DOI: 10.1111/1475-6773.14040

RESEARCH ARTICLE

HSR Health Services Research

The effect of hospital discharge price increases on publicly reported measures of quality

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Funding information
Arnold Ventures; National Institute on Aging, Grant/Award Number: K01AG061274

Abstract

Objective: To determine if increases in hospital discharge prices are associated with improvements in clinical quality or patient experience.

Data Sources: This study used Medicare cost report data and publicly available Medicare.gov Care Compare quality measures for approximately 3000 short-term care general hospitals between 2011 and 2018.

Study Design: We separately regressed quality measure scores on a lag of case mix adjusted discharge price, hospital fixed effects, and year indicators. Clinical quality measures included 30-day readmission rates for acute myocardial infarction, chronic obstructive pulmonary disease, heart failure, hip and knee replacement, and pneumonia; risk-adjusted 30-day mortality rates for acute myocardial infarction, chronic obstructive pulmonary disease, heart failure, and stroke; and 90-day complication rate for hip and knee replacement. Patient experience measures included the summary star rating and 10 domain measures reported through the Hospital Consumer Assessment of Healthcare Providers and Systems survey. We tested for heterogeneous effects by hospital ownership, number of beds, the commercial share of overall discharges, and market concentration.

Data Collection/Extraction Methods: We linked hospitals identified in Medicare cost reports to Medicare.gov Care Compare quality measures. We excluded hospitals for which we could not identify a discharge price or that had an unrealistic price.

Principal Findings: There was no positive association between lagged discharge price and any clinical quality measure. For patient experience measures, a 2% increase in discharge price was not associated with overall patient satisfaction but was associated with small, statistically significant increases ranging from 0.01% to 0.02% (relative to mean scores) for seven of ten domain measures. There was a positive association for five of ten patient experience measures in competitive markets and one measure in both moderately concentrated and heavily concentrated markets.

Conclusions: We found no evidence that hospitals use higher prices to make investments in clinical quality; patient experience improved, but only negligibly.

KEYWORDS
general hospitals, hospital charges, health care, patient-reported outcome measures, quality indicators, quality of health care

What is known on the topic

- Wide variation exists in both hospital prices and quality, but previous studies, which have largely been cross-sectional, have not discerned a clear pattern between price and quality.
- Prior studies could miss an important part of the dynamic between price and quality—that providers might use higher prices to later make investments in quality.

What this study adds

- We determined whether clinical quality and patient experience improved at hospitals after they raised their discharge prices.
- Higher discharge prices were not associated with improvements in clinical quality measures; patient experience improved, but only negligibly.

1 | INTRODUCTION

Whether higher health care prices result in better quality of care is a longstanding question within the US health care industry.[1,2] Given rising prices,[3] patients and health care purchasers could expect that health care providers are expanding investments in quality. However, previous studies, which have largely been cross-sectional, have not discerned a clear pattern between price and quality.[4] These studies could miss an important part of the dynamic between price and quality—that providers might use higher prices to later make investments in quality.

Conceptually, providers could use increased revenue from higher prices to improve clinical quality in order to drive demand from individual patients or become more attractive for inclusion in health plan networks. However, clinical quality investment decisions may not conform to typical market expectations. Both health care prices and quality are often obscured through a lack of transparency or difficulty in interpreting information in consumer tools and report cards, which diminishes their weight when patients make decisions about where to receive care.[5–7] Instead, providers may use the revenue generated from higher prices to invest in factors that they perceive to influence demand, such as enhancing their reputation by improving the patient experience.[8–11] Conversely, rising prices could also be unrelated to quality improvement and result through profit-seeking, for example, by expanding service lines or acquiring physician practices to increase negotiating leverage with insurers.[12] At the same time, limited market competition can reduce hospital incentives to improve quality.[13,14]

To inform whether higher prices drive quality, we aimed to measure if discharge price increases were associated with improvements in quality at short-term care general hospitals between 2011 and 2018. Understanding this relationship is important because commercial prices for hospital services increased by an estimated 14% between 2014 and 2018,[3] yet wide variation in both price[15] and quality[16] persist. Specifically, we estimated the relationship between case mix adjusted discharge price and a comprehensive set of clinical quality and patient experience measures that are publicly reported through Medicare.gov Care Compare.

2 | METHODS

2.1 | Data sources

We used 2008–2018 Medicare cost reports, obtained through the RAND Corporation's Hospital Data tool,[17] to identify short-term care general hospitals, calculate discharge prices, and obtain hospital attributes. We obtained 2011–2018 quality scores from Medicare.gov Care Compare. To measure market concentration, we obtained an annual Herfindahl–Hirschman Index (HHI) measure for each hospital referral region from American Hospital Association annual surveys.

2.2 | Cohort selection

The analytic cohort consisted of short-term care general hospitals that reported on at least one of our included quality measures for at least 2 years between 2011 and 2018, and for which we could calculate an annual mean case mix adjusted discharge price (described below). In a given year, we were unable to calculate the price for approximately 30% of hospitals (e.g., 1362 of 4551 hospitals in 2018) due to missing cost report data. These hospitals tended to be small nonprofit or government hospitals.

