Original Article

Impact of Socioeconomic Status Measures on Hospital Profiling in New York City

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Background—Current 30-day readmission models used by the Center for Medicare and Medicaid Services for the purpose of hospital-level comparisons lack measures of socioeconomic status (SES). We examined whether the inclusion of an SES measure in 30-day congestive heart failure readmission models changed hospital risk-standardized readmission rates in New York City (NYC) hospitals.

Methods and Results—Using a Centers for Medicare & Medicaid Services (CMS)-like model, we estimated 30-day hospital-level risk-standardized readmission rates by adjusting for age, sex, and comorbid conditions. Next, we examined how hospital risk-standardized readmission rates changed relative to the NYC mean with inclusion of the Agency for Healthcare Research and Quality (AHRQ)–validated SES index score. In a secondary analysis, we examined whether inclusion of the AHRQ SES index score in 30-day readmission models disproportionately impacted the risk-standardized readmission rates of minority-serving hospitals. Higher AHRQ SES scores, indicators of higher SES, were associated with lower odds (0.99) of 30-day readmission (P<0.019). The addition of the AHRQ SES index did not change the model's C statistic (0.63). After adjustment for the AHRQ SES index, 1 hospital changed status from worse than the NYC average to no different than the NYC average. After adjustment for the AHRQ SES index, 1 NYC minority-serving hospital was reclassified from worse to no different than average.

Conclusions—Although patients with higher SES were less likely to be admitted, the impact of SES on readmission was small. In NYC, inclusion of the AHRQ SES score in a CMS-based model did not impact hospital-level profiling based on 30-day readmission. **(*Circ Cardiovasc Qual Outcomes*. 2014;7:391-397.)**

Key Words: heart failure ■ patient readmission ■ social class

The high prevalence of congestive heart failure (CHF)[1,2] imposes a large burden on patients, their families, and the healthcare system. For example, CHF is the most common cause of hospital readmissions among Medicare beneficiaries, costing the Medicare program $15 billion annually, of which $12 billion may be preventable.[3] In 2005, the Deficit Reduction Act mandated that hospital performance measurements be made publicly available and include CHF readmission rates. To assess hospital performance, the Centers for Medicare & Medicaid Services (CMS) developed a model to create hospital-level CHF risk-standardized readmission rates (RSRR).[4] The model accounts only for patient comorbid health conditions and age and sex. Hospital-level 30-day CHF readmission rates based on this risk-standardized model became publicly available in 2005 through the Hospital Compare Web site.[5]

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Under the Hospital Readmissions Reduction program, hospitals with excessive readmissions (ie, when the number of patients readmitted to a hospital is more than expected) began losing a percentage of their Medicare reimbursement as of October 2012. In fiscal year 2013, the decrease reached 1% of reimbursement, rising to 2% in 2014 and 3% in 2015.[6] A total of 2217 hospitals were penalized ≤1% of Medicare reimbursements in the first year of the program, and from those 307 will be penalized the maximum 1%.[7]

Readmission penalties potentially pose a tremendous financial threat to hospitals that serve vulnerable populations because the CMS risk model does not adjust for socioeconomic status (SES). Policymakers at CMS excluded SES from their model because of the belief that all hospitals should provide the same quality of care regardless of the resources of the people they serve.[8] However, socioeconomic and social risk factors, such as poverty, low educational attainment, and limited social support, result in worse healthcare outcomes.[9,10] For example, black residents of the poorest neighborhoods of New York City (NYC) have ≈50% higher mortality rates than black residents living in wealthier neighborhoods.[11] Similarly, white residents in poor communities also have higher mortality rates than whites in the wealthiest communities (771 versus 552 per 100 000).[12]

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WHAT IS KNOWN

- Congestive heart failure is the most common cause of hospital readmissions among Medicare beneficiaries, costing the Medicare program $15 billion annually, of which $12 billion may be preventable.
- Recent research has demonstrated that the ability of models to predict congestive heart failure readmissions is improved with the addition of socioeconomic factors that represent the degree of chaos and social risk in a patient's life.

WHAT THE STUDY ADDS

- The impact of the community-level measure of socioeconomic status on 30-day congestive heart failure readmission models was small.
- Better measures may be needed to assess the impact of socioeconomic factors on hospital profiling based on 30-day readmission.
- More research examining the impact of socioeconomic status on 30-day congestive heart failure readmission is needed to determine the link between socioeconomic status and hospital readmissions in the Medicare program.

