

Relationship Between Patient-Reported Hospital Experience and 30-Day Mortality and Readmission Rates for Acute Myocardial Infarction, Heart Failure, and Pneumonia

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INTRODUCTION

The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey has focused hospitals' attention on patient experience metrics. Hospitals' HCAHPS scores have been publicly reported since 2008 and more recently used as part of the Hospital Value-Based Purchasing (HVBP) program^{1,2} as well as the CMS Overall Hospital Star Rating.³ As a component of the CMS Star Rating, HCAHPS scores carry significant weight in line with more traditional outcomes such as mortality and readmissions.³

However, little is known about the association of patient experience with mortality and readmissions. A direct association would support the use of patient experience metrics in evaluating hospitals, while an inverse association might suggest a tradeoff between patient experience and outcomes that would require specific consideration when comparing hospitals.

We sought to assess the relationship between hospital HCAHPS scores with hospital 30-day mortality and readmission rates for acute myocardial infarction (AMI), heart failure (HF), and pneumonia (conditions targeted by the HVBP program).

METHODS

Patient outcome and experience metrics were obtained from the Medicare Hospital Compare database at a hospital level.⁴ Outcome metrics included hospital 30-day risk-standardized mortality and readmission rates for AMI, HF, and PNA for the period between 7/1/2013 and 6/30/2016. Patient experience

metrics, derived from HCAHPS survey data collected between 10/1/2015 and 9/30/2016, were divided into measures of overall satisfaction and nine individual domains of patient experience. Of note, hospital outcome measures reported on Hospital Compare are risk-standardized to account for differences in case mix by age and comorbidities.

Relationships between outcome and patient experience measures were assessed with pair-wise Pearson correlation coefficients (weighted by patient volume). Statistical analyses were performed using SAS (version 9.4).

RESULTS

Study Sample

The numbers of hospitals for mortality and readmission analyses were, respectively, 2346 and 2137 for AMI; 3212 and 3234 for HF; and 3316 and 3322 for PNA.

Correlation Between Patient Experience and Outcome Measures

The HCAHPS overall satisfaction measures were inversely correlated with readmission rates for all three conditions assessed ($r = -0.22$ to -0.31 , $p < 0.001$) (Table 1). The overall satisfaction measures were also inversely associated with mortality rates for AMI and PNA ($r = -0.10$ to -0.20 , $p < 0.001$). However, no significant association was found with HF mortality.

All nine individual domains of patient experience (except quietness for AMI) were inversely correlated with readmission rates for AMI, HF, or pneumonia (Table 2). The strength of correlation was similar for all domains ($r = -0.16$ to -0.30 , $p < 0.001$) except quietness which had a weaker correlation.

In contrast, the correlations between the individual domains of patient experience and mortality were inconsistent and varied for different conditions. With AMI mortality, most domains were negatively correlated. With HF mortality, all nine domains of patient experience were positively correlated (except care transition), although the correlation was small

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Table 1 Pearson Correlation of Hospital Readmission Rates and Mortality Rates for AMI, HF and Pneumonia with Overall Satisfaction Metrics

	AMI 30-day readmission rate	HF 30-day readmission rate	PNA 30-day readmission rate	AMI 30-day mortality rate	HF 30-day mortality rate	PNA 30-day mortality rate
Overall hospital satisfaction rating	-0.22 ($p = <.001$)	-0.27 ($p = <.001$)	-0.23 ($p = <.001$)	-0.14 ($p = <.001$)	0.01 ($p = 0.525$)	-0.10 ($p = <.001$)
Would recommend hospital to a friend	-0.23 ($p = <.001$)	-0.31 ($p = <.001$)	-0.24 ($p = <.001$)	-0.20 ($p = <.001$)	-0.02 ($p = 0.259$)	-0.17 ($p = <.001$)

Table 2 Pearson Correlation of Hospital Readmission Rates and Mortality Rates for AMI, HF and Pneumonia with the Nine Domains of Patient Experience