We excluded, across all years of the study, 39 hospitals that had (in any year) a mean case mix adjusted discharge price greater than $40,000, 155 hospitals with a price less than $0, and 67 hospitals with an annual average price growth of less than -50% or greater than 50%, because of concern that measurement error resulted in these unrealistic

values. Across all measures, our analytic cohort included between 2916 and 3024 hospitals, depending on the year. The analytic cohort for each quality measure differed slightly based on which hospitals reported (Appendix S1 provides the number of hospitals included by year and measure). Across measures, 88% of hospitals, on average, reported in all years of this study.

2.3 | Discharge price measure

We calculated the mean case mix adjusted discharge price by dividing non-Medicare inpatient revenues by non-Medicare discharges and adjusting for case mix. Because of the structure of the cost reports, we were unable to net out Medicaid revenues. Medicaid discharges represent a small portion of overall discharges; therefore, our price measure largely reflects commercial prices. Previous studies have relied on this and similar measures[18–21] and also found that commercial prices estimated from Medicare cost reports are highly correlated with prices in insurer claims data.[22] The case mix adjuster is the hospital's average diagnosis-related group relative weight for its Medicare discharges.

2.4 | Outcomes

Our outcome measures consisted of a set of publicly reported clinical quality and patient experience measures. Prior studies have also relied on these or similar measurses[23–25] to assess quality. In related work, Doyle, Graves, and Gruber (2019) demonstrated that these measures are associated with improved clinical outcomes.[26]

The clinical quality measures included risk-adjusted 30-day readmission rates for acute myocardial infarction (AMI), chronic obstructive pulmonary disease (COPD), heart failure, hip and knee replacement, and pneumonia; risk-adjusted 30-day mortality rates for AMI, COPD, heart failure, and stroke; and 90-day complication rate for hip and knee replacement. These measures are calculated using 3 years of patient data beginning April 1 (for 90-day complication rate for hip and knee replacement) or July 1 (all other measures). For example, a hospital's 30-day readmission rate for AMI reported in 2018 is estimated using data from July 1, 2015 through June 30, 2018.

For patient experience, we utilized measures reported through the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey. The HCAHPS survey captures patients' perception of communication with practitioners, the hospital's noise and cleanliness, and their overall rating of the hospital through 10 domain measures. Each domain measure is expressed as a percentage of patients in agreement that the hospital met a specified standard (e.g., "doctors *always* communicated well"). We also examined the HCAHPS summary star rating, released starting in 2014, which considers the 10 domains. While the HCAHPS measures are not risk-adjusted, they are drawn from a random sample of discharges among adult patients and are adjusted for age, education, and self-rated health.[27] HCAHPS measures are calculated using one calendar year of data.

2.5 | Statistical analysis

To determine the effect of price on quality, we separately regressed each quality measure on mean case mixed adjusted discharge price using hospital-year observations between 2011 (or the introduction of the measure) and 2018. We used lagged price, rather than contemporaneous price, to reflect investment decisions based on prior revenue. Because clinical measures use 3 years of patient data beginning on July 1 (or April 1 for 90-day complication rate for hip and knee replacement), we used the mean price from the first calendar year of data collection as the lagged price (e.g., the lagged price is the mean price in the calendar year 2015 for a measure reported in 2018 that was calculated using data from July 1, 2015 through June 30, 2018). For patient experience measures, we used the standard 1-year lagged mean price (e.g., the lagged price is the mean price in the calendar year 2017 for a 2018 measure). Because of skewness in price, we used the natural logarithm of lagged price. These multivariable regression models included hospital fixed effects, which control for time-invariant hospital characteristics and thus allow each hospital to serve as its own control group. Each regression model also included year indicators to control for nationwide trends in hospital quality. Thus, the estimated parameters reflect the effect of price changes *within* a hospital relative to changes in quality across all hospitals.

We conducted several sensitivity analyses to test the robustness of our results. First, we estimated models using a 2-year, rather than 1-year, lag of discharge price for two reasons: (1) quality investment decisions or impacts could occur further out than the 1-year lag used in the main model, and (2) to assess the robustness of the main model for clinical measures by estimating it without time overlap between price and quality. Second, we estimated the model using an indicator for having had a prior year price increase in the top-decile of all increases (instead of the continuous price measure) to determine if large, nonroutine price increases, such as those that may occur after consolidation, drive quality improvement. Third, we examined the star rating and linear mean score for each of the patient experience domains as they consider the full distribution of survey responses rather than only respondents who answered with the highest level of agreement. Fourth, because of concern that the case mix adjuster only used Medicare diagnoses, we estimated the model also controlling for total births to control for diagnoses related to maternity care, which is largely not present in Medicare.

To test for heterogeneous effects of discharge price on quality, we interacted lagged price with baseline hospital attributes in separate regression models. These indicators included hospital ownership (for-profit, nonprofit, government), the number of beds (<100, 100–299, ≥300), and market concentration within the hospital referral region as measured by HHI (competitive [HHI < 1500], moderately concentrated [HHI 1500–2500], highly concentrated [HHI ≥2500]). These market concentration measures are used by the Federal Trade Commission and the US Department of Justice.[28] Finally, we estimated differential effects based on the percentage of discharges by commercial patients in the hospital (<25%, 25%–50%, ≥50%) because of evidence that hospital quality investment decisions are affected by

the insurance status of a hospital's underlying patient population.[25] This measure is described in Appendix S2.

