**CMS Readmission Penalties:**
Estimating the Impact of Socioeconomics and Race

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**Highlights**
- Adjusting for key socioeconomic and race factors for readmissions relating to AMI, heart failure, and pneumonia decreased variation in readmission rates among hospitals.
- Hospitals that struggle with higher community need, regardless of whether they are safety net hospitals or not, show higher average CMS readmission penalties than do hospitals serving patients from needy communities.
- Adjusting CMS models to account for socioeconomic and race factors would provide for more unbiased comparisons between and among U.S. hospitals for readmission penalty assessments.

**Introduction**
The U.S. Centers for Medicare & Medicaid Services (CMS) currently penalizes hospitals for excessive unplanned readmissions within 30 days of patient discharge, using three clinical condition cohorts in its models: acute myocardial infarction (AMI), heart failure, and pneumonia.

A readmissions penalty can be as high as 2% of a hospital’s base Medicare reimbursements in 2014. Since the first penalty assessments began in fall 2013, penalties were levied against 2,225 of the nation’s 5,724 hospitals.¹ ²

A major concern among U.S. hospital leadership and organizations, such as the American Hospital Association, is that CMS readmission penalty models do not factor in socioeconomic and race factors that can impact a hospital’s readmissions — those community- and location-based factors that are substantially beyond a hospital’s control and can impede unbiased comparison.³

Proponents of the penalties, however, often contend that most hospitals dealing with high penalties based on socioeconomic/race factors are “safety net” hospitals — those facilities providing a significant amount of care to low-income, uninsured, and vulnerable populations. Those safety net hospitals already receive additional CMS payments to help offset the cost of uncompensated care, thus balancing out any adjustments that may be needed in CMS penalty models. Our investigation has shown that even non-safety net hospitals providing care to patients from high need communities experience higher than average reimbursement penalties.

Earlier this year, the National Quality Forum (NQF) solicited comments from all sides of the issue on whether or not an adjustment to the model is needed.⁴
The Study
To help quantify the potential need for adjustments to the readmissions model, Truven Health Analytics™ researchers analyzed the 2014 hospital readmission rates and penalties for the three CMS diagnosis cohorts (AMI, heart failure, and pneumonia) as they relate to socioeconomic and race factors.

To perform this research, analysts used the Truven Health proprietary Community Need Index (CNI) and race identification from CMS patient data.

The CNI was developed by Truven Health specifically to provide insights into economic and social factors that can affect the health of a community, including a high percentage of:
- Families with limited English spoken in the home
- Elderly living in poverty
- Single mothers living in poverty
- Minorities
- Those without a high school diploma/GED
- Unemployed
- Renters versus homeowners

The goal of the study was to evaluate:
- How risk-adjusted readmission rates for AMI, heart failure, and pneumonia are affected by the addition of adjustments for community-level socioeconomic factors and patient race to the risk-adjustment models
- How 2014 CMS readmission penalties are associated with socioeconomics and race in the same three clinical cohorts

Findings
Previous Truven Health analysis had already established that a patient’s race (black, non-white, non-black), the community level of education, and unemployment have a clear and statistical significance associated with 30-day hospital readmission rates.5

This new study moves that big-picture readmissions look down into the three CMS-model clinical cohorts: AMI, heart failure, and pneumonia.

Following are the key findings:

Odds of Being Readmitted and Having High Related Penalties Are Consistent Across Diagnosis Cohorts, Regardless of CNI or Race Factor
As shown in Figure 1, some, but not all, CNI/race factors were correlated with an increase in the three diagnosis categories’ readmissions. (An odds ratio in the chart below 1.0 indicates a factor would have a protective effect on readmission risk in that clinical cohort. Those above 1.0 indicate an increased likelihood of readmission risk.) While such correlations are evident across all of the evaluated community characteristics, only race and community levels of unemployment and lack of high school education were statistically significant.

For each individual community factor, readmission risks were reasonably consistent for all the three clinical cohorts. This indicates that, for instance, high unemployment rates had a fairly equivalent effect on AMI, heart failure, and pneumonia readmissions.
When actual readmission penalty percentages were reviewed, the analysis showed a similar result: Regardless of what socioeconomic/race factor was analyzed, the effect on the three clinical diagnosis cohorts was fairly consistent (see Figure 2).

**Figure 1: Adjusted Readmission Odds Ratios by CNI and Race Factors**

**Figure 2: Actual CMS Readmission Penalty Percentage by Socioeconomic/Race Factor**
Safety Net Hospitals Are Assessed Higher Penalties Than Non-Safety Net Hospitals

In Figure 3 below, we see that for most (seven of ten) socioeconomic and race factors, the CMS readmission penalty amounts assessed were higher for safety net (SN) hospitals than for non-SN hospitals. This reflects the fact that SN hospitals typically deal with patients from disadvantaged communities. The association between safety net hospitals and increased penalty amount was statistically significant \((p = 0.0029)\), even after adjusting for CNI socioeconomic and race factors.

