International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 5, No. 02 March-April; 2023 Page. No. 208-217

To cite this article: Ezimma Nnyagu, PharmD, MPH, Ming Zhang, PhD, and Lesley Clack, ScD (2023). MEASURING QUALITY: EVALUATING HOSPITAL VALUE-BASED PURCHASING AND OVERALL HOSPITAL RATINGS, International Journal of Research in Commerce and Management Studies (IJRCMS) 5 (2): 208-217

MEASURING QUALITY: EVALUATING HOSPITAL VALUE-BASED PURCHASING AND OVERALL HOSPITAL RATINGS

Ezimma Nnyagu, PharmD, MPH[1], Ming Zhang, PhD[2], and Lesley Clack, ScD[1,3]*

[1]Department of Health Policy and Management, College of Public Health, University of Georgia, Athens, GA, 30602. USA.

[2]Department of Epidemiology and Biostatistics, College of Public Health, University of Georgia, Athens, GA, 30602. USA.

[3]Department of Health Sciences, Marieb College of Health & Human Services, Florida Gulf Coast University, Fort Myers, FL 33965. USA.

* Corresponding author: Dr. Lesley Clack, Department of Health Sciences, Marieb College of Health & Human Services, Florida Gulf Coast University, Fort Myers, FL 33965. Phone: (239) 590-7620.

DOI: https://doi.org/10.38193/IJRCMS.2023.5213

ABSTRACT

The Centers for Medicare & Medicaid Services designed the Hospital Value Based Purchasing (HVBP) program and the Overall Hospital Quality Star Ratings program to improve healthcare quality across the US. Controversy remains concerning whether these initiatives truly encourage institutions to continuously work to improve the quality of care provided. To address some of these knowledge gaps, we applied data from the Modern Healthcare Hospital Penalties and Rewards dataset to identify potential relationships. We found the mean HVBP adjustments differed significantly between Ohio and Washington with a mean difference of 0.10% and between Pennsylvania and Washington 0.08%; and the mean hospital overall ratings differed significantly between Georgia and Ohio with mean a difference of 0.58 and between Ohio and Washington 0.65. Therefore, by evaluating the potential relationships, we can interpret the impact of geographic region on Medicare rewards and penalties, healthcare quality, and thus the impact on patient care.

KEYWORDS: Hospital value-based purchasing, quality, value, Medicare, patient satisfaction, hospital rating

INTRODUCTION

Healthcare in the US is exceedingly expensive and there is compelling evidence that a large share of Medicare spending results in little or no patient benefit.[1] To resolve this issue, in 2013, the Patient Protection and Affordable Care Act (ACA) established value-based purchasing programs throughout Medicare, including the Medicare Hospital Value-Based Purchasing (HVBP) program becoming

operational in the U.S. This HVBP program works by reducing a portion of participating hospitals' Medicare payments for hospital-based operating diagnosis-related group (DRG) payments by a specified. The approximated total amount of those payment reductions is then used to provide value-based incentive payments to hospitals based on their performance in the program during that fiscal year. The HVBP program ties Medicare payments and reimbursements to quality of care using 21 quality and cost measures divided into four domains.[2] The clinical process of care/outcomes domain, safety domain, person and community engagement domain, and efficiency and cost reduction domain are used to determine HVBP adjustments of up to 1% to Medicare reimbursements for acute care hospitals.[3]

Medicare rewards hospital systems who provide better quality of care with higher reimbursement payments and penalizes institutions that provide lower quality care by deducting reimbursement payments. Since its inception, the HVBP program has compelled hospital systems across the nation to intensify quality improvement efforts. In light of the increasing aim to improve efficiency, healthcare organizations are continuously exploring innovative strategies for improving care delivery at every stage of the healthcare continuum.[4] Though prior studies have been conducted assessing relationships between hospital value-based purchasing adjustments and various hospital and non-hospital related characteristics, it is still unclear as to what extent specific characteristics are associated with a hospital's VBP adjustment, and consequently incentive payments.[5] Furthermore, some hospitals, administrators, and policy makers have expressed concern over the program's potential to redistribute payments away from geographic regions.[6] Information on viable associations between hospital quality, HVBP adjustments, and geographic region has been limited.