To express marginal effects on a nonlog scale, we multiplied each coefficient by the natural logarithm of 1.02 so that each effect is expressed in terms of the nominal quality change associated with a 2% price increase in the prior year, which is approximately the mean annual price growth across the hospitals in our analytic cohort. All statistical testing was conducted at the 5% significance level with two-sided tests, accounting for clustering at the hospital level. We performed all analyses in Stata 16. This study used publicly available secondary data sources and was exempt from Institutional Review Board review.

3 | RESULTS

3.1 | Characteristics of study sample

Approximately 60% of hospitals were nonprofit private, 25% were for-profit private, and 14% were public (Table 1). The plurality of hospitals had between 100 and 299 beds. The percentage of hospitals whose share of commercial discharges was greater than 50% decreased from 22.4% in 2011 to 8.9% in 2018, largely due to increases in public discharges driven by Medicaid expansion. The percentage of hospitals in a competitive marketplace decreased from 25.2% in 2011 to 23.4% in 2018.

The mean case mix adjusted discharge price over all hospital-year observations increased from $6553 (standard deviation [SD], $3130) in 2011 to $6819 (SD, $4016) in 2018, or a 4.1% increase (Table 1). It is notable that the mean price decreased from 2011 to 2012, such that there was a 6.4% increase between 2012 and 2018. Across hospitals, the mean annual price growth was 1.9% (i.e., calculating each hospital's mean annual price growth and taking the mean over all hospitals) (Figure 1).

Figure 1 presents the pooled mean scores for each quality measure and their annual growth rate. On average, most clinical quality and patient experience measures improved over time, with the exception of 30-day COPD mortality and 30-day heart failure mortality. For clinical measures that did improve, annual growth rates ranged from −0.3% to −4.5% (negative changes denote quality improvement for clinical measures). For patient experience, the summary star rating improved by 2.2% per year (positive changes denote quality

TABLE 1 Attributes of hospitals reporting select quality measures through Medicare.Gov care compare[a]

	2011	2012	2013	2014	2015	2016	2017	2018
Hospitals, #	3024	3003	2997	2990	2960	2942	2929	2916
Case mix adjusted discharge price, mean (SD), $	6553 (3130)	6407 (2983)	6399 (3206)	6553 (3183)	6669 (3251)	6612 (3349)	6628 (3453)	6819 (4016)
Ownership type								
For-profit private, (%)	757 (25.0)	756 (25.2)	760 (25.4)	772 (25.8)	761 (25.7)	751 (25.6)	740 (25.3)	711 (24.4)
Nonprofit private, (%)	1820 (60.2)	1810 (60.3)	1811 (60.4)	1798 (60.1)	1786 (60.3)	1793 (60.9)	1801 (61.5)	1817 (62.3)
Government, (%)	447 (14.8)	437 (14.6)	426 (14.2)	420 (14.1)	413 (14.0)	398 (13.5)	388 (13.3)	388 (13.3)
Beds								
<100, (%)	1033 (34.2)	1027 (34.2)	1037 (34.6)	1043 (34.9)	1031 (34.8)	1014 (34.5)	1009 (34.5)	1008 (34.6)
100–299, (%)	1363 (45.0)	1345 (44.8)	1322 (44.1)	1321 (44.2)	1301 (44.0)	1305 (44.4)	1295 (44.2)	1267 (43.5)
≥300, (%)	628 (20.8)	631 (21.0)	638 (21.3)	626 (20.9)	628 (21.2)	623 (21.2)	625 (21.3)	640 (22.0)
Commercial share of overall discharges								
<25%, (%)	337 (11.4)	318 (10.8)	374 (12.8)	752 (25.7)	886 (30.6)	923 (31.7)	976 (33.7)	946 (33.1)
25%–50%, (%)	1964 (66.2)	1981 (67.3)	2007 (68.7)	1797 (61.5)	1700 (58.7)	1701 (58.4)	1672 (57.8)	1659 (58.0)
>50%, (%)	665 (22.4)	643 (21.9)	540 (18.5)	372 (12.7)	310 (10.7)	290 (10.0)	247 (8.5)	255 (8.9)
Hospital referral region HHI								
Competitive marketplace (HHI <1500), (%)	760 (25.2)	782 (26.1)	721 (24.1)	736 (24.6)	724 (24.5)	706 (24.0)	699 (23.9)	680 (23.4)
Moderately concentrated marketplace (HHI 1500–2500), (%)	1196 (39.6)	1129 (37.6)	1184 (39.5)	1146 (38.3)	1115 (37.7)	1147 (39.0)	1144 (39.1)	1154 (39.6)
Highly concentrated marketplace (HHI ≥2500), (%)	1063 (35.2)	1090 (36.3)	1090 (36.4)	1107 (37.0)	1120 (37.9)	1089(37.0)	1084 (37.0)	1081 (37.1)

Abbreviations: HHI, Herfindahl–Hirschman index; SD, standard deviation.

[a]Includes short-term care general hospitals that reported on at least one of select quality measures between 2011 and 2018 and for which we could calculate case mix adjusted price per discharge from Medicare cost reports. For some categories, total observations may not add to the number of reporting hospitals and percentages may not add to 100 because of missing data.

