.2	3.3	2.3	3.3	2.9	3.2	2.9
Pain Was Always Well Controlled	3 yr mean	67.2 <sup>c</sup>	67.2	69.1	67.2 <sup>c</sup>	67.3	68.8	67.1 <sup>a</sup>	67.4	67.8	67.3 <sup>c</sup>	67.3	68.8	66.0 <sup>c</sup>	66.7	66.7 <sup>b</sup>	67.3	67.9	68.0 <sup>b</sup>	66.6	67.6
	% chg	3.7	2.1	2.2	2.6	3.2	1.1	3.8	2.1	1.9	3.2	2.4	1.9	4.6	3.9	3.2	2.0	2.2	1.8	3.6	2.3
Rooms Were Always Quiet	3 yr mean	53.8 <sup>c</sup>	52.1	56.2	53.3 <sup>c</sup>	52.4	55.8	52.7 <sup>c</sup>	52.1	54.2	54.0 <sup>c</sup>	52.2	55.7	51.0 <sup>c</sup>	50.4	52.7	52.1	53.5	55.6 <sup>a</sup>	52.0	53.1
	% chg	5.8	5.8	3.8	4.9	6.3	3.9	8.1 <sup>a</sup>	3.9	4.6	4.7	5.1	6.3	4.5	9.0	7.3	4.8	3.8	3.8	5.7	5.3
Rooms Were Always Clean	3 yr mean	69.5 <sup>c</sup>	67.9	71.8	69.5 <sup>c</sup>	68.3	70.9	69.1 <sup>c</sup>	67.9	69.6	69.5 <sup>c</sup>	68.3	71.0	67.9 <sup>c</sup>	67.9	68.0	68.0	68.7	71.9 <sup>c</sup>	67.8	68.9
	% chg	5.2	3.4	3.9	4.8 <sup>b</sup>	4.8	1.6	5.5	3.7	3.1	3.8	4.0	4.1	6.3	5.9	5.2	3.4	3.6	0.8	4.8	3.7

**Table 7. Experience-of-Care Scores by Pneumonia Process Measures (2009-2011)**

HCAHPS Measure	Statistic	Pneumococcal Vaccination			Influenza Vaccination			Blood Culture Before Antibiotics			Smoking Cessation Advice/Counseling			Appropriate Initial Antibiotic			Initial Antibiotic Within 6 Hours		
		Low (343)	Med. (687)	High (337)	Low (338)	Med. (687)	High (338)	Low (356)	Med. (679)	High (328)	Low (346)	Med. (552)	High (465)	Low (366)	Med. (703)	High (299)	Low (346)	Med. (706)	High (314)
High Overall Rating of the Hospital	3 yr mean	66.0 <sup>a</sup>	65.5	66.8	65.3 <sup>b</sup>	65.6	67.1	65.1 <sup>b</sup>	65.7	67.2	68.2 <sup>c</sup>	64.3	66.4	67.5 <sup>c</sup>	65.1	66.3	64.6 <sup>c</sup>	65.7	68.0
	% chg	7.9	5.4	6.4	7.4	5.7	6.1	7.6	5.8	5.8	5.0	7.2	5.4	6.2	6.1	6.2	5.6	5.7	7.7
Patient Would Definitely Recommend Hospital	3 yr mean	68.0 <sup>a</sup>	68.6	69.7	67.4 <sup>c</sup>	68.8	69.9	67.3 <sup>c</sup>	68.8	70.0	70.0 <sup>c</sup>	67.4	69.4	69.1 <sup>a</sup>	68.2	69.7	67.0 <sup>c</sup>	68.8	70.4
	% chg	6.3	3.9	5.2	4.8	4.8	4.5	5.8	4.2	5.0	2.9	6.0	4.0	4.7	4.6	5.0	3.5	4.3	6.9
