



## Lessons Learned from the Hospital Readmission Reduction Program

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### Abstract

The Affordable Care Act implemented the Hospital Readmissions Reduction Program (HRRP) as a cost containment measure within the Social Security Act.

**Methods:** Examine racial parity in the HRRP, utilizing a cross-sectional analysis of Center for Medicare and Medicaid Services (CMS) and American Community Survey (ACS) data for 2015 CMS reimbursement. Analyze population share and hospital performance including risk-adjusted excess readmissions, overall patient experience, surgical mortality, and readmissions.

**Results:** Reimbursement cuts were greatest in hospitals serving African-Americans ( $p < 0.001$ ) and lower median income ( $p < 0.001$ ). Significant risk adjusted readmission disparities exist for African-Americans in all current measured parameters ( $p < 0.001$ ) and remain after adjusting for income and insurance as well as being magnified across national hospital rankings.

**Conclusion:** Our data provides direct evidence that HRRP inequitably reduces reimbursement among hospitals that serve a larger fraction of African-American, lower socioeconomic share individuals and safety net hospitals

**Keywords:** Readmission; HRRP; Reduction Program; Affordable Care Act; Safety Net

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### Introduction

In response to the rapid fiscal expansion of healthcare, the Affordable Care Act was introduced with the goal of increasing access to quality healthcare, while simultaneously reducing its cost. In 2010 Congress enacted the Patient Protection and Affordable Care Act through amendments to title X of the Health Care and Education Reconciliation Act [1]. This legislation was comprehensive and focused on universal healthcare, eliminating annual and lifetime limits, mitigating the effects of recessions and discrimination while providing extension of dependent coverage, and ensuring quality care [1]. These healthcare policies were based on uniform explanations, standardized definitions, and provision of comprehensive information.

Cost coverage for universal healthcare was reliant on the expansion of the covered patient pool comprised of both low- and high-risk participants, with the goal of decreasing the overall risk of the covered population. Several strategies were incorporated into the Affordable Care Act for cost containment. These included wellness programs, preventive care strategies, mandated electronic medical records, deployment of bio similar and generic drug programs, and hospital value-based purchasing [1,2]. The Affordable Care Act additionally mandates quality and cost containment through payment accuracy and patient-centered outcomes. Deployment of value-based programs proceeded with a bonus structure to the reimbursement penalty phase when the Affordable Health Care Act was fully implemented [3,4].

The most significant of these measures was the Center for Medicare & Medicaid Services Hospital Readmissions Reduction Program (HRRP), introduced in 2010 [1,2]. In the first three years of the program, voluntarily participating hospitals received financial incentives to reduce preventable readmissions. By fiscal year 2013, the program implemented a 3% reduction in reimbursement to all hospitals with excess rates of readmissions for index diagnoses [3-5]. The initial index diagnoses included the discharge diagnoses of acute myocardial infarction (AMI), congestive heart failure (CHF), and pneumonia (PN) among Medicare beneficiaries. By fiscal year 2015, chronic obstructive

**Table 1:** Area-Level Characteristics by Reimbursement Reduction.

	Reimbursement Cut	No Reimbursement Cut	p-value
Share African-American	0.143	0.112	0.000
Share Asian	0.041	0.038	0.292
Share Hispanic	0.140	0.139	0.975
Median Income (\$)	49,720	53,565	0.000
Share without HI	0.151	0.148	0.297

pulmonary disease (COPD) and hip and knee replacements (HK) were added to the program. In fiscal year 2014-2015, nearly 80% of hospitals experienced reimbursement reductions totaling nearly \$428 million [3].

The HRRP was devised to improve the quality of health outcomes. Several studies have subsequently identified unadjusted reductions in reimbursement in hospitals serving a lower socioeconomic status population, particularly disproportionate share and safety net hospitals [3-12]. To further understand the effects of HRRP, we hypothesize that under current regulations, this program would disproportionately affect hospitals serving minority populations.

## Methods

Hospital data were collected from the Center for Medicare and Medicaid Services' Hospital Compare from public use files for May, 6<sup>th</sup> 2015 after Institutional Review Board approval was obtained through review and exemption waiver for access to Center for Medicare and Medicaid Services (CMS) and American Community Survey (ACS) data for the 2015 CMS reimbursement. The IRB described the plan to evaluate the existence and potential distribution of disparity in the HRRP [13]. After excluding all Veteran's Affairs and children's hospitals, as well as hospitals in United States Outlying Territories, our sample included 4,578 hospitals. Information on each hospital includes the physical address and a variety of quality measures, including 30-day risk-adjusted readmission rates for Acute Myocardial Infarction (AMI), Heart Failure (HF), Chronic Obstructive Pulmonary Disease (COPD), Pneumonia (PN), and Hip/Knee Arthroplasty (HK). Our data also include the corrected adjustment factor used by CMS, an aggregate of the five risk-adjusted readmission rates that determines the extent of the reimbursement rate reduction [14].