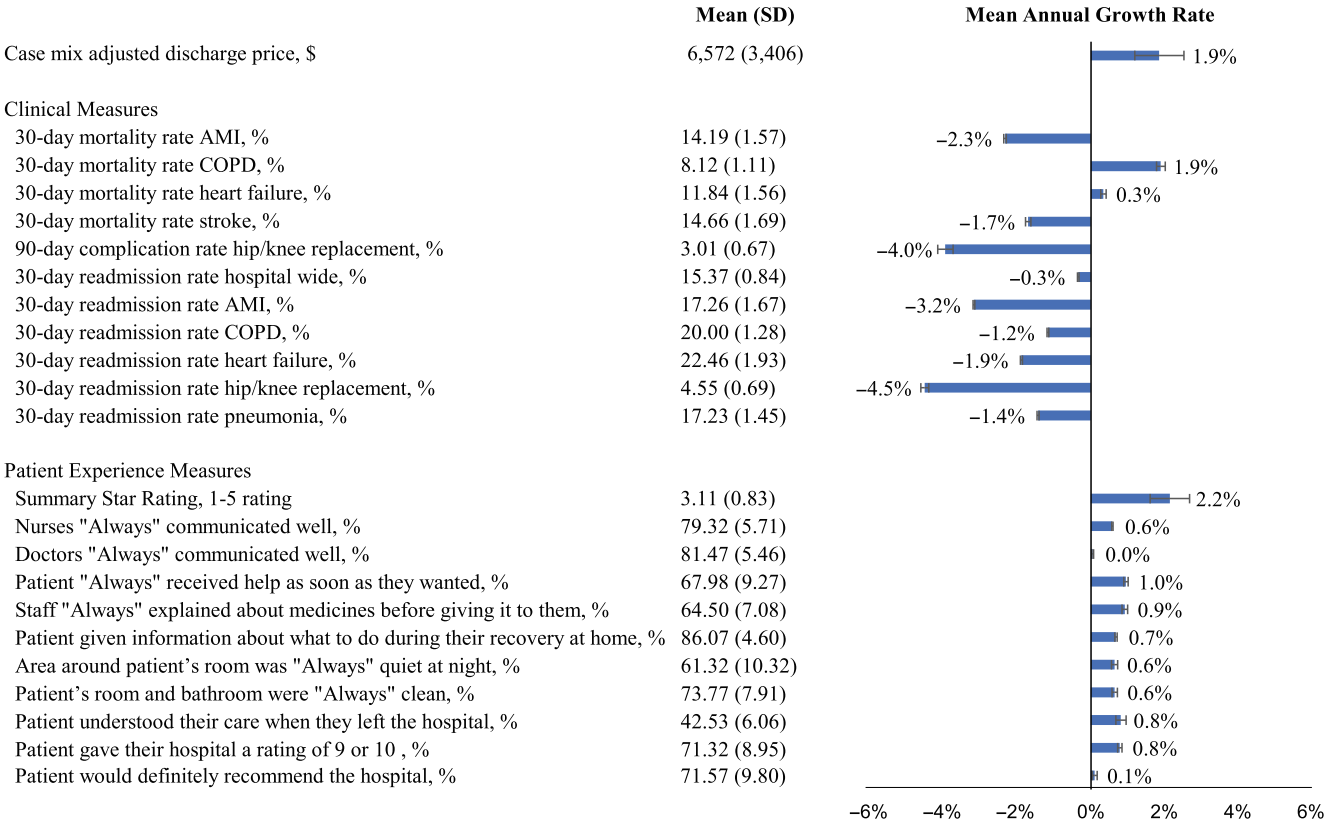

FIGURE 1 Mean Annual Growth in Case Mix Adjusted Discharge Price and Quality, 2011–2018. Includes short-term care general hospitals that reported on at least one of select quality measures between 2011 and 2018 and for which we could calculate case mix adjusted price per discharge from Medicare cost reports. AMI, acute myocardial infarction; COPD, chronic obstructive pulmonary disease; SD, standard deviation. Error bars represent the 95% confidence interval. [Color figure can be viewed at wileyonlinelibrary.com]

improvement for patient experience measures). Quality improvement across the patient experience domain measures was consistent, with eight of the ten measures improving between 0.6% and 1.0% per year. Annual mean scores are available in Appendix S2.

3.2 | Regression analysis results

Figure 2 presents the results of our regression analysis. The full regression table is available in Appendix S3. There was no positive association between lagged price and quality for any clinical quality measure. The only significant effect was for the 30-day readmission rate for AMI, which increased by 0.002 (95% Confidence Interval [CI]: 0.000–0.004, p-value = 0.045) per 2% increase in lagged price, and implies that higher prices were associated with higher readmission rates, although this change was small compared to the mean readmission rate (17.26%), and translates to a 0.01% relative change.

For patient experience, we found no significant association between lagged price and the summary star rating. For the domain measures, seven of the ten measures had a positive association between lagged price and quality, and no measure had a negative association. The effect sizes were relatively small compared to the mean scores. For example, "patient gave their hospital a rating of 9 or 10" had the largest improvement, which was 0.011 percentage points (95% CI: 0.005–0.018; p-value <0.001) per 2% increase in lagged price and had a mean score of 71.32%, reflecting a 0.02% relative change (Figure 3).

