

# Correlates of Price Transparency for Healthcare Services in United States Hospitals

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**Purpose:** The purpose of this study is to investigate demographic and hospital characteristics that predict hospital price transparency in the United States.

**Methods:** We identified 6214 hospitals and extracted characteristics of each using the American Hospital Association Annual Survey, as well as cash prices for a representative selection of commonly performed procedures and visits from the Turquoise Health dataset. Descriptive statistics were used to determine compliance rates and price variation, and a Poisson regression model was used to calculate incidence rate ratios (IRR) and 95% confidence intervals (CI) for predictors of price transparency.

**Results:** Price transparency compliance ranged from 13% to 49% of hospitals, and across-center ratios ranged from 244.8 to 4789.0. Number of hospital beds was marginally associated with price transparency for more services (IRR: 1.01 [95% CI: 1.01–1.02]); in contrast, location in the Southern (IRR: 0.91 [95% CI: 0.87–0.96]) or Western (IRR: 0.94 [95% CI: 0.90–0.99]) regions of the US was associated with transparency for fewer services.

**Conclusion:** Smaller hospitals as well as those located in the South and West regions were less likely to be compliant with the CMS mandate for price transparency for hospital standard charges. Additionally, the poor usability of price transparency directories on hospital websites limits information access and undermines transparency efforts.

**Keywords:** price transparency, health policy, health economics, health equity

## Introduction

Uninsured and underinsured patients regularly pay out-of-pocket prices that significantly exceed the reimbursement rates set by private insurance companies and public payers like the United States (US) Medicare and Medicaid Services (CMS).<sup>1,2</sup> Overall healthcare costs in the US are considerably higher than in other high-income countries, including both privately- and publicly-insured patients.<sup>3</sup> Several health economists have proposed requiring hospitals to publicly disclose prices, thus promoting competition and allowing patients to “shop” for cheaper care.<sup>4</sup>

In 2019, CMS required hospitals to publish their “standard charges” for their services in online chargemasters (comprehensive lists of prices for all hospital procedures and services).<sup>5</sup> However, the ensuing publication of these chargemasters—with thousands of items and services often described by confusing abbreviations—spurred criticism from patients, providers, hospitals, and politicians.<sup>6</sup> On January 1, 2021, CMS required the disclosure of gross (non-discounted) charges, cash (discounted) charges for patients paying entirely out-of-pocket without insurance, payer-specific negotiated charges, and de-identified minimum and maximum negotiated charges for at least 300 shoppable services.<sup>5</sup> Due to continued criticism, CMS implemented new regulations on January 1, 2022 to increase the maximum penalty for noncompliance and outlaw hospital barriers to patient access.<sup>7</sup> However, studies across several medical specialties suggest that many hospitals are not yet in compliance with the CMS mandate.<sup>1,2</sup> Overall, there is limited information regarding the correlates of price transparency.<sup>8</sup>

The purpose of this paper is to identify demographic and hospital characteristics that predict price transparency at any given US hospital.

## Methods

The Northwestern University Institutional Review Board determined that this study was not human subjects research. All data acquisition complied with relevant data protection and privacy regulations. We did not access any individual patient data for our analysis.

We identified 6214 hospitals using the American Hospital Association database.<sup>9</sup> Hospitals associated with the US Department of Veterans Affairs and Department of Defense were excluded from our analysis due to their unique payment models. We identified several characteristics of each hospital using the American Hospital Association (AHA) Annual Survey: zip code, region, number of hospital beds, procedure volume, personnel numbers, hospital net income, and hospital ownership (private, non-profit, government).<sup>9</sup> Hospital region was determined using US Census Bureau regional classifications.<sup>10</sup> Urban-rural classification was determined using the Rural-Urban Commuting Area Codes (RUCA) database from the US Department of Agriculture.<sup>11</sup>

Out-of-pocket prices for a selection of commonly performed procedures and office visits (Table 1) were extracted from the Turquoise Health dataset,<sup>12</sup> a public-use continuously updated dataset of list prices for all billable services at hospitals and health centers nationwide. Of note, no individual patient data is accessible through this dataset and there is no relationship between Turquoise Health and the AHA. The 14 billable services were selected due to their high volume of usage and representation across various medical fields and encounter levels. These figures were verified with hospital chargemasters for accuracy. Duplicate entries were removed from the database. If a discrepancy was identified, the value was corrected to match the hospital chargemaster. “Out-of-pocket” comprises both “cash price” and “self-pay” descriptors in the database.

