

Association Between Medicare Star Ratings for Patient Experience and Medicare Spending per Beneficiary for US Hospitals

Journal of Patient Experience
2017, Vol. 4(1) 17-21
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sagepub.com/journalsPermissions.nav
DOI: 10.1177/2374373516685938
journals.sagepub.com/home/jpx



Stephen Trzeciak, MD, MPH¹, John P Gaughan, MS, PhD, MBA¹,
Joshua Bosire, MS¹, Mark Angelo, MD¹, Adam S Holzberg, DO¹,
and Anthony J Mazzairelli, MD, JD, MBE¹

Abstract

Objective: To test the association between patient experience and Centers for Medicare and Medicaid Services (CMS) spending at the hospital level. **Methods:** Using CMS Hospital Compare data set, we analyzed 2014 data for CMS patient experience star ratings and the hospital Medicare Spending per Beneficiary (MSPB) Measure, which assesses price-standardized, risk-adjusted payments for services provided to Medicare beneficiaries for an episode of care from 3 days before hospital admission to 30 days following discharge. We tested the association using linear regression, adjusting for complexity of care using hospital Case Mix Index (CMI) and for socioeconomic status of the hospital patient population using Disproportionate Share Hospital (DSH) status. **Results:** The MSPB decreased with increasing hospital patient experience ratings. After adjustment for CMI and DSH, better hospital patient experience was associated with lower spending per episode (5.6% decrease from the lowest to highest patient experience star rating). **Conclusion:** We found that better hospital patient experience was associated with lower health-care spending. Further research is needed to define what specific elements and phases of the episode of care are driving the association.

Keywords

patient experience, patient satisfaction, hospitals, Medicare, health-care spending, cost

Introduction

Prior research suggests that superior patient experience (also termed “patient satisfaction”) may be associated with lower utilization of health-care resources, for example, fewer referrals to specialists and diagnostic testing (1-5). However, the relationship between patient experience and health-care spending by payers is currently unclear. Defining this relationship is very important from the payer perspective and may have substantial health policy implications. The objective of this study was to test the association between patient experience and health-care spending at the hospital level using (1) the Centers for Medicare and Medicaid Services (CMS) star ratings for patient experience in US hospitals and (2) the hospital Medicare Spending per Beneficiary (MSPB) Measure. Our hypothesis was that better patient experience in the hospital would be associated with lower health-care spending by the payer.

Methods

We analyzed 2014 hospital-level data from CMS Hospital Compare data set (6). Patient experience star ratings reflect hospital performance on the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey and are a summary score across all HCAHPS domains (7). The HCAHPS domains include, for example, patient assessment of caregiver listening and communication, treatment with courtesy and respect, quality of discharge instructions, and

¹ Cooper University Health Care and Cooper Medical School of Rowan University, Camden, NJ, USA

Corresponding Author:

Stephen Trzeciak, MD, MPH, Cooper University Hospital, One Cooper Plaza, Dorrance 428, Camden, NJ 08103, USA.
Email: trzeciak-stephen@cooperhealth.edu



Table 1. Data for MSPB Measure, Case Mix Index, and DSH Status (as Quantified by Low Income Days), Stratified by CMS Patient Experience Star Rating.^a

| | CMS Stars for Patient Experience | | | | |
|-------------------------|----------------------------------|--------------|-------------|-------------|-------------|
| | 1-Star | 2-Star | 3-Star | 4-Star | 5-Star |
| MSPB Measure | | | | | |
| Median (quartile range) | 1.01 (0.10) | 0.99 (0.09) | 0.97 (0.08) | 0.94 (0.09) | 0.92 (0.07) |
| Case Mix Index | | | | | |
| Median (quartile range) | 1.52 (0.30) | 1.52 (0.34) | 1.53 (0.40) | 2.04 (0.84) | 2.16 (0.57) |
| Low income days | | | | | |
| Median (quartile range) | 11136 (19130) | 6520 (12247) | 3612 (8400) | 187 (1579) | 77 (125) |

Abbreviations: CMS, Centers for Medicare and Medicaid Services; DSH, Disproportionate Share Hospital; MSPB, Medicare Spending per Beneficiary.