We estimated regression models that used a 2-year, rather than 1-year, price lag. The relationships between price and quality for the 2-year lag followed closely with our main results (Appendix S4). We also tested whether our results were driven by hospitals with large, nonroutine price increases (i.e., top-decile annual price increases) (Appendix S5). This estimation yielded one significant effect for the 30-day readmission rate for heart failure (effect size = −0.070 [95% CI: −0.134 to −0.007; p-value = 0.003]), but none over the patient experience measures, implying our results are not driven by only hospitals with large price increases. For patient experience, the price was associated with fewer domain measures when we examined each domain's star rating and linear mean score (Appendix S6), yet small, significant effects remained for several measures (four star rating measures and three linear mean score measures). Lastly, including total births as a control variable did not substantively impact our results (Appendix S7).

In tests of differential effects based on baseline hospital attributes, there were no consistent patterns for clinical measures (results available in Appendix S8), with the association between price and

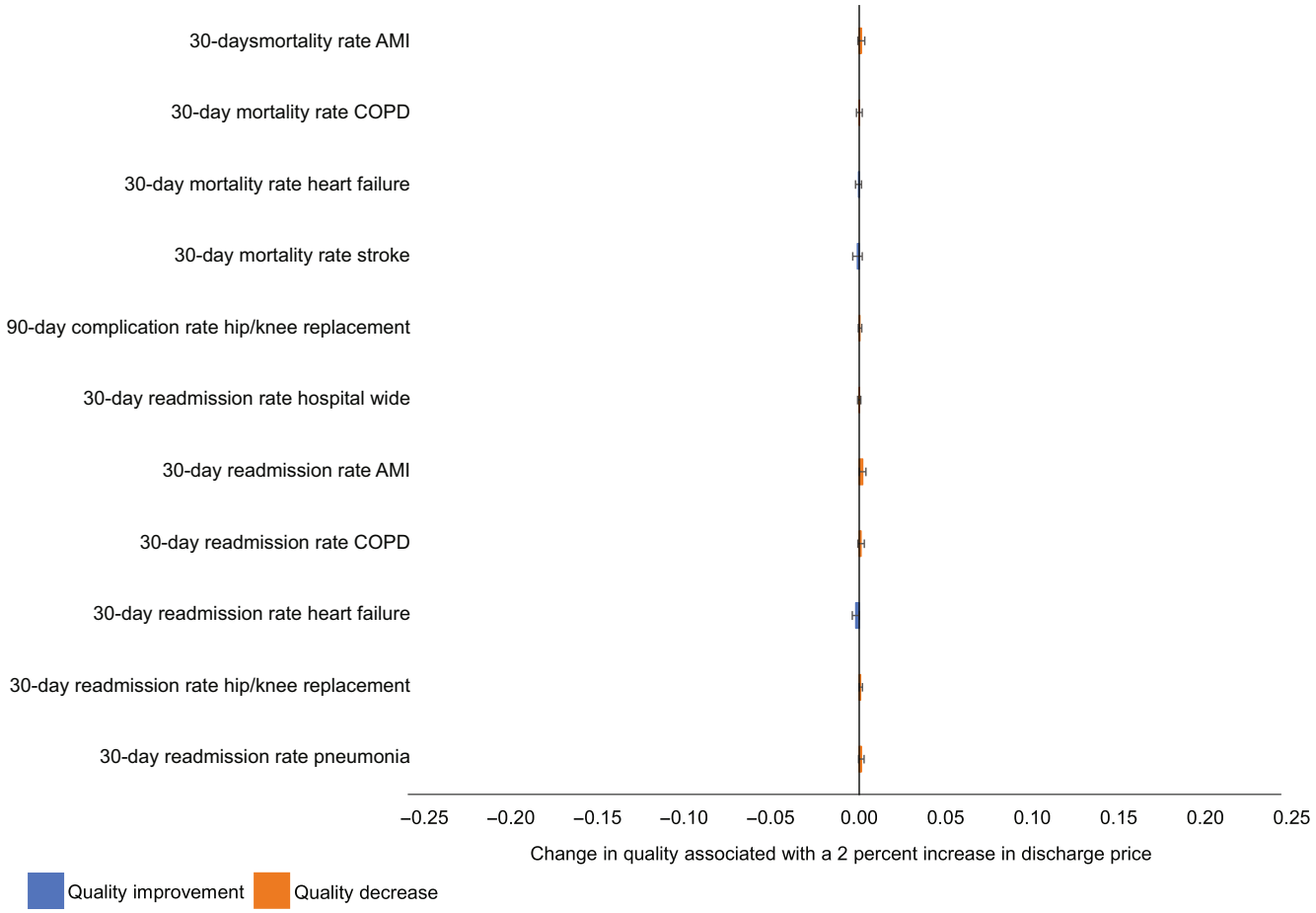

FIGURE 2 Regression-Adjusted Association Between a 2% Increase in Lagged Case Mix Adjusted Discharge Price and Clinical Quality. Includes short-term care general hospitals that reported on at least one of select quality measures between 2011 and 2018 and for which we could calculate case mix adjusted price per discharge from Medicare cost reports. For clinical measures the lagged price is the price for the calendar year in the first year of data collection. AMI, acute myocardial infarction; COPD, chronic obstructive pulmonary disease. Effect sizes are expressed as percentage points and calculated as the regression coefficient multiplied by the natural log of 1.02. Error bars represent 95% confidence intervals with standard errors clustered at the hospital level. [Color figure can be viewed at wileyonlinelibrary.com]