Because readmission rates that enter the 2015 reimbursement reduction scheme was calculated between 2010 and 2013, we merge our hospital data with the American Community Survey (ACS) five-year average demographic data at the zip code level measured between 2009 and 2013 [15]. We convert the zip code tabulation area unit of measure in the ACS to zip codes and merge at the zip code level with our hospital data. ACS data include mean zip code level socioeconomic characteristics, as well as zip code level proportions in different racial/ethnic groups. Thus, our final data characterize

both hospital quality and the socioeconomic and racial makeup of the likely patient population [15-17].

Regression Analysis Estimated regression coefficients presented in Table 3 of the main text come from the following specification:

$$\text{Outcome}_{ij} = \beta_0 + \beta_1 \text{ShareAA}_j + \beta_2 \text{MedianIncome}_j + \beta_3 \text{ShareNoHI}_j + \epsilon_{ij}.$$

Here,  $\text{Outcome}_{ij}$  is one of the six dependent variables presented in (Table 3), including a binary variable for whether hospital  $i$  in zip code  $j$  faces a reimbursement reduction, and each of the five individual readmission metrics in hospital  $i$  in zip code  $j$ . Our parameter of interest is  $\beta_1$ , which captures the association between the share of African-Americans living in zip code  $j$  and our outcomes. Equation 1 adjusts for the median income of zip code  $j$  and the share of individuals in zip code  $j$  with no health insurance. We divide median income by 10,000 in our regression such that  $\beta_2$  captures the impact of a \$10,000 increase in median income in zip code  $j$  on the outcome of interest. All regressions were weighted by zip code population.

## Results

Table 1 breaks our sample down by whether a hospital faced a reimbursement cut from CMS in 2015. Comparing the likely patient groups for hospitals that did or did not face reimbursement cuts, we found no statistical differences in the share of Asian residents, Hispanic residents, or in the share of individuals without health insurance. However, hospitals that faced a reimbursement cut were located in zip codes with a higher share of African-Americans (0.143 vs. 0.112, p-value=0.000) and with a lower median income (\$49,720 vs. 53,565, p-value=0.000). The correction factor that determines the reimbursement cut faced by a hospital is an aggregated measure of the risk-adjusted readmission rates for AMI, HF, COPD, PN, and HK. For each readmission rate, our data include a normalized score that suggests reimbursement cuts along that dimension if the score is above one. Table 2 presents socioeconomic measures and racial proportions for hospitals above and below one, as well as the worst 100 and best 100 hospitals, for each measure. Results presented in Table 2 are consistent and striking: hospitals located in zip codes with larger shares of African-Americans are more likely to face reimbursement cuts on all readmission measures and differences in the share of African-Americans widen when comparing the worst vs. the best hospitals. For example, the share of the population self-identifying as African-American is 5.5 percentage points higher (16.6% vs. 11.1%, p-value=0.000) for hospitals with excess AMI readmission ratios above one, and the gap increases to 11.7 percentage points (20.1% vs. 8.40%, p-value=0.000) in the worst vs. the best hospitals. For other ratios, our findings, by index type, are HF (16.8% vs. 10.8%, p-value=0.000; worst/best 23.0% vs. 6.2%, p-value=0.000), COPD (15.9% vs. 11.7%, p-value=0.000; worst/best 16.1% vs. 9.7%, p-value=0.014), PN (17.0% vs. 10.6%, p-value=0.000; worst/best 17.5% vs. 6.7%, p-value=0.000), HK (14.7% vs. 10.6%, p-value=0.000; worst/best 21.0% vs. 6.6%, p-value=0.000). No other socioeconomic

**Table 2:** African-American Share by Excess Readmission Rate Ratio.

Readmission Category	Ratio>1	Ratio<1	p-value	Bottom 100	Top 100	p-value
AMI	0.166	0.111	0.000	0.201	0.084	0.000
HF	0.168	0.108	0.000	0.230	0.062	0.000
COPD	0.159	0.117	0.000	0.161	0.097	0.014
PN	0.170	0.106	0.000	0.175	0.067	0.000
HK	0.147	0.106	0.000	0.210	0.066	0.000

**Table 3:** Regression Adjusted Disparities.

	Adj=1	AMI	HF	COPD	PN	HK
Share AA	-0.121** (0.045)	0.070** (0.009)	0.104** (0.011)	0.063** (0.009)	0.090** (0.009)	0.164** (0.022)
Median Inc.	0.0145** (0.005)	0.003** (0.001)	0.002** (0.001)	0.001 (0.001)	0.001 (0.001)	0.007** (0.001)
Share No HI	0.000 (0.001)	0.001** (0.000)	0.001** (0.000)	-0.001** (0.000)	-0.000 (0.000)	0.000 (0.001)
Constant	0.143** (0.041)	0.967** (0.008)	0.968** (0.009)	1.003** (0.007)	0.991** (0.008)	0.951** (0.015)
Mean	0.220	1.001	1.002	1.002	1.001	1.007
St. Dev.	0.414	0.071	0.080	0.065	0.075	0.146
R <sup>2</sup>						
N	3,289	2,192	2,972	2,946	3,007	2,507

or racial measure is consistently and statistically significantly different across the five excess readmission ratios.