^aComplete data for all parameters were available for 2474 Hospitals.

whether a patient would recommend the hospital. The primary outcome measure for this study was health-care spending as quantified by the MSPB Measure, which assesses price-standardized, risk-adjusted payments for services provided to Medicare beneficiaries for an episode of care spanning from 3 days prior to an inpatient hospital admission through 30 days after discharge (8). The MSPB Measure evaluates hospitals' efficiency relative to the efficiency of the national median hospital, for example, MSPB Measure of 1.05 is 5% higher CMS spending than the median hospital (after risk adjustment). Thus, the MSPB Measure is a calculated efficiency metric for the entire episode of care that facilitates comparison of CMS spending efficiency across hospitals. The MSPB Measure risk adjustment methodology accounts for beneficiary age and severity of illness. The MSPB Measure price-standardization methodology removes the effect of geographic payment differences by excluding geographic differences in regional labor costs and practice expenses, as measured by hospital wage indexes and geographic practice cost indexes. The price-standardization methodology also removes the effect of add-on payments to teaching hospitals (eg, indirect medical education adjustment).

We used linear regression to test the association between the number of patient experience stars and the MSPB Measure. The model tested the effect that a 1-star rise in patient experience rating (eg, increasing from 3 to 4 stars) would have on MSPB. Since the star ratings for hospitals range from 1 (worst) to 5 (best), an inverse association (ie, negative slope) identifies an association between better experience and lower spending. We included hospital Case Mix Index (CMI) in the regression model to further adjust for complexity of care at the hospital level. We also included the Disproportionate Share Hospital (DSH) status (ie, DSH quartile) in the regression model, in order to adjust the analysis for the socioeconomic status of the hospital patient population. The DSH quartile reflects the proportion of underserved patients in the hospital population, with the highest quartile representing the most underserved patients. We tested the linearity assumption of the regression model by plotting the raw residuals and the studentized residuals against the patient

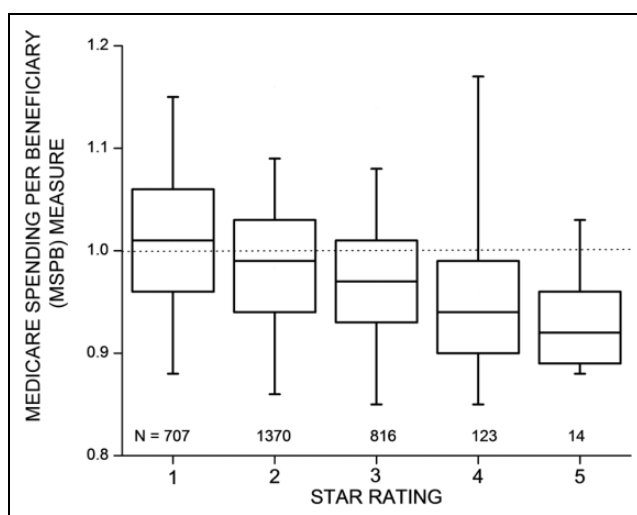


Figure 1. The Medicare Spending per Beneficiary (MSPB) Measure for US hospitals stratified by the Centers for Medicare and Medicaid Services (CMS) star rating for patient experience in the hospital (1 = worst; 5 = best). The MSPB Measure evaluates hospital efficiency relative to the efficiency of the national hospital median value, for example, MSPB Measure of 1.05 is 5% higher spending than the median hospital (after risk adjustment). The numbers (N) below each box-and-whisker plot are the numbers of hospitals in each star rating (total N = 3030 hospitals).

experience star rating, assessing for random distribution above and below 0 for all star categories and assessing the slopes for each star interval. We used a *P* value of <.05 to represent statistical significance. We used SAS version 9.4 (SAS Institute, Cary, North Carolina) for analysis.

All of the data used in this study are in the public domain and do not include patient-level identifiers; therefore, this study met criteria for exemption from review by the Institutional Review Board at Cooper University Health Care.

Results

Data for 3030 hospitals were included. Table 1 displays the summary values for the data used in the regression model. Figure 1 displays decreasing MSPB as patient experience

Table 2. Linear Regression with the Medicare Spending per Beneficiary (MSPB) Measure as the Dependent Variable.

| Variable | Parameter Estimate | Standard Error | t Value | P |
|--|--------------------|----------------|---------|--------|
| CMS star rating for patient experience | −0.014 | 0.002 | −6.94 | <.0001 |
| CMI | 0.038 | 0.005 | 8.05 | <.0001 |
| DSH quartile | 0.011 | 0.002 | 7.02 | <.0001 |

Abbreviations: CMI, Case Mix Index; CMS, Centers for Medicare and Medicaid Services; DSH, Disproportionate Share Hospital; MSPB, Medicare Spending per Beneficiary.