quality being statistically insignificant over the hospital attributes in all but a few instances. For patient experience, we found no significant association between price and the summary star rating. However, some patterns emerge over the domain measures. For instance, we found a stronger pattern of association between price and patient experience for hospitals in competitive marketplaces. There was a positive association for five of the ten patient experience measures in competitive markets and one measure in both moderately concentrated and heavily concentrated markets. Figure 4 shows the measures with significant effects. For example, a 2% increase in price was associated with a 0.014 percentage points (95% CI: 0.006–0.021; *p*-value = 0.001) increase for "nurses *always* communicated well" in competitive marketplaces but was insignificant in more concentrated markets. "Patient gave their hospital a rating of 9 or 10" was statistically significant in competitive marketplaces (effect size = 0.023 percentage points [95% CI: 0.009–0.031; *p*-value = 0.002]) and moderately concentrated marketplaces (effect size = 0.011 percentage points [95% CI: 0.001–0.021; *p*-value = 0.027]).

The association between price and patient experience was more prominent among for-profit private hospitals (Appendix S8, Fig. 2). We found a positive relationship between price and quality for seven of the ten patient experience measures for for-profit private hospitals compared to three measures for nonprofit hospitals and no measures for public hospitals. For bed size (Appendix S8, Fig. 4) and share of commercial discharges (Appendix S8, Fig. 6), we found little difference across categories within each hospital attribute.

4 | DISCUSSION

Wide variation exists in hospital prices and quality, but the relationship between price and quality is not well understood. Using a longitudinal regression model, we found no evidence to suggest hospitals use higher discharge prices to later invest in clinical quality. Price increases were associated with negligible improvements in patient experience. The relationship between higher prices and the improved

