THE RELATIONSHIP BETWEEN HOSPITAL CHARACTERISTICS AND CMS STAR RATINGS

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KEY FINDINGS

• Hospitals serving vulnerable patients receive lower star ratings.

• Large, urban, teaching hospitals tend to receive lower star ratings.

• Star ratings may exacerbate existing resource constraints for essential hospitals.

• Further research is needed to understand the magnitude of the effect of hospital bed counts, teaching status, governance structure, and patient sociodemographic status on star ratings.

REPORTING ON HOSPITAL QUALITY MEASURES

Over the past decade, the U.S. health care system has dedicated significant resources to improving the quality, efficiency, and cost-effectiveness of care delivery systems. These efforts have resulted in a variety of innovative programs, policy enactments, and funding streams for hospitals, including Delivery System Reform Incentive Payment (DSRIP) waivers, accountable care organizations, and patient-centered medical homes.

Public reporting of quality measures is another key aspect of these improvement initiatives. In 2002, the Centers for Medicare & Medicaid Services (CMS) collaborated with organizations representing consumers, hospitals, physicians, employers, accrediting organizations, and other federal agencies to create Hospital Compare, a public-facing website that provides detailed information on the quality of more than 4,000 Medicare-certified hospitals across the United States. This information, available on Medicare.gov, allows consumers to compare quality measures at different hospitals and make informed decisions about where they choose to receive care. Alternatively, it encourages hospitals to improve their quality of care based on their scores.

As part of this initiative, CMS collects data from hospitals on the following aspects of health care:
• General Hospital Information
• Patient Experiences
• Timely and Effective Care
• Complications
• Readmissions and Deaths
• Use of Medical Imaging
• Payment and Value of Care

Our primary purpose is to measure the distribution of star ratings among hospitals that treat a large proportion of low-income patients.

Hospital data for these seven domains are gathered using a variety of sources, including electronic health records (EHRs), health insurance claims, and other validated data collection methods and instruments. In particular, CMS implemented a new qualitative survey tool in 2006 to standardize patient experience measurement across all U.S. hospitals—the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey.

Developed through a partnership between CMS and the Agency for Healthcare Research and Quality (AHRQ), HCAHPS is based on a rigorous and multifaceted scientific process that includes an extensive literature review, cognitive interviews, consumer testing, stakeholder input, and a three-state pilot test. The survey asks a random sample of...
recently discharged adult patients to provide feedback about their hospital experience based on aspects such as hospital staff, communication, pain management, and the overall hospital environment. The aggregated results of the 11 measures (seven quality measures, two individual items, and two global items) for each hospital are then posted on Hospital Compare as a percentage for easy consumer utility.

In April 2015, CMS added HCAHPS star ratings to Hospital Compare in an effort to further assist consumers in understanding patient experience information. The star ratings summarize results for each of the 11 HCAHPS measures and present that summary on a 5-star rating scale. The goal is to provide a snapshot of the patient experience measure of care with a singular metric of hospital patient experience.

Because the CMS hospital star rating system is a new program, there is a limited amount of research on its effectiveness and impact. However, a similar star rating system, focused on a wider range of quality metrics, has been well established among nursing homes (implemented in 2008), and research in this area may provide critical insights into the system’s impact on health care quality.

A study published in May 2015 on the impact of star ratings at nursing homes found that patients dually eligible for Medicare and Medicaid were more likely to reside in low-rated nursing homes than non-dual eligible patients. This suggests that more vulnerable patients receive care from lower-rated nursing homes. Furthermore, evidence suggests that the star rating system actually exacerbates disparities in care quality over time in nursing homes. Study authors also suggested that lower-income patients utilized star ratings less often in their decision making than more affluent patients, offering it as a possible explanation for increased disparities.

Given these concerns, Essential Hospitals Institute, the research and quality arm of America’s Essential Hospitals, investigated whether implementing a star rating system within hospitals could lead to similar results. **Our primary purpose is to measure the distribution of star ratings among hospitals that treat a large proportion of low-income patients.** A secondary purpose is to test whether the following hospital characteristics affect that distribution:

- size
- teaching status
- governance
- geography
- urban or rural status

**RESEARCH METHODOLOGY**

In June 2015, CMS released a public report of HCAHPS star ratings, summarizing patient experience data collected from October 1, 2013 to September 30, 2014. These data provided ratings for 3,548 hospitals. By merging this dataset with the American Hospital Association’s (AHA) Annual Survey of Members, we were able to obtain governance type and bed counts for 3,522 hospitals. Utilizing data released by CMS for fiscal year 2015, allowed us to analyze teaching status and patient sociodemographic data for 3,093 of these hospitals. To draw on all available data, we used the maximum sample for each analysis and employed t-tests to evaluate for significance in sample means.

**Definitions**

We defined governance type as either for-profit, nonprofit, federal government, or nonfederal government. Nonfederal government refers to hospitals operated by a state, county, city, hospital district, or hospital authority. We defined teaching status as either none, other teaching, or major teaching using resident-to-bed ratio of 0, less than 0.25, and greater than 0.25 respectively.