We conducted all statistical analyses in Stata using alpha=0.05. Descriptive statistics were used to determine compliance rates and price variation for each service. We calculated the across-center ratio as the maximum price for a service divided by the minimum price. Our primary outcome was price transparency for the 14 selected services, which

**Table 1** Selection of Commonly Performed Procedures and Office Visits

| Procedure Name  | CPT or MS-DRG* Code |
|---|---------------------|
| Colonoscopy, flexible; diagnostic                               | 45378               |
| CT scan, pelvis, with contrast                                  | 72193               |
| Electrocardiogram, routine, with interpretation and report      | 93000               |
| Emergency Department, Level 3                                   | 99283               |
| Emergency Department, Level 4                                   | 99284               |
| Emergency Department, Level 5                                   | 99285               |
| Kidney Function Blood Test Panel                                | 80069               |
| Knee arthroscopic cartilage removal                             | 29881               |
| MRI scan of brain before and after contrast                     | 70553               |
| New patient office or other outpatient visit, typically 30 mins | 99203               |
| New patient office or other outpatient visit, typically 45 mins | 99204               |
| New patient office or other outpatient visit, typically 60 mins | 99205               |
| Ultrasound of abdomen, complete                                 | 76700               |
| Uterine and adnexa procedures, non-malignancy                   | 743*                |

**Note:** \*MS-DRG code used instead of CPT.

**Abbreviations:** CPT, current procedural terminology; MS-DRG, Medicare severity diagnosis related groups.

served as proxies for healthcare services in the US. We used a Poisson regression model to calculate incidence rate ratios (IRR) and 95% confidence intervals (CI) for predictors of price transparency for 14 billable services.

## Results

A total of 3873 hospitals (62%) reported prices for at least one of the selected healthcare services; most were acute care (2371; 61%) or critical access (877; 23%) hospitals. There were 1460 (38%) hospitals in the South, 1175 (30%) in the Midwest, 749 (19%) in the West, and 489 (13%) in the Northeast. Not all hospitals reported providing the same services.

Compliance with CMS mandates ranged from 13% of hospitals for routine electrocardiograms to 49% of hospitals for complete abdominal ultrasounds. Across-center ratios ranged from 244.8 for Level 3 Emergency Department Encounters to 4789.0 for Kidney Function Blood Test Panels, indicating considerable variation in cash prices for the same service across the country (Table 2).