Recent research has demonstrated that the ability of models to predict CHF readmissions is improved with the addition of socioeconomic factors that represent the degree of chaos and social risk in a patient's life.[10] Therefore, it is possible that hospitals are being held accountable and potentially penalized for factors that are beyond a hospital's control (eg, social isolation, substance abuse). Patients who are socially disadvantaged may require more investment in targeted interventions such as supported discharge transitions, care coordination, health coaching, home visits, same day appointments, and greater education efforts. Hospitals that care for disadvantaged populations may need more resources to support disadvantaged populations not less. In other words, current readmission models, which are based on age, sex, and comorbid conditions, might penalize hospitals that serve a high-risk, disadvantaged population that needs more supportive services in care transitions. Although Medicare administrative data are limited in the types of information collected, they capture home zip code; this can help delineate the average SES of a community. In this study, we examined whether adjustment for the average SES of a community in NYC, where neighborhoods diverge considerably in terms of resources and wealth, could have an impact on hospital profiling.

Methods

Data Sources

We extracted data from the 2005 to 2008 Medicare inpatient files that included complete information on heart failure hospitalizations for Medicare fee-for-service enrollees. We also accessed the 2005 to 2008 Beneficiary Annual Summary files that provided data on chronic conditions, date of death, beneficiary residency zip code, and number of months of enrollment in a health maintenance organization.

Study Population

The study population included Medicare fee-for-service patients who were ≥65 years of age and hospitalized with a primary discharge diagnosis of CHF between December 1, 2006, and December 1, 2009. We identified index hospitalizations for patients with heart failure according to the CMS inclusion criteria used to calculate a CHF readmission measure and included patients with any of the following *International Classification of Diseases, Ninth Revision* codes as a primary diagnose: 402.01, 402.11, 402.91, 402.01, 404.03, 404.11, 404.13, 404.91, 404.93, 428.0, 428.1, 428.2, 428.21, 428.22, 428.23, 428.3, 428.31, 428.32, 428.33, 428.4, 428.41, 428.42, 428.43, 428.9.[4]

We excluded patients <65 years of age and those who died in the hospital, those who left against medical advice, and those with incomplete data.[4] In addition, we limited our hospital-level analysis to acute or critical care hospitals and, similar to methods outlined by CMS, excluded all rehabilitation, psychiatric, and chronic care facilities.[4]

Main Outcome Variable

Our dependent variable was 30-day hospital all-cause readmission after index admission for CHF. We used the established CMS methodology in identifying 30-day readmissions.[6]

Independent Variables

The CMS CHF readmission model uses age, sex, and comorbid conditions to estimate the RSRR. To test our hypothesis that SES would affect hospital profiles, we added to the RSRR model a proxy measure for SES, the Agency for Healthcare Research and Quality (AHRQ) SES index. AHRQ developed the SES index specifically for use with Medicare data because Medicare files lack person-level SES data. The index is based on the beneficiary's zip code of residence and includes the following 7 Census variables: percentage of people in the labor force who are unemployed, percentage of people living below poverty level, median household income, median value of owner-occupied dwellings, percentage of people ≥25 years of age with less than a 12th-grade education, percentage of people ≥25 years of age completing ≥4 years of college, and percentage of households that average ≥1 people per room.[13–15] Higher index scores indicate higher SES. Our calculations of the AHRQ SES index were based on 2006 to 2010 American Community Survey data because this database contained the needed SES variables and were performed on the census block group level. We used 9-digit zip codes; the linkage between US Postal service zip codes and Census block data was performed using Maponics commercial cross-walk file (Maponics, LLC, VT).

Data on date of death were extracted from the Beneficiary Annual Summary File. In our analysis, we used the complete set of chronic conditions defined by CMS for readmission rate assessment after index hospitalization with heart failure.[16]

Statistical Analysis

We examined whether inclusion of a measure of SES in the 30-day CHF RSRR models influenced hospital-level profiling in NYC. Because of the natural clustering of observations within hospitals, we used hierarchical generalized linear models to estimate the log odds of 30-day readmission. We built 2 models of readmission in sequence: (1) the first (base) model included baseline patient age, sex, comorbidities, and hospital; (2) the second model included the baseline characteristics plus the AHRQ SES index. The baseline model was a CMS-like model that modeled the log-odds of readmission within 30 days of discharge from an index CHF admission as a function of age, sex, clinical characteristics, and a random hospital-specific intercept.[6] The incremental discriminative performance of the models was assessed using the C statistic.