We used disproportionate share hospital (DSH) patient percent (DPP) to measure the potential impact of sociodemographic factors in patient populations on the distribution of star ratings. CMS uses this metric to determine the amount of DSH supplementary payments given to a hospital to help offset the cost of treating a large share of low-income and vulnerable patients, including the uninsured. We chose to use DPP because of its ability to capture both Medicaid patients and those who are eligible for Medicare Part A or Supplemental Security Income (SSI).

As a cross-sectional analysis, this study only provides insights into a specific point in time and has no ability to examine any temporal relationships that may exist. Furthermore, the data we examined were limited, as hospital characteristics data were not available for the complete sample. However, we have no reason to believe that these missing data differ significantly from our sample.
PRIMARY FINDING: HOSPITALS TREATING MORE VULNERABLE PATIENTS RECEIVE LOWER STAR RATINGS

To understand whether any relationship exists between serving patients with lower sociodemographic status (SDS) and star ratings, we examined the distribution of DSH patient percentage (DPP) among each star rating level. Figure 1 illustrates the association between treating a higher proportion of low-income patients (higher DPP) and lower star ratings. These data show that hospitals receiving higher ratings tend to have a lower DPP. Not only were 5-star rated hospitals more likely to treat fewer vulnerable patients, on average their DPP was more than four times lower than those receiving 1-star ratings.

Additionally, comparing those treating the largest share of vulnerable patients shows that hospitals in the top quartile of DPP received an average rating of 2.76 stars, while those in the lower three quartiles of DPP received an average of 3.41 stars.

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FINDING: SMALLER HOSPITALS RECEIVE HIGHER RATINGS THAN LARGER HOSPITALS

Table 1 provides insights into the distribution of star ratings based on bed counts. In general, hospitals with fewer beds received higher ratings than those with more beds. Specifically, those with fewer than 100 beds were more than 13 times more likely to receive a 5-star rating than hospitals with 100 beds or more. These larger hospitals were also given a 1- or 2-star rating 3.84 times more often.

Hospitals with more beds were increasingly likely to receive an average (3-star) rating. Hospitals with fewer than 100 beds averaged 3.83 stars while those with 100 beds or more averaged significantly less, 3.05 stars. These findings may reflect that smaller hospitals with fewer beds often provide specialized or fewer targeted service lines and treat less complex or chronically ill patients. Larger hospitals serve a high number of patients in the emergency department (ED). Research has shown a greater likelihood of low HCAHPS scores reported from patients admitted via the ED, as patient-provider interactions are often more limited due to the stressful nature of the ED. Conversely, smaller hospitals typically see fewer ED visits or may not provide ED services at all.

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>STAR RATING DISTRIBUTION BY NUMBER OF BEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fewer than 5</td>
<td>6 - 24</td>
</tr>
<tr>
<td>n</td>
<td>2</td>
</tr>
<tr>
<td>1 Star</td>
<td>0%</td>
</tr>
<tr>
<td>2 Stars</td>
<td>0%</td>
</tr>
<tr>
<td>3 Stars</td>
<td>0%</td>
</tr>
<tr>
<td>4 Stars</td>
<td>0%</td>
</tr>
<tr>
<td>5 Stars</td>
<td>100%</td>
</tr>
</tbody>
</table>

Research has shown a greater likelihood of low HCAHPS scores reported from patients admitted via the ED, as patient-provider interactions are often more limited due to the stressful nature of the ED.
Finding: Non-Teaching Hospitals Are Most Likely To Receive High Star Ratings

Analyzing the distribution of star ratings by hospital teaching status reveals that hospitals with a higher resident-to-bed ratio, a size-adjusted metric of the number of residents a hospital trains, received lower ratings. Non-teaching hospitals were nearly nine times more likely to receive 5 stars and more than three times less likely to receive 1 star than major teaching institutions. As Table 2 shows, hospitals with less than a 0.25 resident-to-bed ratio perform similarly to non-teaching hospitals on the lower end of the distribution, but struggle to attain the highest ranking.

### Table 2

<table>
<thead>
<tr>
<th>Teaching Status</th>
<th>1 Star</th>
<th>2 Stars</th>
<th>3 Stars</th>
<th>4 Stars</th>
<th>5 Stars</th>
</tr>
</thead>
<tbody>
<tr>
<td>None (0)</td>
<td>3.28%</td>
<td>13.11%</td>
<td>37.85%</td>
<td>36.84%</td>
<td>8.92%</td>
</tr>
<tr>
<td>Other teaching (&lt;0.25)</td>
<td>3.03%</td>
<td>16.53%</td>
<td>47.25%</td>
<td>31.27%</td>
<td>1.93%</td>
</tr>
<tr>
<td>Major teaching (&gt;0.25)</td>
<td>10.58%</td>
<td>25.60%</td>
<td>40.61%</td>
<td>22.18%</td>
<td>1.02%</td>
</tr>
</tbody>
</table>

Finding: The Impact of Hospital Governance Type on Star Ratings Is Variable

The relationship between star ratings and governance type is explored in Table 3. Among those hospitals receiving the highest rating, there is considerable disparity between for-profit and nonprofit hospitals. Of the for-profit hospitals, 13.45 percent received a 5-star rating compared with 7.02 percent of nonprofit hospitals. Interestingly, this pattern does not hold true when one examines hospitals at levels below a 5-star rating. For example, nonprofits and nonfederal government hospitals performed at a 4-star level or above roughly 32 percent more often than for-profits. Similarly, 87.3 percent of nonprofits and nonfederal government hospitals received 3 stars or more, while only 67.54 percent of for-profit hospitals received 3 stars or more.