^aThe model tested the effect that a 1-star rise in patient experience rating (eg, increasing from 3 to 4 stars) would have on MSPB. Since the star ratings for hospitals range from 1 (worst) to 5 (best), an inverse association (ie, negative slope) identifies an association between better experience and lower spending. Complete data for the regression model were available for 2474 hospitals. The F value was 86.21 and the R Square was 0.087 for the regression model. A 1-star rise in patient experience was associated with a 1.4% decrease in spending. This translates to a 5.6% decrease in spending from the lowest to highest patient experience star rating.

star ratings increase (unadjusted). In the regression model (Table 2) adjusting for CMI ($b = 0.041$, $P < .0001$) and DSH quartile ($b = 0.011$, $P < .0001$), we found that a 1-star rise in patient experience was associated with a 1.4% decrease in spending as measured by the MSPB Measure ($b = -0.014$, $P < .0001$). This translates to a 5.6% decrease in hospital spending over the range of values from the lowest to highest patient experience star rating.

In testing the linearity assumption of the regression model, we found the residuals were randomly distributed above and below 0 for all star categories, and the slopes for each star interval were similar except the 1-star and 2-star intervals, which were not significant. Thus, the linearity assumption was valid.

Discussion

In this study, we found that better patient experience in US hospitals—as measured by CMS patient experience star ratings—was independently associated with lower health-care spending per episode for Medicare beneficiaries. Importantly, this study analyzed actual spending by a payer (Medicare) rather than relying on estimates of hospital costs as a proxy and adjusted for the hospitals' complexity of care and the socioeconomic status of the hospital patient population. We submit that these results are potentially important from the payer perspective and support the inclusion of patient experience data in the framework of value-based purchasing. We also believe these data provide scientific rationale for a research agenda to further test the patient experience–health-care spending relationship.

As the primary outcome measure for this study was the overall MSPB Measure, a calculated efficiency metric for all of the spending for an episode of care from 3 days prior to admission to 30 days following discharge, and Hospital Compare data set does not contain separate calculations for the component parts of the episode, our study did not precisely identify what specific elements or phases of the episode of care are responsible for the association between better patient experience and lower spending. Nonetheless, we are able to consider the potential drivers of the observed

results based on knowledge of the MSPB Measure methodology. First, the 3-day period prior to hospital admission only represents 1.5% of the total spending per episode of care nationally (9), so this phase of therapy is unlikely to be a substantial driver of the observed association. Second, it is possible that—at least to some extent—the observed association is reflecting discretionary use of health-care resources in the hospital. Providers who are diligent about providing excellent patient experience may be similarly diligent about excellence in all aspects of patient care, including efficiency and stewardship of resources. Superior patient experience may also reduce patient expectations for testing and/or referrals to specialists, and thus, providers who consistently provide superior patient experience may be less reliant on testing and referrals (2-5). Although Medicare payments to hospitals for an inpatient stay are a fixed amount according to Diagnosis-Related Group assignment, the MSPB Measure also includes Medicare spending under Medicare Part B (eg, payments to physicians), and thus could reflect, for example, excessive consultations, procedures, and professional fees for interpretation of diagnostic tests. In addition, the MSPB Measure includes “outlier” payments to hospitals and thus can reflect payments for cases of unusually costly inpatient care. Finally, given that HCAHPS surveys are always administered and completed following discharge from the hospital, we believe it is likely that a substantial driver of the association between better patient experience and lower spending for the episode of care relates to the 30 days following discharge from the hospital. For example, the MSPB Measure reflects the spending associated with readmissions to the hospital. Superior patient experience can inspire patient confidence in (and adherence to) a treatment plan, both in the hospital and following discharge, and better adherence to treatment makes readmission to the hospital less likely. Prior research has demonstrated that better patient experience in the hospital is associated with lower 30-day readmissions (10,11). Further, patients requiring readmission to the hospital may be more likely to give a poor rating to the care that they received during the index admission to the hospital. Importantly, the MSPB Measure also reflects the spending associated with utilization of

(and length of stay in) postacute care facilities such as a skilled nursing facility (SNF). Patients who do better following discharge, that is, have better outcomes, may be more likely to rate their care in the hospital favorably. Patients who require SNF care following discharge (as opposed to home care, which is far less expensive than SNF) may be more likely to rate their care unfavorably. As such, superior patient experience data may be a proxy assessment of better patient outcome or functional improvement, that is, patient-reported outcome measure (PROM; 12-15). We suggest that, from a payer (Medicare) perspective, it is not necessarily critical to discriminate if patient experience survey data are actually a PROM rather than a pure patient-reported experience measure (PREM), because both PROMs and PREMs are valuable in the context of value-based purchasing, that is, paying for better outcomes in addition to better experience (15).