Next, we calculated hospital 30-day RSRR. These rates were obtained as the ratio of predicted to expected readmissions, multiplied by the NYC mean unadjusted readmission rate. The expected number of readmissions in each hospital was estimated using its patient

Table 1. Characteristics of Patients Admitted to New York City Hospitals

Variables	All Hospitals	Minority-Serving Hospitals	Nonminority-Serving Hospitals	*P* Value
Number of hospitals	48	21	27	…
Number of patients	17 767	3737	14 517	…
Admissions with heart failure	25 962	5376	20 586	…
Crude readmission rate	30.15%	32.98%	29.41%	<0.001
Age, mean (SD)	81.29 (8.28)	79.53 (8.31)	81.75 (8.21)	<0.001
Men	38.95%	34.11%	40.21%	<0.001
Black	23.12%	54.22%	15.00%	<0.001
Hispanic	8.07%	10.23%	7.51%	<0.001
History of CABG	14.09%	12.20%	14.58%	<0.001
History of PCI	10.78%	10.70%	10.81%	0.81
Cardiorespiratory failure or shock	10.80%	11.01%	10.75%	0.57
Congestive heart failure	57.02%	59.43%	56.39%	<0.001
Acute coronary syndrome	14.94%	17.30%	14.32%	<0.001
Coronary atherosclerosis or angina	66.19%	62.50%	67.15%	<0.001
Valvular or rheumatic heart disease	8.53%	5.67%	9.27%	<0.001
Specified arrhythmias	39.45%	35.94%	40.37%	<0.001
Other or unspecified heart disease	3.09%	3.57%	2.97%	0.03
Vascular or circulatory disease	17.73%	17.93%	17.68%	0.66
Metastatic cancer or acute leukemia	1.54%	1.26%	1.61%	0.07
Cancer	8.40%	7.51%	8.63%	0.01
DM or DM complications	46.29%	53.07%	44.53%	<0.001
Protein-calorie malnutrition	4.44%	3.44%	4.71%	<0.001
Disorders of fluid, electrolyte, acid-base	29.81%	31.36%	29.41%	0.005
Liver or biliary disease	4.80%	6.03%	4.48%	<0.001
Peptic ulcer, hemorrhage, other gastrointestinal disorders	10.44%	11.20%	10.24%	0.04
Other gastrointestinal disorders	26.79%	29.71%	26.03%	<0.001
Severe hematologic disorders	2.02%	1.75%	2.09%	0.11
Anemias and blood disease	33.34%	37.70%	32.20%	<0.001
Dementia or other specified brain disorders	14.90%	15.90%	14.64%	0.02
Drug and alcohol abuse/dependence	4.62%	6.88%	4.03%	<0.001
Major psychiatric disorders	2.99%	3.76%	2.78%	0.0006
Depression	9.09%	7.96%	9.39%	0.001
Other psychiatric disorders	3.94%	3.52%	4.06%	0.06
Hemiplegia, paraplegia, paralysis	5.21%	7.46%	4.62%	<0.001
Stroke	2.74%	3.11%	2.64%	0.06
Chronic obstructive pulmonary disease	33.25%	34.32%	32.97%	0.06
Fibrosis of lung or other chronic lung disorders	3.15%	3.13%	3.16%	0.89
Asthma	9.15%	13.67%	7.97%	<0.001
Pneumonia	28.18%	28.11%	28.20%	0.89
End-stage renal disease or dialysis	3.47%	5.23%	3.01%	<0.001
Renal failure	33.51%	36.07%	32.84%	<0.001
Nephritis	2.06%	2.34%	1.99%	0.11
Other urinary tract disorders	8.89%	9.15%	8.82%	0.44
Decubitus ulcer or chronic skin ulcer	9.42%	9.51%	9.39%	0.81

CABG indicates coronary artery bypass grafting; DM, diabetes mellitus; and PCI, percutaneous coronary intervention.

mix and the average hospital-specific intercept.[4] The profiling of hospitals was based on the CMS methodology and compared the hospital RSRR value (with confidence interval [CI] obtained using a bootstrapping procedure) and the overall average readmission rate calculated for all NYC hospitals.[4] Hospitals with 30-day readmission rates and associated 95% CIs above average were deemed worse than

expected, and those with 30-day readmission rates below average were considered better than expected.