Table 2 presents evidence of racial disparities in hospital quality. Observed differences in proportions may be the result of confounding factors correlated with both zip-code share African-American and excess readmissions. (Table 3) presents regression adjusted estimates of the impact of African-American share on whether a hospital faces a reimbursement reduction and on each of the five excess readmission ratios. Estimates are conditional on the median income and health insurance rate within a zip code and are weighted by zip code population. Column 1 of (Table 3) presents results from a linear probability model for no reimbursement cut. A ten percentage point increase in the share of African-Americans living in a zip code is associated with a 0.0121 decrease in the probability of a hospital facing no reimbursement cut ( $0.1 * -0.121 = -0.0121$ ). At the mean, this effect corresponds to a 5.5% reduction in the probability of a hospital facing no reimbursement cut. Similar associations are found for each of the excess readmission ratios. Columns 2-6 of (Table 3) present multiple regression results (also weighted by zip code population) for the excess readmission ratio on the share of African-Americans in the hospital's zip code. In each case, we find positive and significant results, suggesting worse excess readmission rates for hospitals located in zip codes with higher shares of African-Americans even after controlling for median income and the fraction of the population without health insurance.

## Discussion

The Affordable Care Act legislation was enacted to improve access to healthcare coverage [1]. Within this same legislation there were numerous measures constructed to dictate and in many cases mandate value and quality. The most challenging of these measures were cost containment strategies prescribing preventive healthcare, generic and bio similar medication adoption, and value-based healthcare with the current Hospital Readmissions Reduction Program (HRRP) focused on reduction of hospital readmissions [1,3]. The Centers for Medicare and Medicaid Services (CMS) estimated in fiscal year 2013 readmissions cost over \$26 billion or nearly 37% of the total Medicare spending [1,3,12].

Medicare paid for 58% of all hospital readmissions, followed by private insurance at 20% and Medicaid at 18% [3,12]. Eighteen percent of all Medicare patients are readmitted within 30 days, leading to an

annual cost of over \$17 billion thought to be avoidable. The Hospital Readmissions Reduction Program was designed and introduced as a cost containment measure [1]. The HRRP currently imposes a 3% financial penalty for hospitals with excess rates of readmissions for five diagnoses including: acute myocardial infarction (AMI), congestive heart failure (CHF), pneumonia (PN), chronic obstructive pulmonary disease (COPD) and hip and knee replacements (HK) among Medicare beneficiaries. Each diagnosis was chosen for its significant financial component in the yearly CMS spend.

Prior studies by a Harvard Public Health Group and California Medicaid identified that the HRRP placed a disproportionate burden on safety net hospitals. Our data confirms that hospitals penalized by CMS were more likely to serve lower socioeconomic areas, while also showing that, after controlling for income and insurance coverage, penalties were more likely at hospitals providing care for populations with a larger share of African Americans [3,6,12-18]. This effect was not observed in hospitals providing care for other disadvantaged minority groups such as Hispanics or Asians. Racial and socioeconomic healthcare disparity has been historically pervasive in advanced care inclusive of invasive and surgical procedures [19,20]. Lower socioeconomic inner city populations have historically relied on safety net hospitals such as Charity, Grady and Parkland for comprehensive healthcare. Disparities are also driven by difficulties accessing the healthcare system because of challenges with childcare, transportation, and less flexible work hours for non-professional workers typically served by safety net facilities [10,12-22].

The analysis above suggests two areas for further investigation. First, does it make sense to adjust readmission rates for higher risk patient populations? Second, do reimbursement cuts for deficient hospitals remove the resources they need to make improvements? There could be a systemic better-before-worse cost effect where there are near term cost reductions followed by higher costs. This could happen if the penalized hospitals fail to improve and experience delays in the diagnosis and treatment of disease with a corresponding increase in cost per patient. This issue had been raised by Freeman et al. who stressed that disease and healthcare disparity must be addressed in the context of the community situation [22]. Their observation is supported by our analysis. The penalized institutions in our sample ranked within what were considered the "worst 100" hospitals. As a group, compared to the top 100 hospitals, they served much poorer populations with a higher fraction of African Americans.

## Conclusion

This study provides direct evidence that current quality improvement efforts such as the Hospital Readmissions Reduction Program employed by the Affordable Care Act Hospital Readmissions Reduction Program have a significant impact on safety net hospitals that serve impoverished and higher fraction African American communities. Reimbursement reductions run the risk of inadvertently affecting these populations and might increase the long-run costs of serving them. We call for further study to see if measures such as a reimbursement multiplier administered to safety net hospitals might mitigate the HRRP impact on safety net hospitals and institutions that serve vulnerable populations.

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