In July of 2016, the Centers for Medicare & Medicaid Services (CMS) created its Overall Hospital Quality Star Ratings ("stars") program in an effort to support consumer decision-making. To determine the overall hospital star ratings, CMS uses up to 57 quality measures, each categorized into 1 of 7 domains: mortality, safety of care, readmission, patient experience, effectiveness of care, timeliness of care, and efficient use of medical imaging.[7] The aim was to make quality information more actionable and accessible by consolidating dozens of hospital quality measures into a familiar 5-star rating system.[8]

While both the HVBP program and the Overall Hospital Quality Star Ratings program were implemented with good intentions, controversy remains concerning whether these initiatives truly encourage institutions to: continuously work to improve the quality of care provided; provide an accurate assessment of the quality of care provided at hospitals in different U.S. geographical regions; and discover whether overall hospital star ratings potentially misrepresent quality across facilities, and hence are of uncertain utility to consumers. Nonetheless, long term effects of geographical region,

particularly regarding HVBP and the Overall Hospital Quality Star Ratings ("stars"), are unknown. Of particular interest is whether characteristics (e.g., geographical region) modify performance in either of the programs. It is possible that the outcomes of HVBP adjustments and hospital overall ratings are heterogeneous across hospitals in different regions.[1] The objectives of this study are to 1) identify potential relationships between hospital overall ratings and HVBP adjustments of four U.S. regions: Georgia, Pennsylvania, Ohio, and Washington State, and 2) evaluate the change in HVBP adjustment and hospital overall ratings from in each state. By evaluating potential relationships between hospital overall ratings and hospital value-based purchasing adjustments across various U.S. regions, we can interpret the impact of geographic region on Medicare rewards and penalties, healthcare quality, and thus the impact on patient care.

In 2017, John O. DeLancey and colleagues conducted an observational analysis of data merged from three sources: CMS Overall Hospital Quality Star Ratings database, American Hospital Association 2014 Annual Survey of Hospitals, and the CMS Fiscal Year 2015 Payment Update Impact File (add references). Investigators included 3,591 U.S. hospitals receiving a star rating and identified key hospital characteristics that lead to major variations in overall hospital star ratings. Overall hospital star ratings had substantial variations, with 4 or 5 stars only being awarded to 15.8% of major teaching hospitals, 18.8% of other teaching hospitals, 30.2% of community hospitals, and 33.3% of critical access hospitals. Smaller hospitals more frequently achieved a high star rating compared with larger hospitals (No. of beds: <100, 34.0%; 100 – 299, 24.3%; 300 – 499, 24.2%; ≥500, 19.4%; $P < .001$).[9] It was concluded that smaller hospitals, specialty hospitals, and hospitals reporting less outcome measures more frequently received a higher star rating.

Prior research collected data from a retrospective review of short-term acute-care hospitals from across the U.S. to examine the effect of hospital ownership and size on hospitals' value-based purchasing scores.[10] Representative samples were created from randomly selected short-term acute-care hospitals and grouped into three categories of both ownership and size.[10] The ownership categories were as follows: for-profit, nonprofit, and government. The size categories are as follows: small, 99 beds or fewer; medium, 100 to 249 beds; and large, 250 beds or more (add references). Results revealed that for-profit controlled hospitals outperform both nonprofit and government-controlled hospitals in process-of-care (PC) measures, Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) measures, and value-based purchasing total performance scores (TPS).[10]

A study performed in year 2015 assessed nonrandom variation in patient satisfaction as determined by HCAHPS surveys of patients from a total of 3907 HVBP-participating hospitals (add references). Researchers made use of publicly available online data obtained from Hospital Compare, American Hospital Directory, and the United States Census Bureau. Results revealed that hospital size and