![Figure 3: Average CMS Readmission Penalty Percentages for SN and Non-SN Hospitals](image)

When Adjusted for Socioeconomic/Race Factors, Variation Across Hospitals in Risk-Adjusted Readmission Rates Diminished for Each Diagnosis Category

When each clinical cohort readmission rate in the model was adjusted for CNI socioeconomic and race factors, the standard deviation on risk-adjusted readmission rates across hospitals declined.

While the difference is modest, it does indicate that adding socioeconomic and race factor adjustments into the models results in higher precision in estimating the risk-adjusted readmission rate.

In other words, the CNI and race factors do contribute to readmission rates and penalties in a measureable way.
Hospitals With a Rate Decline After SES/Race Adjustment Tended to Have Higher Readmission Penalties Than Hospitals That Had a Rate Increase After Adjustment

Hospitals that showed lower readmission rates with the adjusted model had, on average, higher penalties in each diagnosis category, as shown in Figure 5. This tells us that some fraction of their readmission rates is due to the socioeconomic/race characteristics of less advantaged communities.

It also shows that factoring an adjustment into the model would result in reduced variation across cohorts; i.e., readmission rates and penalties in affluent communities would rise, while rates and penalties in disadvantaged communities would decrease.
Even After Adjusting for SN Status, Hospitals in Communities With High Levels of CNI and Race Factors Had Higher Penalties

Perhaps the most important takeaway from the analysis is demonstrated in Figure 6. Across the three clinical cohorts of AMI, heart failure, and pneumonia, we split hospitals that had high CMS readmission penalties into two groups: SN hospitals and non-SN hospitals. As you can see below, both types of hospitals had penalties of 0.25 and higher. This result was statistically significant ($p < 0.0001$).

The conclusion from this finding is that, if the CMS models were to take into account adjustments for CNI and race factors, these hospitals, on average, would pay lower penalties due to the fact that SES/race adjustments made in our models resulted in a decline in the adjusted readmission rates.

![Figure 6: SN and Non-SN Hospitals Both Had High Assessed Penalties](image)

**Summary**

Our analysis indicates that that hospitals that struggle with higher community need, regardless of whether they are safety net hospitals or not, show higher CMS readmission penalties than do hospitals serving patients from less needy communities and who are more likely to be white versus minorities.

A model with readmission penalty percentage as the outcome showed that, even after adjusting for hospital safety net status, hospitals with lower readmission rates after adding the CNI factors to the model showed statistically significant higher penalty percents across the three clinical diagnosis cohorts:

- AMI: 0.093% increase, $p < 0.0001$
- Heart failure: 0.041% increase, $p = 0.009$
- Pneumonia: 0.057% increase, $p = 0.0004$
These results are consistent with the notion that these are hospitals already struggling to deal with disadvantaged community needs and CMS readmission penalties — without adjustment — are placing more of a burden on them. This could make it more difficult for these hospitals to improve readmission rates (the goal of the CMS penalty program) and deal with quality improvement across the clinical cohorts of AMI, heart failure, pneumonia, and others.

The study indicates that an adjustment to the CMS models to account for socioeconomic and race factors would reduce variation and result in less biased comparisons of hospitals.

**Methodology**

CMS Standard Analytical Files (SAF IP 100%) data from third quarter, 2009, through second quarter, 2012, were used to replicate, to the extent possible, the CMS methodologies for assessing hospital-specific adjusted rates for 30-day, unplanned readmissions for AMI, heart failure, and pneumonia (clinical cohorts). Risk-adjustment information for unplanned, 30-day readmissions was produced for all hospitals.

Two sets of models were fitted:

- Models that were specified in a manner that, as closely as possible, matched the CMS models for the clinical cohorts
- Models that were identical to the first model, except that seven terms from the Truven Health Community Need Index (CNI) methodology were added to reflect community-level characteristics of the patient population, as well as race, as assigned at the patient-level by CMS

All Truven Health models were adjusted for patient risk factors in a manner as similar as possible to the CMS models.

The CNI methodology was used to evaluate the community characteristics of patients based on the county of residence of the patient.

The following seven CNI measures were used:

1. English [limited]
2. Poverty [elderly]
3. Poverty [single mom]
4. Minority
5. No high school
6. Unemployment
7. Renting

Patient race, as assigned by CMS, was represented in three categories: white, black, and other.
Sources
3 AHA Fact Sheet, Hospital Readmissions Reduction Program, April 2014.
5 Foster D, Young J, and Heller S. Community Need Association With 30-Day Readmissions, Center for Healthcare Analytics, Truven Health Analytics, May 2014.

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