Association Between the Centers for Medicare and Medicaid Service Hospital Star Rating and Patient Outcomes

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Scholarly Report submitted in partial fulfillment of the MD Degree at Harvard Medical School

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Student Name: David E Wang

Scholarly Report Title: Association Between the Centers for Medicare and Medicaid Service Hospital Star Rating and Patient Outcomes.

Mentor Name(s) and Affiliations: Ashish Jha, MD, MPH, Senior Associate Dean, Research Translation and Global Strategy, K.T. Li Professor of Global Health, Director - Harvard Global Health Institute, Department of Health Policy and Management

Collaborators, with Affiliations: Jose Figueroa, MD, MPH, Brigham and Woman’s Hospital, Yusuke Tsugawa, MD, MPH, Harvard School of Public Health

Abstract: Association Between the Centers for Medicare and Medicaid Service Hospital Star Rating and Patient Outcomes.
Wang DE, Tsugawa Y, Figueroa JF, Jha AK.

Purpose: The Centers for Medicare and Medicaid Services (CMS) recently introduced a 5-star hospital rating system. This rating depends solely on patient experience based on the Hospital Consumer Assessment of Healthcare Providers and Systems, and currently, it does not include measures of quality of care or patients’ health outcomes. We investigated whether hospitals with more stars have lower risk-adjusted 30-day mortality and readmissions than hospitals with less stars.

Methods: We evaluated the characteristics of hospitals by number of stars received. Next, we examined the association between the number of stars hospitals received and patient 30-day mortality and readmission rates. We calculated a composite patient outcome for mortality and readmissions across 3 conditions (acute myocardial infarction, pneumonia, and heart failure) using regression models with indicators for primary condition, patient age, sex, and coexisting conditions. We used multivariable linear regression models to further adjust for hospital characteristics weighted by the number of Medicare hospitalizations for each hospital.

Results: Of the 3076 hospitals in our sample, 4.1% received 5 stars, 26.2% received 4 stars, 47.0% received 3 stars, 20.3% received 2 stars, and 2.5% received 1 star. In general, 4- and 5-star hospitals were more likely to be small, nonteaching, and located in small rural towns in the Midwest. We found that the number of stars was inversely associated with risk-adjusted mortality rate. The relationship was monotonic, with 5-star hospitals having the lowest mortality rate of 9.8% (95% CI, 9.7%-9.9%), followed by 4-star hospitals with a rate of 10.4% (95% CI, 10.3%-10.4%), 3-star hospitals with a rate of 10.5% (95% CI, 10.5%-10.5%), 2-star hospitals with a rate of 10.7% (95% CI, 10.7%-10.7%), and 1-star hospitals with a rate of 11.2% (95% CI, 11.2%-11.3%) (P <.001 for trend). Higher CMS star ratings were also associated with lower adjusted readmission rates, with 5-star hospitals having the lowest readmissions rate of 18.7% (95% CI, 18.6%-18.8%), followed by 4-star hospitals with a rate of 20.2 (95% CI, 20.2%-20.2%), 3-star hospitals with a rate of 21.0% (95% CI, 21.0%-21.0%), 2-star hospitals with a rate of 21.8% (95% CI, 21.7%-21.8%), and 1-star hospitals with a rate of 22.9% (95% CI, 22.8%-22.9%) (P <.001 for trend).

Conclusion: We found that a higher CMS star rating was associated with lower patient mortality and readmissions. These findings should be encouraging for policymakers and consumers; choosing 5-star hospitals does not seem to lead to worse outcomes and in fact may be driving patients to better institutions.
Student Contribution

I had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. I primarily lead and contributed to the following aspects of this study:

- Study concept, study decision
- Acquisition, analysis, and interpretation of data
- Drafting of the manuscript
- Revision of the manuscript
- Statistical analysis using R programming

Dr.’s Tsugawa, Figueroa, and Jha provided administrative support, technical support, and study supervision in all areas described above.

Study Citation


Study Link

https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2513630
Appendix 1 (Full Text of Publication)

Association Between the Centers for Medicare and Medicaid Services Hospital Star Rating and Patient Outcomes

Introduction

In an effort to help patients choose hospitals based on quality, the Centers for Medicare and Medicaid Services (CMS) recently introduced a 5-star hospital rating system. This rating depends solely on patient experience based on the Hospital Consumer Assessment of Healthcare Providers and Systems, and currently, it does not include measures of quality of care or patients’ health outcomes. Whether hospital stars are associated with better outcomes is unclear, and critics worry that the star rating system may mislead patients into thinking that 5-star hospitals are superior in quality.1-4 Therefore, we investigated whether hospitals with more stars have lower risk-adjusted 30-day mortality and readmissions than hospitals with less stars.