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 5, No. 02 March-April; 2023 Page. No. 208-217

primary language (non-English speaking) most strongly predicted unfavorable HCAHPS scores, whereas education and white ethnicity most strongly predicted favorable HCAHPS scores.[11] This study provided evidence that demographic and structural factors (e.g., hospital beds) predict patient satisfaction scores even after CMS adjustments.[11]

Researchers at The University of Virginia conducted a study using FY 2015 and FY 2016 HVBP program data available on the Hospital Compare website (add URL and references). The study team collected and organized data for the periods from the HVBP program and used multilevel random coefficient models to estimate the mean and significance of total performance score (TPS) differences from fiscal year (FY) 2015 and FY 2016, by hospital type.[8] The Medicare Value-Based Purchasing Program's (VBPP) TPS components data was evaluated by hospital groups: physician-owned surgical hospitals (POSH), Kaiser Hospitals, University Health System Consortium Hospitals, Pioneer Accountable Care Organization Hospitals, US News and World Report Honor Roll Hospitals, and other hospitals.[8] Results revealed a decrease from 41.65 to 40.25 in overall mean TPS for 2985 hospitals. POSH and Kaiser Hospitals had significantly higher TPS in FY 2015 and FY 2016. Results suggested that POSH and Kaiser Hospitals provide significantly greater value of care with consistency from year to year when compared with other groups studied.[8] This study provided evidence that hospital type may predict the quality of care provided.

MATERIALS AND METHODS

Data source and data selection criteria

Data used for this study was retrieved from the Modern Healthcare's Hospital Penalties and Rewards dataset for FY 2014 – FY 2017. The Hospital Penalties and Rewards dataset includes data from 5,054 acute care hospitals across the United States and provides information consisting of various hospital characteristics. We used data concerning geographic region, HVBP adjustments, and hospital overall ratings. The study was restricted to acute care hospitals exposed to the HVBP program and Overall Hospital Quality Star Ratings program in four specific U.S geographic regions which were chosen according to the U.S. Census Bureau's designations: the Northeast, the Midwest, the South, and the West. One state from each of the United States regions was chosen based on population size, level of educational attainment, racial demographic, and distribution of health care coverage. The four states whose acute care hospitals were incorporated in the study include: Georgia, Ohio, Pennsylvania, and Washington state. These states represented the South, Midwest, Northeast, and West regions, respectively. A total of 4,457 acute care hospitals that failed to meet inclusion criteria were removed from the study.

Statistical Analysis

The analysis of the final study sample was performed using IBM SPSS Statistics software, version 26.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 5, No. 02 March-April; 2023 Page. No. 208-217

The hospital dataset was analyzed to assess the relationship between HVBP adjustments and hospital overall ratings for the 597 remaining institutions during the aforementioned time periods.

The analysis of changes in HVBP adjustments from FY 2014 – FY 2017 and assessment of relationship between FY 2016 HVBP adjustments and FY 2016 hospital overall rating was conducted using descriptive statistics (please provide some details here). Multivariate analysis of the changes in HVBP adjustment components from FY 2014 – FY 2017 was performed using a one-way multiple analysis of variances (MANOVA) to detect potential differences in FY 2014 – FY 2017 HVBP adjustments and FY 2016 hospital overall ratings by geographic region as well as identify potential relationships between FY 2016 hospital overall ratings and FY 2016 HVBP adjustments by geographic region.

One-way MANOVA was used to identify potential significant differences in mean HVBP adjustments between each state during FY 2014 – FY 2017 and hospital overall ratings during FY 2016. Tukey's test was used to identify which groups' mean HVBP adjustments were significantly different from one another. Statistical significance was assessed by the Wilks' Lambda for multivariate tests, using the predetermined threshold value of $P < 0.05$.

RESULTS

In Table 1, we list the description of the number of hospitals included in each comparison group in this study. Our final sample included 597 acute care hospitals, with observations for the study variables: geographic region (state), FY 2014 – FY 2017 HVBP adjustments, and FY 2016 hospital overall rating. Table 2 displays descriptive statistics for FY 2016 – FY 2017 HVBP adjustments and FY 2016 hospital overall ratings by state, and Table 3 provides descriptions of the total mean HVBP adjustments for FY 2014 – FY 2017.