Hospital Staff Was Responsive	3 yr mean	63.0 <sup>b</sup>	61.2	61.7	62.3 <sup>b</sup>	61.1	62.5	62.5 <sup>b</sup>	61.1	62.3	65.5 <sup>c</sup>	59.6	61.6	64.8 <sup>c</sup>	60.5	61.1	60.6 <sup>c</sup>	61.4	63.8
	% chg	7.5	4.6	4.4	8.2 <sup>a</sup>	4.8	3.4	6.8	4.9	4.2	5.1	5.1	5.1	4.6	5.2	5.4	5.9	4.7	5.3
Doctors Always Communicated Well	3 yr mean	79.1 <sup>b</sup>	78.1	78.2	78.8	78.2	78.5	78.8 <sup>a</sup>	78.1	78.7	80.3 <sup>c</sup>	77.4	78.3	79.9 <sup>c</sup>	77.8	78.1	77.9 <sup>c</sup>	78.2	79.3
	% chg	1.6	1.1	1.5	1.5	1.2	1.4	1.3	1.3	1.4	0.7	1.8	0.9	1.1	1.3	1.4	0.6	1.5	1.5
Nurses Always Communicated Well	3 yr mean	74.7	74.4	74.5	74.2	74.4	74.9	74.4 <sup>a</sup>	74.2	75.2	76.4 <sup>c</sup>	73.4	74.4	75.9 <sup>c</sup>	73.9	74.2	73.5 <sup>c</sup>	74.4	75.6
	% chg	4.8	3.2	3.4	4.9	3.2	3.2	4.0	3.4	3.6	3.1	4.1	3.1	3.0	3.8	3.6	3.6	3.5	3.7
Always Communicated About Meds	3 yr mean	60.0	59.3	59.3	59.6	59.3	59.6	59.7	59.2	59.7	61.8 <sup>c</sup>	58.3	59.1	60.9 <sup>c</sup>	58.9	59.0	58.7 <sup>c</sup>	59.3	60.5
	% chg	7.2 <sup>a</sup>	3.9	4.9	6.1	4.5	4.5	5.7	4.6	4.6	4.3	5.2	4.5	4.0	4.8	5.7	5.1	4.4	5.4
Always Communicated About Discharge Information	3 yr mean	81.0 <sup>c</sup>	81.9	82.2	81.1 <sup>b</sup>	81.9	82.1	81.0 <sup>c</sup>	82.0	82.2	82.5 <sup>c</sup>	81.3	81.7	82.1	81.6	81.8	80.7 <sup>c</sup>	82.0	82.4
	% chg	4.2	2.5	2.9	3.6	2.7	3.0	3.8	2.6	3.0	3.1	3.2	2.5	3.1	2.9	3.1	3.0	2.6	3.7
Pain Was Always Well Controlled	3 yr mean	68.0	67.9	68.1	67.4 <sup>b</sup>	67.9	68.7	67.9	67.8	68.5	69.3 <sup>c</sup>	67.0	68.2	68.9 <sup>c</sup>	67.5	68.0	67.1 <sup>c</sup>	67.9	69.0
	% chg	3.8	2.1	2.3	3.5	2.1	2.5	3.1	2.4	2.3	2.1	3.1	1.9	2.2	2.5	2.8	2.2	2.5	2.9
Rooms Were Always Quiet	3 yr mean	55.6 <sup>b</sup>	53.6	54.3	54.9 <sup>c</sup>	53.3	55.6	55.1 <sup>c</sup>	53.4	55.2	57.1 <sup>c</sup>	52.7	54.2	56.9 <sup>c</sup>	53.2	53.8	54.1 <sup>c</sup>	53.5	56.1
	% chg	6.6	5.2	4.9	7.2	4.6	5.6	4.3	6.4	4.5	4.0	5.1	6.5	4.5	5.3	6.5	6.3	5.2	5.1
Rooms Were Always Clean	3 yr mean	71.1 <sup>c</sup>	69.6	69.6	70.6 <sup>a</sup>	69.5	70.1	70.3 <sup>a</sup>	69.5	70.6	73.4 <sup>c</sup>	68.1	69.7	72.5 <sup>c</sup>	69.0	69.2	69.0 <sup>c</sup>	69.6	71.8
	% chg	5.4	3.7	3.3	5.4	3.3	4.1	5.7	3.8	2.7	4.0	3.9	3.9	4.6	3.9	3.5	5.2	3.3	4.0