### Table 3

<table>
<thead>
<tr>
<th>Governance Type</th>
<th>1 Star</th>
<th>2 Stars</th>
<th>3 Stars</th>
<th>4 Stars</th>
<th>5 Stars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Government</td>
<td>10.00%</td>
<td>40.00%</td>
<td>10.00%</td>
<td>40.00%</td>
<td>0%</td>
</tr>
<tr>
<td>For-Profit</td>
<td>5.55%</td>
<td>26.91%</td>
<td>34.81%</td>
<td>19.28%</td>
<td>13.45%</td>
</tr>
<tr>
<td>Non-Federal Government</td>
<td>3.70%</td>
<td>9.44%</td>
<td>35.56%</td>
<td>38.33%</td>
<td>12.96%</td>
</tr>
<tr>
<td>Nonprofit</td>
<td>2.62%</td>
<td>9.95%</td>
<td>38.52%</td>
<td>41.89%</td>
<td>7.02%</td>
</tr>
</tbody>
</table>
FINDING: URBAN HOSPITALS RECEIVE LOWER STAR RATINGS THAN RURAL HOSPITALS

Examining hospital star ratings across urban and rural communities reveals that while a similar proportion of hospitals received 5 stars, there were differences in the distribution of 1- and 2-star ratings. Less than 1 percent of rural hospitals received a 1-star rating, while nearly 5 percent of urban hospitals did so. Overall, twice the percentage of urban hospitals received ratings in the bottom two categories than hospitals in rural areas.

<table>
<thead>
<tr>
<th></th>
<th>Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>2,364</td>
<td>729</td>
</tr>
<tr>
<td>1 Star</td>
<td>4.82%</td>
<td>0.96%</td>
</tr>
<tr>
<td>2 Stars</td>
<td>16.92%</td>
<td>9.19%</td>
</tr>
<tr>
<td>3 Stars</td>
<td>40.69%</td>
<td>39.09%</td>
</tr>
<tr>
<td>4 Stars</td>
<td>31.22%</td>
<td>43.62%</td>
</tr>
<tr>
<td>5 Stars</td>
<td>6.35%</td>
<td>7.13%</td>
</tr>
</tbody>
</table>

FINDING: GEOGRAPHY HAS LITTLE IMPACT ON STAR RATINGS

We found that in general, hospitals in the Northeast and West received lower star ratings. This is driven primarily by heavily populated states in these regions. However, in other regions population does not seem to be a major factor in star ratings. For example hospitals in lesser populated states such as North Dakota and Arkansas averaged lower ratings than their neighbors.

FIGURE 2: CMS SUMMARY STAR RATING AVERAGE BY STATE

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Average Stars
- 2.00 – 2.75
- 2.83 – 3.27
- 3.29 – 3.45
- 3.48 – 3.52
- 3.57 – 3.77
- 3.79 – 4.16
UNINTENDED CONSEQUENCES FOR ESSENTIAL HOSPITALS

Essential hospitals are often large, nonprofit, academic medical centers. Our findings reveal that these three factors have an impact on star ratings, possibly leading to compounded negative consequences for these critical institutions. Dedicated first and foremost to serving the vulnerable, essential hospitals typically treat a larger proportion of racial and ethnic minority patients and tend to provide specialty services (e.g., level I trauma centers and burn units) that are not always available at other hospitals. In addition, essential hospitals train nearly 12 times as many physicians as other U.S. teaching hospitals.

A distribution analysis (Table 5) among essential hospitals confirms this negative association disproportionately affects essential hospitals. Given these findings and previous research into star ratings systems and their relationship to disparities, further research is needed to discover the mechanisms and potential impact of such systems on these critical institutions.

FINDINGS DEMONSTRATE MORE RESEARCH IS NEEDED

Our analysis revealed that certain types of hospitals were more likely to receive lower star ratings than others. Specifically, larger hospitals, urban hospitals, and teaching hospitals tended to receive lower star ratings. Additionally, nonprofit hospitals tended to receive a score of 3 or 4 compared with their for-profit counterparts, which in general received scores of 2 or 3. However, nonprofit hospitals were less likely to receive a 5-star rating.

We were primarily interested in the distribution of star ratings among hospitals serving a large share of low-income patients. We found that these hospitals were typically given lower ratings under the HCAHPS system. Our findings highlight the possibility of underlying bias in the rating system and the need for more research into the impact of national rating systems on consumer choice, quality of care, and health care disparities.

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Notes


7. Findings were significant at p=0.001.

8. Findings were significant at p<0.0001.