The descriptive statistics revealed that from FY 2014 to FY 2017, the total mean HVBP adjustments increased from -0.02% to 0.08% among the 597 hospitals included in the study. In Georgia and Pennsylvania, mean HVBP adjustments increased steadily during FY 2014 – FY 2016, then decreased during FY 2017. Conversely, in Ohio and Washington, mean HVBP adjustments maintained steady increases from FY 2014 – FY 2017. Results also revealed that total the FY 2016 mean HVBP adjustment and total mean overall hospital star ratings in was 0.11% and 2.44 (out of a 5-star rating), respectively.

As stated in Materials and Methods, Wilks' Lambda for multivariate tests was used to assess statistical significance, using the predetermined threshold value of $P < 0.05$. There was a statistically significant difference in HVBP adjustments and hospital overall ratings based on a geographic region

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 5, No. 02 March-April; 2023 Page. No. 208-217

(state), F (15, 1626) = 132.96, $p < .0005$; Wilk's $\Lambda = 0.928$. Tukey's honestly significant difference (HSD) test revealed statistically significant differences in mean HVBP adjustments during FY 2014 and overall hospital star ratings during FY 2016. Analysis of results from Tukey's HSD test revealed a statistically significant difference in mean HVBP adjustments between Ohio and Washington state during FY 2014. During FY 2014 mean HVBP adjustments differed significantly between Ohio and Washington with a mean difference of 0.10% (p = 0.003; 95% CI: 0.03% – 0.18%). Tukey's HSD test also detected a statistically significant difference between mean HVBP adjustments in Pennsylvania and Washington state during FY 2014 (mean difference = 0.08%, p = 0.024; 95% CI: 0.01% – 0.16%). The results of the one-way MANOVA did not reveal statistically significant differences in mean HVBP adjustments between states during FY 2015, FY 2016, or FY 2017. In FY 2016, mean hospital overall ratings differed significantly between Georgia and Ohio with mean a difference of 0.58 (p = 0.002; 95% CI: 0.17 – 1.00) and Ohio and Washington with a mean difference of 0.65 (p = 0.002; 95% CI: 0.18 – 1.12).

DISCUSSION

Through this study, we aimed to identifying the potential relationships between hospital overall ratings and HVBP adjustments of four U.S. regions and evaluating the change in HVBP adjustment and hospital overall ratings from in each state. By doing so, we can interpret the impact of geographic region on Medicare rewards and penalties, healthcare quality, and thus the impact on patient care.

In this study, we found that the differences in HVBP adjustments based on geographic region were minor and inconsistent throughout FY 2014 – FY 2017. With the exception of significant differences in FY 2014 mean HVBP adjustments and FY 2016 hospital overall ratings between previously specified states, results were generally non-significant. These results indicate that during the Hospital Value Based Purchasing (HVBP) program's inaugural year, acute care hospitals in Ohio and Pennsylvania may have been better suited to overcome challenges associated with acclimating to the new value-based standards as opposed to the previous fee-for-service standards used for acute care hospitals in Washington. This reasoning may also explain why total mean HVBP adjustments increased from FY 2014 – FY 2016. The increase in total mean HVBP adjustments among all four states during this time may have been driven by institutions' ability to adapt to the changing landscape. It is likely that as time passed, hospitals became better acclimated to the HVBP program. This supports the notion that despite the lack of early responsiveness to the program, the effects of the HVBP program may grow stronger over time as incentives increase and hospitals have time to respond to the program. Another plausible explanation for the increase in total mean HVBP adjustments from FY 2014 – FY 2016 was alteration of the HVBP program process and outcome variables.