It is also important to consider that quality of care could mediate the observed association to some extent. As the HCAHPS survey assesses vital processes of care, such as treatment with courtesy and respect, coordination of care, and the quality of communication including discharge instructions, we submit that it is intuitive that patient experience is an indicator of the quality of care (14). Numerous prior studies have reported that superior patient experience is associated with high-quality care (1), which may be more efficient than low-quality care from a health-care spending perspective. Thus, despite our inability to pinpoint the specific elements or phases of the episode of care driving the observed association in this study, we believe the results represent an important signal aligning with the “triple aim” of value-based programs—to improve quality and patient experience while reducing the costs of care.

We acknowledge other limitations. First, we acknowledge the preliminary nature of this report. Our results support the rationale for further testing of the hypothesis, rather than confirming the hypothesis. Nonetheless, we believe these results are compelling and underscore that a research agenda testing the impact of patient experience on health-care spending is warranted. With analysis at the hospital level, rather than at the patient level, we acknowledge that it is not possible to include patient-level data in the analyses. However, data for patient experience in the hospital are always aggregated at the hospital level. The CMS requirements for HCAHPS data collection and reporting mandate that the patients retain anonymity in their survey responses, and thus, there are no unique identifiers in the patient experience data for linkage to other patient-level data. We recognize that few 5-star hospitals were included in the analysis, but this is a function of how difficult it is to achieve a 5-star rating in the CMS stars rating methodology. We also acknowledge the possibility of unmeasured confounders at the hospital level that were not tested here. It is also notable that the MSPB Measure does not account for patient deductibles and copayments. In addition, we only analyzed Medicare spending in this study, and different

payers (eg, commercial insurance) may have different results. However, Medicare is the largest payer of hospital services in the United States, and thus, we submit that the results are likely generalizable. Along these lines, we acknowledge that not every hospital in the United States is included in the Hospital Compare data set; however, Hospital Compare data set is generally considered a representative sample of US health care by the health services research community. We also recognize that DSH status includes Medicaid patients, in addition to Medicare patients. As with any nonexperimental study design, we acknowledge that association does not necessarily represent causation. However, we offer multiple reasons (listed above) why a causal relationship between better patient experience and lower health-care spending is plausible. Finally, we acknowledge that our study leveraged a large administrative database and thus may have found statistical significance where the significance at the level of the individual episode of care is relatively small (ie, small “effect size”). However, small effect sizes can represent major differences in health-care spending when applied across very large populations. Thus, we submit that our findings are potentially very important from the payer perspective (eg, CMS).

Conclusion

In this study analyzing hospital-level data for ~3000 US hospitals, we found an association between better patient experience in US hospitals and lower MSPB (ie, 5.6% lower spending from the lowest to highest patient experience star rating), after adjustment for complexity of care and socioeconomic status of the hospital patient population. These data support the inclusion of patient experience measures in value-based purchasing. Future research to further test this hypothesis, and to determine what specific elements of the episode of care are responsible for the observed association, is necessary.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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Author Biographies

Stephen Trzeciak is the head of Critical Care Medicine at Cooper University Health Care and a Professor of Medicine at Cooper Medical School of Rowan University.

John P Gaughan is a biostatistician at the Cooper Research Institute and a Professor of Medicine at Cooper Medical School of Rowan University.

Joshua Bosire is an assistant vice president of Patient Experience and Access at Cooper University Health Care.

Mark Angelo is the head of Palliative Care and the Medical Director of Population Health at Cooper University Health Care and an Assistant Professor of Medicine at Cooper Medical School of Rowan University.

Adam S Holzberg is the head of Female Pelvic Medicine and Reconstructive Surgery at Cooper University Health Care and an Associate Professor of Obstetrics and Gynecology at Cooper Medical School of Rowan University.

Anthony J Mazzairelli is the chief physician executive at Cooper University Health Care and an Associate Professor of Emergency Medicine at Cooper Medical School of Rowan University.