Methods

The study was approved by the institutional review board at the Harvard T. H. Chan School of Public Health. We linked the October 2015 Hospital Compare data on hospital star ratings5 with the American Hospital Association annual survey database. We evaluated the characteristics of hospitals by number of stars received. We restricted our sample to acute care hospitals with 25 or more hospitalizations.

Next, we examined the association between the number of stars hospitals received and patient 30-day mortality and readmission rates. Using 100% Medicare Inpatient File 2013, we calculated a composite patient outcome for mortality and readmissions across 3 conditions (acute myocardial infarction, pneumonia, and heart failure) using regression models with indicators for primary condition, patient age, sex, and coexisting conditions. We used multivariable linear regression models to further adjust for hospital characteristics (hospital size, ownership, teaching status, rurality, ICU, and hospital referral region indicators), weighted by the number of Medicare hospitalizations for each hospital.

Results

Of the 3076 hospitals in our sample, 4.1% received 5 stars, 26.2% received 4 stars, 47.0% received 3 stars, 20.3% received 2 stars, and 2.5% received 1 star (Table 1). In general, 4- and 5-star hospitals were more likely to be small, nonteaching, and located in small rural towns in the Midwest. We found that the number of stars was inversely associated with risk-adjusted mortality rate. The relationship was monotonic, with 5-star hospitals having the lowest mortality rate of 9.8% (95% CI, 9.7%-9.9%), followed
by 4-star hospitals with a rate of 10.4% (95% CI, 10.3%-10.4%), 3-star hospitals with a rate of 10.5% (95% CI, 10.5%-10.5%), 2-star hospitals with a rate of 10.7% (95% CI, 10.7%-10.7%), and 1-star hospitals with a rate of 11.2% (95% CI, 11.2%-11.3%) (P <.001 for trend).

Higher CMS star ratings were also associated with lower adjusted readmission rates, with 5-star hospitals having the lowest readmissions rate of 18.7% (95% CI, 18.6%-18.8%), followed by 4-star hospitals with a rate of 20.2 (95% CI, 20.2%-20.2%), 3-star hospitals with a rate of 21.0% (95% CI, 21.0%-21.0%), 2-star hospitals with a rate of 21.8% (95% CI, 21.7%-21.8%), and 1-star hospitals with a rate of 22.9% (95% CI, 22.8%-22.9%) (P <.001 for trend) (Table 2).

Discussion

We found that a higher CMS star rating was associated with lower patient mortality and readmissions. It is reassuring that patients can use the star ratings in guiding their health care seeking decisions given that hospitals with more stars not only offer a better experience of care, but also have lower mortality and readmissions.

Our study has limitations. First, our analyses focused on the Medicare population; therefore, whether these findings would hold for younger patients is unclear. Second, although we adjusted for both patient and hospital characteristics, it is possible that some of the worse outcomes at low stars hospitals may represent residual confounding. Finally, the differences were most apparent at the extremes, with 2- to 4-star hospitals being relatively comparable. Whether this reflects the clustering methodology of the star rating program or whether quality of care is similar in these hospitals is unclear.

These findings should be encouraging for policymakers and consumers; choosing 5-star hospitals does not seem to lead to worse outcomes and in fact may be driving patients to better institutions.

Article Information

Corresponding Author: Ashish K. Jha, MD, MPH, Department of Health Policy and Medicine, Harvard T. H. Chan School of Public Health, 42 Church St, Cambridge, MA 02138 (ajha@hsph.harvard.edu).

Author Contributions: Dr Wang had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.
Study concept and design: All authors.
Acquisition, analysis, or interpretation of data: All authors.
Drafting of the manuscript: All authors.
Critical revision of the manuscript for important intellectual content: All authors.
Statistical analysis: Wang, Tsugawa, Jha.
Administrative, technical, or material support: Figueroa.
Study supervision: Tsugawa, Figueroa, Jha.
Conflict of Interest Disclosures: None reported.

References