Since the change in FY 2015 – FY 2017 mean HVBP adjustments did not demonstrate statistical

significance with regard to the state, it is likely that differences in mean HVBP adjustments may have been due to factors outside of the geographic region. Thus, the results of this study suggest that research should continue to focus on hospital-related characteristics (e.g. hospital size, hospital type, etc.) to understand differences in HVBP adjustments among acute care hospitals. More robust, generalizable research studies should focus on geographic region and hospital quality as further research is needed to understand the relationship between these two factors.

The FY 2016 total mean HVBP adjustments and total mean overall hospital star ratings were 0.11% and 2.44, respectively. Although total mean HVBP adjustments increased from FY 2014 – FY 2015, FY 2016 mean overall hospital ratings were quite unexceptional at 2.44 of 5 "stars". This result is consistent with another report [6]that despite variation in HVBP adjustments among states, the expected changes in hospital payment from Medicare under the new hospital pay-for-performance program were small and that almost two-thirds of hospitals nationwide would have very small adjustments in payment, between −0.25 percent and 0.24 percent. While this may be true, such small changes in payment might be also function as a minor incentive to improve performance.[6] As data concerning FY 2017 hospital overall ratings could not be assessed in this study, whether or not changes in Medicare HVBP adjustments of this size will affect hospital quality remains uncertain. Additionally, despite the expected marked differences among the HVBP adjustments in FY 2014, the differences in the values representing potential comparison changes between FY 2016 total mean HVBP adjustments and FY 2016 mean hospital overall ratings by state would not appropriately indicate whether or not overall hospital star ratings potentially misrepresent quality across facilities.

Limitations of our study include: The MANOVA statistic was applied to detect differences in mean HVBP adjustments, but itis unable to identify where the difference is. Fortunately, Tukey's test was able to identify means that were statistically different from one another. Furthermore, this study only represents 2016 overall hospital star ratings data. Thus, relationships between overall hospital star ratings can only be evaluated during FY 2016 and not FY 2014, FY 2015, or FY 2017. An additional limitation of the study includes the presence of incomplete observations for the study variables. Researchers did not exclude hospitals without reported outcomes data in each study period. In effect, the number of hospitals providing HVBP adjustments and overall hospital star ratings data were not equal throughout each study group. Lastly, researchers used single states to represent entire geographical regions. There can be vast differences in demographics among states of the same region. Although researchers selected states with similar characteristics (e.g. population size, racial demographic, and distribution of healthcare coverage), it may have been more appropriate to include multiple, if not all, states from the specified regions.

In summary, the study provided a realistic representation of variations in quality among inpatient facilities in addition to substantiating the potential for variations in healthcare quality based on geographic region or state. The HVBP program has encouraged hospitals to evaluate the value of the care they provide and improve quality of care across the healthcare continuum (add references). Consequently, as healthcare continues to move rapidly into an era defined by quality of care rather than quantity of care, it will become increasingly vital to evaluate changes in hospital value-based purchasing adjustments and overall hospital star ratings associated with various hospital and non-hospital related characteristics. Doing so may potentially assist hospitals in understanding the factors that effect HVBP scores and potentially lead to intervention for hospitals across the nation.

CONCLUSIONS

In this study, we identified a significant difference in FY 2014 mean HVBP adjustments between Ohio and Washington in that the mean HVBP adjustment of Ohio was significantly higher than the mean HVBP adjustment of Washington. These observations reveal significant differences in FY 2014 HVBP adjustments and FY 2016 hospital overall ratings between geographic regions, but no significant differences between geographic regions and mean HVBP adjustments during other time periods. Results also revealed no significant variation in mean HVBP adjustments and across states with regard to FY 2015 – FY 2017.