**Table 2** Cash Prices, Transparency, and Variation for 14 Shoppable Services

| CPT or MS-DRG* Code                                   | No. of Disclosures, n (%); N = 6214 Hospitals | Median Out-of-Pocket Price (IQR) | Minimum | Maximum    | Across-Center Ratio |
|---|---|----------------------------------|---------|------------|---------------------|
| 45378<br>Colonoscopy, diagnostic                      | 1856 (30%)                                    | 1546.35 (780–2526.05)            | 41.79   | 17,094.92  | 409.1               |
| 72193<br>CT pelvis, with contrast                     | 2932 (47%)                                    | 1420.00 (863.10–2118.00)         | 3.50    | 17,353.50  | 4958.1              |
| 93000<br>EKG, with interpretation & report            | 820 (13%)                                     | 67.39 (25.61–124.5)              | 9.00    | 4325       | 480.6               |
| 99283<br>ED, Level 3                                  | 2894 (47%)                                    | 642.20 (309.00–1664.00)          | 26.64   | 6521.26    | 244.8               |
| 99284<br>ED, Level 4                                  | 2899 (47%)                                    | 1048.00 (518.00–3133.45)         | 33.75   | 61,376.25  | 1818.6              |
| 99285<br>ED, Level 5                                  | 2897 (47%)                                    | 1499.76 (735.53–4064.61)         | 39.4    | 82,941     | 2105.1              |
| 80069<br>Kidney Function Blood Panel                  | 2961 (48%)                                    | 92.68 (47.40–157.65)             | 1.82    | 8716       | 4789.0              |
| 29881<br>Knee arthroscopic cartilage removal          | 1166 (19%)                                    | 5115.92 (2188.55–10,207.72)      | 72.2    | 49,218.92  | 681.7               |
| 70553<br>MRI Brain                                    | 2957 (48%)                                    | 2507.78 (1430.33–3861.30)        | 39.65   | 29,915     | 754.5               |
| 99203<br>New patient visit, 30 mins                   | 2156 (35%)                                    | 157.80 (97.76–250.70)            | 8.97    | 3487.57    | 388.8               |
| 99,204<br>New patient visit, 45 mins                  | 2124 (34%)                                    | 208.000 (124.71–347.05)          | 11.00   | 6081.85    | 552.9               |
| 99205<br>New patient visit, 60 mins                   | 1981 (32%)                                    | 250.43 (153.93–434.66)           | 14.00   | 8829.63    | 630.7               |
| 76700<br>US Abdomen                                   | 3056 (49%)                                    | 577.85 (336.62–896.50)           | 17.21   | 11,452.65  | 665.5               |
| 743*<br>Uterine and adnexa procedures, non-malignancy | 1046 (17%)                                    | 21,259.00 (12,875.94–33,592.00)  | 339.30  | 279,352.70 | 823.3               |

**Note:** \*MS-DRG code used instead of CPT.

**Abbreviations:** CPT, current procedural terminology; IQR, interquartile range; MS-DRG, Medicare severity diagnosis related groups.

Several characteristics contributed to the prediction of price transparency for healthcare services in regression analysis (Table 3). After adjustment, number of hospital beds was marginally associated with price transparency for more services (IRR: 1.01 (95% CI: 1.01–1.02)); in contrast, location in the Southern (IRR: 0.91 (95% CI: 0.87–0.96)) or Western (IRR: 0.94 (95% CI: 0.90–0.99)) regions of the US was associated with transparency for fewer services. Number of surgical operations, full-time physicians and dentists, and net income were collinear with number of hospital beds and dropped after sensitivity analysis (Table 4).

**Table 3** Predictors of Price Transparency in Poisson Regression Analysis

| Characteristics                   | Multiple Regression, IRR** [95% CI]                                    |
|-----------------------------------|--|
| Urban-rural classification        |  |
| Metropolitan                      | 1 [reference]  |
| Micropolitan                      | 1.03 [0.99–1.07]   |
| Small town                        | 1.01 [0.96–1.07]   |
| Rural                             | 1.00 [0.89–1.12]   |
| Ownership                         |  |
| Nonprofit                         | 1 [reference]  |
| For profit                        | 1.05 [0.99–1.11]   |
| Public                            | 1.04 [0.997–1.08]  |
| Region                            |  |
| Northeast                         | 1 [reference]  |
| West                              | 0.94 [0.90–0.997] *  |
| South                             | 0.91 [0.87–0.96] *   |
| Midwest                           | 0.95 [0.91–1.00]   |
| Hospital beds (simple regression) | 1.01 [1.01–1.02] *   |
| Surgical operations               | Dropped due to collinearity with hospital beds in sensitivity analysis |
| Full-time physicians/dentists     | Dropped due to collinearity with hospital beds in sensitivity analysis |
| Net income                        | Dropped due to collinearity with hospital beds in sensitivity analysis |