In a secondary analysis, we examined the impact of the AHRQ SES index on the profiling of minority serving hospitals (defined in the literature as the top 10% of hospitals with the highest proportion of black patients).[17] Of 479 minority-serving hospitals across the country, 21 are located in NYC.

All CIs were computed at the 95% level. Analyses were performed using SAS statistical software (SAS Institute Inc, version 9.2, Cary, NC). Institutional review board approval was obtained according to the *Circulation: Cardiovascular Quality and Outcomes* guidelines.

Results

Study Population

The sample included 48 NYC hospitals and 17 767 patients who had 25 962 hospitalizations between 2006 and 2009. The majority of patients were women. The most frequent conditions for hospitalizations were coronary atherosclerosis or angina, CHF, and renal failure (Table 1).

The median patient-level AHRQ SES index was 55, with a range of 33 to 76 (lower quartile 52, median 55, upper quartile 58). The Figure shows the mean SES index scores in all zip code areas of metropolitan NYC. The South Bronx neighborhood had the lowest SES score, and the Upper East Side neighborhood in Manhattan had the highest score. St. Barnabas Hospital in central Bronx served the population with the lowest average AHRQ SES score (47.3), and Lenox Hill Hospital on the Upper East Side had the patient population with the highest average score (59.9).

The median observed 30-day readmission rate in NYC hospitals was 30.3% (interquartile range, 28.6%–31.6%). Twenty-one of the 48 NYC hospitals were classified as minority serving (Table 1). In the minority-serving hospitals of NYC, the proportion of heart failure admissions by blacks ranged between 30.95% and 95.88% (lower quartile 40.66%, median 52.78%, upper quartile 77.32%).

Impact of SES on 30-Day Readmission

After accounting for age, sex, and comorbid conditions, the AHRQ SES index was significantly associated with 30-day readmission risk (Table 2). Individuals with higher SES index scores were less likely to experience a 30-day hospital readmission (estimate=−0.0057, $P<0.019$, or odds ratio=0.99 with 95% CI, 0.9968 and 0.9996). In other words, an increase of the SES score by 1 U decreased the odds of readmission by 0.6% (an increase by 5 U decreased the odds by 2.6%). Adjustment for the AHRQ SES score had no appreciable effect on the C statistic (0.6347 adjusted to 0.6353). The following comorbid conditions that were covariates in the model had the strongest association with 30-day readmission after adjusting for other variables: history of end-stage renal disease on dialysis 1.34