Quality performance varies widely across hospitals. Numerous public and private payer initiatives have attempted to resolve this conflict through value-based purchasing programs.[1] Policy makers have signaled that over the next several years, the majority of Medicare payments will be tied, at least in part, to value-based payments.[12] Both the HVBP program and Overall Hospital Quality Star Ratings program emphasize a focus on quality of care instead of a focus on quantity. Considering their growth since enactment into large-scale initiatives, the HVBP and Overall Hospital Quality Star Ratings programs have the potential to help improve the quality of patient care in inpatient hospital settings. Opportunities to enhance the performance of HVBP programs include improving the quality measurement science, reducing health disparities, establishing a broad outcome measurement, and determining the optimal role of value-based purchasing relative to alternative payment models.[13]

Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. Additionally, the authors declare no affiliation or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

Author Contributions

Conceptualization, E.N. and L.C.; Methodology, E.N. and L.C.; Validation, E.N., M.Z. and L.C.; and Writing: E.N., M.Z. and L.C.

Funding Information

None.

Informed Consent Statement

Not applicable if no consent statement was used. Or any consent form used?

REFERENCES

1. Ryan, MA, Krinsky S, Maurer K, Dimick, J.B. Changes in Hospital Quality Associated with Hospital Value-Based Purchasing. *New England Journal of Medicine*. 2017;376(24):2358–2366. Doi:10.1056/NEJMsa1613412.
2. Maddox KEJ, Sen AP, Samson LW, Zuckerman RB, DeLew N, Epstein AM. Elements of Program Design in Medicare's Value-based and Alternative Payment Models: a Narrative Review. *Journal of General Internal Medicine* 32(11):1249–54. DOI: 10.1007/s11606-017-4125-8.
3. Turner JS, Broom KD, Counte MA. Is there a relationship between value-based purchasing and hospital profitability? An exploratory study of Missouri hospitals. *Health Services Research and Managerial Epidemiology. 2015;1(2)1-11.*
4. Spaulding, A., Choate, S., Hamadi, H., & Zhao, M. (2018). The Impact of Hospitalists on Value-Based Purchasing Program Scores. *Journal of healthcare management / American College of Healthcare Executives*, *63*(4), e43–e58. doi:10.1097/JHM-D-16-00035
5. Borah, B. J., Rock, M. G., Wood, D. L., Roellinger, D. L., Johnson, M. G., & Naessens, J. M. (2012). Association between value-based purchasing score and hospital characteristics. *BMC health services research*, *12*, 464. doi:10.1186/1472-6963-12-464
6. Werner RM, Dudley RA. Medicare's new hospital value-based purchasing program is likely to have only a small impact on hospital payments. *Health Affairs.* 2012;31(9):1932–1940
7. Fontana MA, Lyman S, Islam W, MacLean CH. When stars do not align: overall hospital quality star ratings and the volume-outcome association. *Journal of Bone and Joint Surgery.* 2019:e0044. http://dx.doi.org/10.2106/JBJS.OA.18.00044
8. Jones RS, Ramirez AG, Stukenborg GJ, Tracci MC, Turrentine FE. Observations on the medicare value-based ranking of hospitals during fiscal years 2015 and 2016. *American Journal of Medical Quality.* 2019;34(2):136–143.
9. DeLancey JO, Softcheck J, Chung JW, Barnard C, Dahlke AR, Bilimoria KY. Associations between hospital characteristics, measure reporting, and the centers for Medicare &

Medicaid services overall hospital quality star ratings. *JAMA.* 2017 May 16;317(19):2015-2017.

10. Chatfield JS. Value-Based Purchasing: The Effect of Hospital Ownership and Size. *The health care manager.* 2016;*35*(3):199–205. doi:10.1097/HCM.0000000000000116
11. McFarland DC, Ornstein KA, Holcombe RF. Demographic factors and hospital size predict patient satisfaction variance-implications for hospital value-based purchasing. *Journal of hospital medicine*. 2015;10(8)503–509. doi:10.1002/jhm.2371
12. Chatterjee P, Tsai TC, Jha AK. Delivering value by focusing on patient experience. *Am J Manag Care.* 2015;21(10):735-737
13. Chee TT, Ryan AM Wasfy JH, Borden WB. Current state of value-based purchasing programs. *Circulation.* 2016;133(22):2197–2205. doi:10.1161/CIRCULATIONAHA.115.010268.