**Note:** \*Denotes statistical significance.

**Abbreviation:** \*\*IRR, incidence rate ratio.

**Table 4** Variable Descriptive Analysis

| Characteristics               | Measurement; Description  |
|-------------------------------|---|
| Urban-rural classification    | Categorical; classified by USDA using population size and density             |
| Ownership                     | Categorical; classified based on profit distribution and funding              |
| Region                        | Categorical; classified by US Census Bureau                                   |
| Hospital beds                 | Numerical; surrogate for hospital size and availability of inpatient services |
| Surgical operations           | Numerical; number of surgical operations performed in one year                |
| Full-time physicians/dentists | Numerical; number of full-time physicians & dentists employed at location     |
| Net income                    | Numerical; net income of given hospital or health system                      |

**Abbreviation:** USDA, US Department of Agriculture.

## Discussion

The findings of this study shine light on the poor state of price transparency for healthcare services throughout various specialties in hospitals across the US and elucidate pertinent relationships between hospital characteristics and price transparency. Overall, most hospitals remained noncompliant with the CMS price transparency mandate for these 14 commonly performed procedures and office visits, even after the CMS increased the maximum penalty for noncompliance on January 1, 2022.<sup>7</sup> No billable event included in this study was associated with a compliance rate of 50% or greater, and most fell well below this rate.

Having fewer hospital beds was associated with a higher risk of noncompliance with the CMS mandate. Hospital advocates argued that smaller hospitals would face difficulties in creating price transparency programs.<sup>7</sup> In response, the CMS developed a sliding scale of financial penalties for noncompliance ranging from \$300 to \$5500 based on hospital bed count, which serves as a proxy for hospital size.<sup>7</sup> It is unclear whether the lower rate of price transparency among smaller hospitals was due to the reduced penalty for noncompliance or greater difficulty in posting prices due to limited resources and personnel. Moreover, smaller hospitals are often unable to offer comparable pricing to larger hospitals due to economies of scale,<sup>13</sup> and thus may be less keen to advertise their prices.

There was also significant regional variation in price transparency. Hospitals in the Southern and Western regions had a lower rate of compliance relative to those in other regions. Across-center ratios of maximum to minimum prices for a given procedure demonstrated significant variability across hospitals, with an average of 1378.8 among all studied CPT codes. Decreased levels of transparency compliance in these regions may be explained by a higher average travel time to the nearest hospital in these regions compared to the reference.<sup>14</sup> When a hospital has less competition in its area, there may be decreased incentive to disclose pricing as there is less impetus for patients to engage in price shopping.<sup>15</sup> There may also be regional differences in profit-seeking behavior and supply-side efficiency.<sup>16</sup>

Procuring list prices from hospital chargemasters was often a tedious task, even when facilitated by the authors' familiarity with billing terminology and hospital informatics. To find these prices, patients must be able to navigate multiple hospital websites, find the correct chargemaster listed on each site, seek the relevant data, and understand billing terminology. As this process often requires several steps on an array of complex and variable websites, many patients may give up on their search for information. Thus, the current CMS legislation's efforts at price transparency fall short of its aim to provide patients with the necessary information to make informed care decisions.<sup>17</sup> Future regulations should consider creating a single patient-friendly, CMS-operated website and requiring direct hospital submission of prices to CMS; this would allow CMS to more effectively track and penalize noncompliance and help patients access prices more smoothly.

This study has several limitations. Its findings may not be generalizable to other healthcare services, although the selected services are among the most common ones billed in the US. Also, pricing variation was calculated based on available pricing data and may not extrapolate to hospitals that are noncompliant with the transparency mandate. In terms of data analysis, the across-center ratio is more indicative of national price ranges than it is average inter-facility disparities. Finally, it is possible that hospitals misreport standard charges on their chargemaster. This would not only alter our conclusions, but also undermine the goal of the transparency mandate.

## Conclusion

Smaller hospitals and those located in the South and West regions were less likely to be compliant with the CMS mandate for price transparency for standard hospital charges. Additionally, the poor usability of price transparency directories on hospital websites limits information access and serves to negate transparency efforts. Considering that variable financial burdens can be potent drivers of health disparities, the CMS mandate has not brought us closer to health equity from the standpoint of the patient.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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