HHS Public Access

Author manuscript

Am J Med. Author manuscript; available in PMC 2018 April 01.

Published in final edited form as:

Am J Med. 2017 April ; 130(4): e153–e155. doi:10.1016/j.amjmed.2016.08.047.

Area-Level Poverty and Excess Hospital Readmission Ratios

Raj N. Manickam, MS[1], **Yi Mu, MS**[1], **Abhijit V. Kshirsagar, MD, MPH**[2], and **Heejung Bang, PhD**[1,3]

[1]Graduate Group in Epidemiology, University of California, Davis, USA

[2]UNC Kidney Center, University of North Carolina, Chapel Hill, USA

[3]Division of Biostatistics, Department of Public Health Sciences, School of Medicine, University of California, Davis, USA

Reducing the number of preventable hospital readmissions has become a national health policy priority. Thirty-day readmissions are widely used in public reporting and value-based payments. The Centers for Medicare & Medicaid Services (CMS) reduces payments to hospitals that demonstrate a high rate of such readmissions, based on the rationale that the quality of inpatient care and transitions of hospital influences subsequent readmissions.[1]

Yet hospital transitional services and outpatient infrastructure available to patients may be limited in poor areas. There is understandable concern that hospitals serving populations with a high burden of poverty may be unfairly penalized for merely serving their community.[2–4]

To assess the potential impact of surrounding community, we examined the correlation between excess readmission ratios and socioeconomic status on hospital-level for 5 conditions for hospitalization. We hypothesized lower regional socioeconomic status is associated with higher excess readmission ratios.

Methods

The excess readmission ratio is the standardized rate ratio, the observed rate divided by model-based expected rate. Data for acute myocardial infarction, heart failure, pneumonia, chronic obstructive pulmonary disease, and total hip and knee arthroplasty in 2011–2014 are from https://www.medicare.gov/hospitalcompare/. for socioeconomic status, we used ‘percentage below federal-poverty-level’ from the Census-American Community Survey, linked to Hospital Service Areas.

We used summary statistics, correlation, and box-plot with quintile-split. Each analysis was *unadjusted* for other covariates, as correlation could be useful to inform if additional

Contact information: Heejung Bang, One Shields Ave, Med-Sci 1C, Department of Public Health Sciences, University of California, Davis, CA 95616, USA, hbang@ucdavis.edu.

Conflict of Interest: None.

Authorship: All authors have access to the data and played a role in writing this manuscript.

IRB Approval: The institutional review board at the University of California, Davis, determined that the IRB review is not required. (IRB ID: 915888-1)

adjustment may be justified in the CMS models (as is) or penalty assessment, via covariate or stratification.

Results

Data were available for >2100 hospitals (Table). The mean/median of all excess readmission ratios were ~1, as expected for proper standardization. The variability was largest for hip-knee, compared to other conditions (SD=0.14 vs. ~0.07). The distribution of poverty was skewed to the right (mean/median=17.1/16.8, range=3–56%). Correlations between the excess readmission ratios and poverty were relatively small in magnitude, but all positive; highest for heart failure (0.13, $p<0.0001$) and lowest for hip-knee (0.01, $p=0.6$), primarily due to higher variability for hip-knee.[5] Excess readmission ratio's distributions largely overlapped for 5 poverty subgroups (Appendix). Slight elevation of the excess was visible in the poorest subgroup for all conditions.

Discussion

In this nationwide sample of hospitals, we found that correlations of the excess readmission ratios with area-level poverty were uniformly positive and 4 of 5 were statistically significant. Correlation was smallest for hip-knee and highest for heart failure, followed by pneumonia and myocardial infarction. Variability, distributional overlap and standardization must be drivers of low correlations.[5]

The results suggest the current CMS models might focus on the appropriate variables, models and metrics in determining readmissions across the areas of varying poverty, and/or weak associations may be destined based on the methodologies used in the CMS models and our study.[2] Nonetheless, significant correlations after comprehensive "standardization" in quantifying excess (>0.1) may not be ignorable from policy perspectives.[2, 5] Correlation with various poverty and diversity measures might serve as part of monitoring and evaluation of the CMS models and other penalty programs, with a goal to make them as close to 0 as possible.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Funding: H. Bang was partly supported by the National Institutes of Health through grants UL1 TR000002 and P50 AR063043.

References

1. Frishman WH, Alpert JS. Reducing hospital readmissions for cardiovascular disease: is it feasible? The American Journal of Medicine. 2013; 126(9):753–4. [PubMed: 23968898]
2. Barnett M, Hsu J, McWilliams J. Patient characteristics and differences in hospital readmission rates. JAMA Internal Medicine. 2015; 175(11):1803–12. [PubMed: 26368317]
3. Bernheim SM, Parzynski CS, Horwitz L, et al. Accounting for patients' socioeconomic status does not change hospital readmission rates. Health Affairs. 2016; 8:1461–70.

4. Kind AJH, Jencks S, Brock J, et al. Neighborhood socioeconomic disadvantage and 30-day rehospitalization: A retrospective cohort study. Annals of Internal Medicine. 2014; 161:765–74. [PubMed: 25437404]

5. Weinberg C, Zaykin D. Is bad luck the main cause of cancer? J National Cancer Institute. 2015; 107(7) pii: djv125.

Table

Descriptive Statistics and Correlation of Excess Readmission Ratios and Poverty Level

Medical condition	Sample size	Mean (Standard Deviation)	Median (Min–Max)	Spearman correlation with poverty level (p-value)
Myocardial infarction	2173	1.002 (0.07)	0.999 (0.74–1.25)	0.08 (0.0001)
COPD	2921	1.002 (0.07)	0.997 (0.77–1.31)	0.06 (0.001)
Heart failure	2944	1.001 (0.08)	0.999 (0.72–1.46)	0.13 (<0.0001)
Hip-Knee	2511	1.007 (0.14)	0.999 (0.54–1.83)	0.01 (0.62)
Pneumonia	2993	1.001 (0.07)	0.998 (0.78–1.28)	0.09 (<0.0001)
Poverty	3248	17.1 (6.4)	16.8 (3.1–56.2)	

COPD: chronic obstructive pulmonary disease.

Poverty is assessed by percent (%) of people below federal poverty level.