	AMI 30-day readmission Rate	HF 30-day readmission rate	PNA 30-day readmission rate	AMI 30-day mortality rate	HF 30-day mortality rate	PNA 30-day mortality rate
Doctor communication	-0.16 ($p = <.001$)	-0.24 ($p = <.001$)	-0.20 ($p = <.001$)	-0.04 ($p = 0.036$)	0.08 ($p = <.001$)	0.03 ($p = 0.115$)
Nurse communication	-0.17 ($p = <.001$)	-0.25 ($p = <.001$)	-0.17 ($p = <.001$)	-0.13 ($p = <.001$)	0.05 ($p = 0.007$)	-0.06 ($p = <.001$)
Care transition	-0.20 ($p = <.001$)	-0.30 ($p = <.001$)	-0.23 ($p = <.001$)	-0.15 ($p = <.001$)	0.03 ($p = 0.068$)	-0.12 ($p = <.001$)
Discharge information	-0.23 ($p = <.001$)	-0.30 ($p = <.001$)	-0.22 ($p = <.001$)	-0.07 ($p = 0.001$)	0.11 ($p = <.001$)	0.02 ($p = 0.248$)
Communication about medicines	-0.18 ($p = <.001$)	-0.20 ($p = <.001$)	-0.18 ($p = <.001$)	-0.04 ($p = 0.073$)	0.10 ($p = <.001$)	0.01 ($p = 0.697$)
Staff responsiveness	-0.19 ($p = <.001$)	-0.24 ($p = <.001$)	-0.22 ($p = <.001$)	-0.10 ($p = <.001$)	0.11 ($p = <.001$)	0.00 ($p = 0.857$)
Pain management	-0.17 ($p = <.001$)	-0.25 ($p = <.001$)	-0.20 ($p = <.001$)	-0.08 ($p = <.001$)	0.06 ($p = <.001$)	-0.05 ($p = 0.006$)
Cleanliness	-0.19 ($p = <.001$)	-0.17 ($p = <.001$)	-0.17 ($p = <.001$)	-0.09 ($p = <.001$)	0.09 ($p = <.001$)	-0.08 ($p = <.001$)
Quietness	-0.04 ($p = 0.056$)	-0.10 ($p = <.001$)	-0.15 ($p = <.001$)	0.09 ($p = <.001$)	0.10 ($p = <.001$)	0.08 ($p = <.001$)

($r=0.05$ to 0.11). For PNA mortality, the correlations were mixed and either small or insignificant.

DISCUSSION

Using the CMS Hospital Compare dataset, we found that higher patient-reported overall satisfaction was associated with lower readmission rates for AMI, HF, and pneumonia, as well as lower mortality for AMI and pneumonia. Individual domains of patient experience were also inversely associated with readmissions for AMI, HF, and pneumonia, but mixed and inconsistent associations were found with mortality. Taken together, these results indicate an association between patient experience and outcomes which supports the use of patient experience metrics for assessing hospital quality.

We found a stronger and more consistent association between patient experience and hospital readmissions as compared with mortality. Readmissions are a complex and multifaceted challenge for hospital systems. It is intuitive that patient experience variables—which include communication regarding medicines and discharge plans—are integral to a successful discharge. In contrast, mortality may be driven more by illness severity. The lack of association between overall satisfaction and HF mortality is intriguing. The underlying cause is unclear, but may represent a difference in patient experience between acute and chronic conditions.

Our analysis suggests that patient-reported data can offer hospitals key insights into their performance, and may offer effective avenues for improving hospital outcomes. Additional work investigating the potential relationship between patient experience and outcomes needs to be undertaken to identify the direct mediators of this relationship.

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Compliance with Ethical Standards:

Conflict of Interest: Dr. Kumar Dharmarajan is the Chief Scientific Officer of Clover Health, a Medicare Advantage company. Dr. Erica Spatz reports receiving support from the Centers for Medicare & Medicaid Services to develop and maintain performance measures used in public reporting programs. Dr. Nihar Desai receives support from the Centers for Medicare & Medicaid Services to develop and maintain performance measures, the American College of Cardiology Foundation, the Agency for Healthcare Research and Quality (K12HS023000), and Johnson & Johnson, through Yale University, to develop methods of clinical trial data sharing. All remaining authors declare that they do not have a conflict of interest.

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