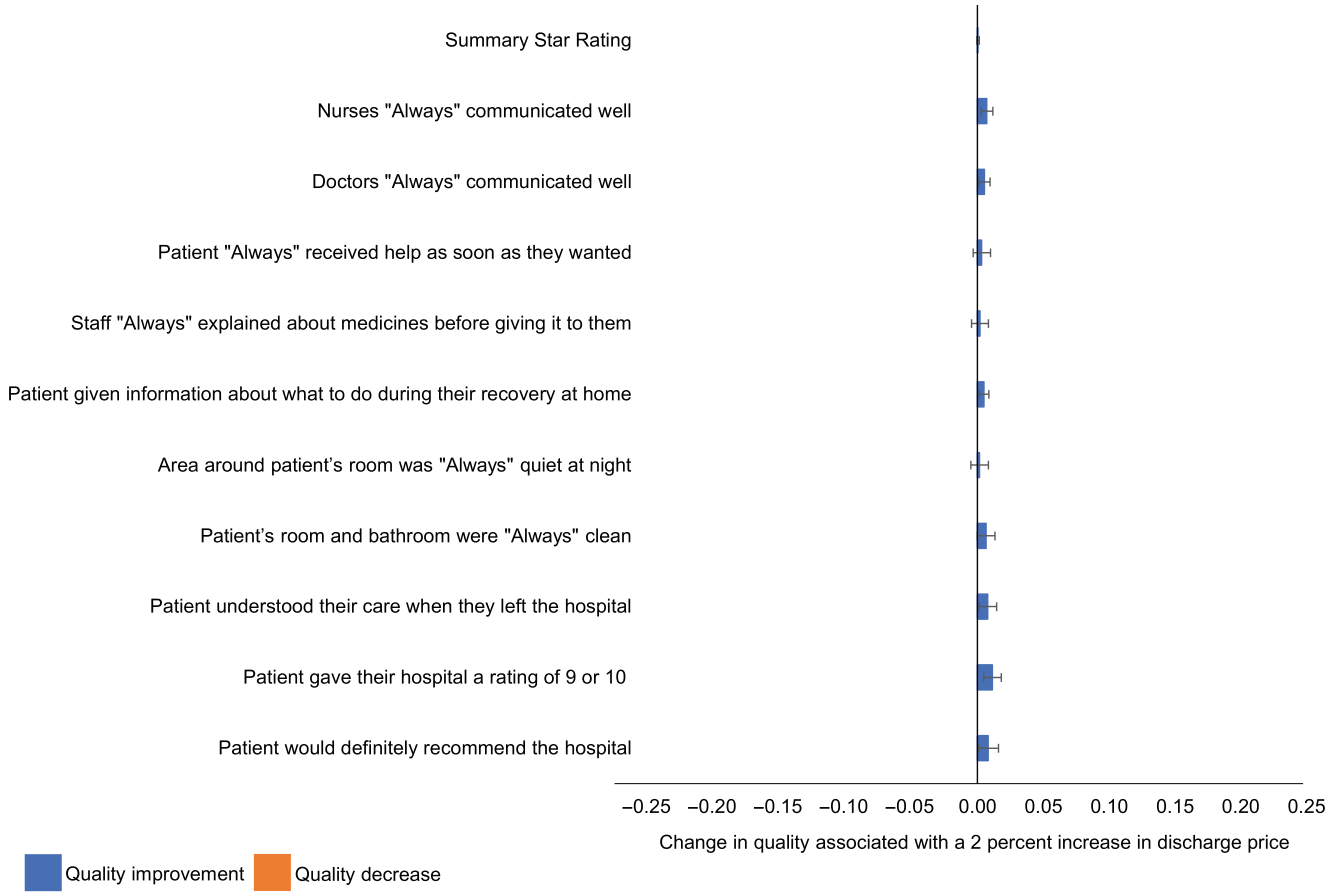

FIGURE 3 Regression-Adjusted Association Between a 2% Increase in Lagged Case Mix Adjusted Discharge Price and Patient Experience. Includes short-term care general hospitals that reported on at least one of select quality measures between 2011 and 2018 and for which we could calculate case mix adjusted price per discharge from Medicare cost reports. Summary star rating is measured on a 1–5 scale, all other measures are expressed as a percentage. Effect size calculated as regression coefficient multiplied by the natural log of 1.02. Error bars represent 95% confidence intervals with standard errors clustered at the hospital level. [Color figure can be viewed at wileyonlinelibrary.com]

patient experience was strongest for hospitals in competitive marketplaces and for-profit private hospitals.

For clinical quality, our findings align with literature that has been unable to show that higher prices drive quality improvement. Hussey et al. (2013) reviewed 61 studies dated through 2012 and concluded that there was no pattern of associations between price, or costs, and quality, with two-thirds of the included studies finding no relationship or a negative relationship, and positive associations were generally small in magnitude where the existed.[4] This conclusion has held in recent studies. For example, Whaley (2018) found that price increases were associated with modestly higher rates of complication among common surgical procedures,[29] and Unruh et al. (2020) estimated no difference in clinical quality (measured as having at least one ambulatory care-sensitive hospitalization or being readmitted within 30-day of hospital discharge) among high- and low-price physicians.[30]

Garthwaite, Ody, and Starc (2022) suggest that higher prices are a byproduct of investments in quality to attract privately insured patients when the hospital's marginal patient is likely to have private insurance.[25] The authors present evidence that this relationship holds for 30-day mortality rates for heart attack, heart failure, and pneumonia—quality measures used in this study. However, their analysis may have limited generalizability by using only one year of data. In our analysis, there was no relationship between price and clinical quality at hospitals that had a relatively large share of commercial discharges among their overall discharges.

Although the patient experience improvements due to price increases were negligible, it is striking that we found significant effects over most domain measures. This finding warrants further investigations of patient experience to determine if higher prices are associated with more specific investments not reflected well in the HCAHPS survey. For instance, we found a positive relationship between price and HCAHPS measures regarding doctor and nurse communication and the cleanliness of patient rooms and bathrooms. Hospitals might drive demand in a similar manner as hotels by investing in tangible amenities such as attentive staff or pleasant surroundings—a sentiment put forth by Goldman and Romley, who investigated Los Angeles, California, hospitals in the early 2000s.[11,31,32] These improvements might also drive reputation, which has been shown to influence demand for providers.[9] In fact, White, Reschovsky, and Bond (2014) found that high-price hospitals fared well on US News and World Report Rankings, which are primarily based on

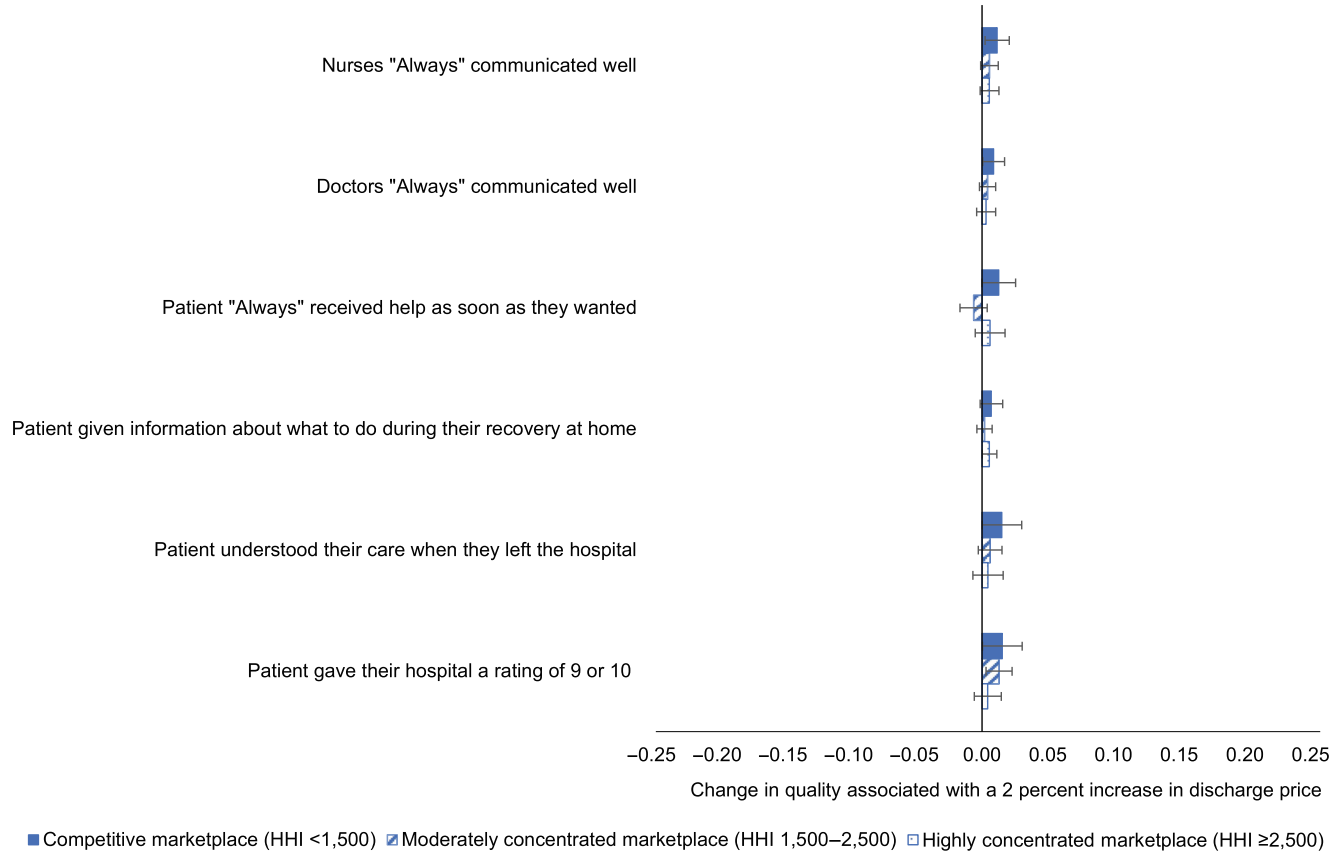

FIGURE 4 Regression-Adjusted Association Between a 2% Increase in Lagged Case Mix Adjusted Discharge Price and Select Patient Experience Measures, by Market Concentration. Includes short-term care general hospitals that reported on at least one of select quality measures between 2011 and 2018 and for which we could calculate case mix adjusted price per discharge from Medicare cost reports. HHI, Herfindahl–Hirschman index. Effect sizes are expressed as percentage points and calculated as regression coefficient multiplied by the natural log of 1.02. Error bars represent 95% confidence intervals with standard errors clustered at the hospital level. [Color figure can be viewed at wileyonlinelibrary.com]

reputation, but did not have better clinical quality than low-price hospitals.[8]

In this study, there was a positive relationship between price and quality for more patient experience measures in competitive markets than in moderately and highly concentrated markets. The idea that hospitals with fewer competitors have less incentive to improve quality is not new.[13,14] Short and Ho (2019) found that increased market concentration was strongly associated with reduced patient satisfaction in health systems.[23] In related work, Beaulieu et al. (2020) found that hospitals acquired by another hospital or health system experienced a decrease in patient experience scores.[24]

Overall, this study suggests that higher prices do not result in future clinical quality improvement but may result in some improvement in patient experience. The lack of clinical quality improvement may be tied to findings that consumers are unlikely to consider clinical quality when deciding where to receive care, even when the information is presented in user-friendly public reports.[5–7] Patient experience and reputation are likely easier to pass on through word-of-mouth in recommendations by friends and family, which is often a critical element in making decisions on where to receive care.[9]

5 | LIMITATIONS

Hospitals might use higher prices to invest in quality that was not reflected in the measures used in this study. For example, hospitals could have invested in process or structural measures, expanded existing service lines, or started new service lines through acquisitions of hospitals or physician practices. On the other hand, high-priced hospitals could have used the revenue to adopt more advanced health information technology to help accurately capture performance rather than experiencing true patient experience improvements.[33]

The patient experience measures may have been difficult to improve upon, given the use of categorical responses (e.g., "always") rather than a numerical scale (e.g., 1–100). Prior research has found that it is difficult to identify improvement at individual hospitals when there are low rates of poor outcomes,[34] and a similar concept may apply to this study's data if the categorically data obscure true improvements in quality. The unadjusted annual improvement for each patient experience measure was less than 1%. Hospitals might have experienced larger quality improvements that were not detectable in the underlying HCAHPS surveys, which could explain the small magnitude of the estimated effects.

The discharge price was case mix adjusted using the information on Medicare discharges because similar information on non-Medicare discharges is not included in Medicare cost reports. Thus, our study assumes similar relative risk across hospitals between their non-Medicare and Medicare discharge populations. Differences between the risk of non-Medicare and Medicare discharges at hospitals could introduce measurement error and attenuate our estimates towards zero. However, we found similar results when we included a control for total births to account for maternity care, which along with pediatrics, is largely not present in the Medicare population.

6 | CONCLUSIONS

Using longitudinal data on hospital discharge prices and publicly reported quality of care measures, we found no evidence that hospitals use higher prices to make investments in clinical quality; patient experience improved, but only negligibly.

ACKNOWLEDGMENT

Arnold Ventures and the National Institute on Aging (K01AG061274) provided funding to support this work. The funders had no role in study design; conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; the decision to submit the manuscript for publication; or the decision as to which journal the manuscript was submitted.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Crespin DJ, Whaley C. The effect of hospital discharge price increases on publicly reported measures of quality. *Health Serv Res*. 2023;58(1):91-100. doi:10.1111/1475-6773.14040