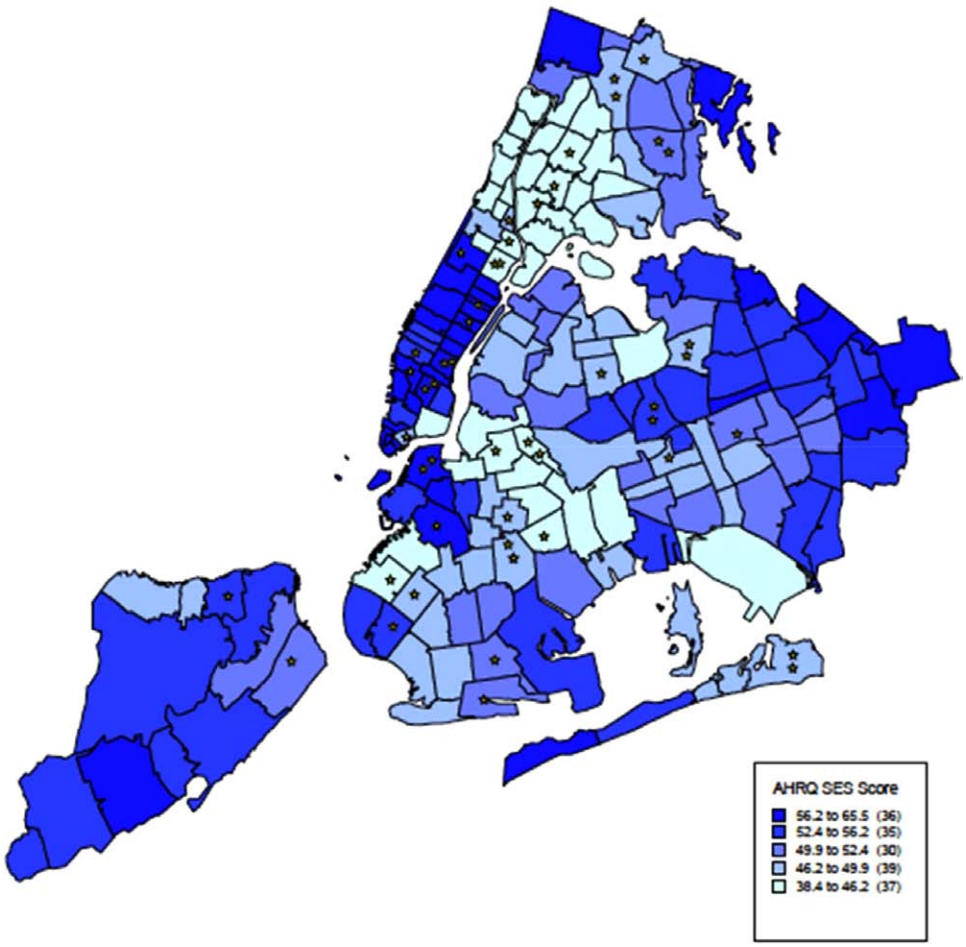

Figure. New York City distribution of the Agency for Healthcare Research and Quality (AHRQ) Socioeconomic Status (SES) Index by zip code. *New York City Hospitals.

Table 2. Impact of AHRQ Index on 30-Day Congestive Heart Failure Readmissions

Variables	Estimate	Standard Error	*P* Value	OR (95% CI)
Age (per 1 y)	0.0000	0.0019	0.99	1.00 (1.00–1.00)
Men	0.0403	0.0303	0.18	1.04 (0.98–1.10)
AHRQ SES score (per 1 U)	–0.0057	0.0024	0.019	0.99 (0.99–0.99)
History of CABG	0.0600	0.0411	0.14	1.06 (0.98–1.15)
Cardiorespiratory failure or shock	0.1112	0.0454	0.014	1.12 (1.02–1.22)
Congestive heart failure	0.1396	0.0370	0.0002	1.15 (1.07–1.24)
Acute coronary syndrome	0.0457	0.0400	0.25	1.05 (0.97–1.13)
Coronary atherosclerosis or angina	0.0646	0.0329	0.05	1.07 (1.00–1.14)
Valvular or rheumatic heart disease	0.1576	0.0493	0.001	1.17 (1.06–1.29)
Specified arrhythmias	0.0702	0.0321	0.029	1.07 (1.01–1.14)
Other or unspecified heart disease	0.1182	0.0781	0.13	1.13 (0.97–1.31)
Vascular or circulatory disease	0.1547	0.0373	<0.001	1.17 (1.09–1.26)
Metastatic cancer or acute leukemia	0.0208	0.1149	0.86	1.02 (0.82–1.28)
Cancer	0.1064	0.0514	0.039	1.11 (1.01–1.23)
DM or DM complications	0.0645	0.0300	0.033	1.07 (1.01–1.13)
Protein-calorie malnutrition	0.2957	0.0648	<0.0001	1.34 (1.18–1.53)
Disorders of fluid, electrolyte, acid-base	0.1773	0.0337	<0.0001	1.19 (1.12–1.28)
Liver or biliary disease	0.0915	0.0630	0.15	1.10 (0.97–1.24)
Other gastrointestinal disorders	0.1757	0.0456	0.0001	1.19 (1.09–1.30)
Gastrointestinal disorders	0.0258	0.0327	0.43	1.03 (0.96–1.09)
Severe hematologic disorders	0.2324	0.0938	0.013	1.26 (1.05–1.52)
Anemias and blood disease	0.1513	0.0313	<0.001	1.16 (1.09–1.24)
Dementia or other specified brain disorders	0.1472	0.0399	0.0002	1.16 (1.07–1.25)
Drug/alcohol abuse/dependence	0.0441	0.0659	0.5	1.05 (0.92–1.19)
Major psychiatric disorders	0.0958	0.0800	0.23	1.10 (0.94–1.29)
Depression	–0.0108	0.0487	0.83	0.99 (0.90–1.09)
Other psychiatric disorders	0.2671	0.0687	0.0001	1.31 (1.14–1.49)
Hemiplegia, paraplegia, paralysis	–0.0407	0.0630	0.52	0.96 (0.85–1.09)
Stroke	0.0271	0.0847	0.75	1.03 (0.87–1.21)
Chronic obstructive pulmonary disease	0.1493	0.0309	<0.0001	1.16 (1.09–1.23)
Fibrosis of lung or other chronic lung disorders	0.0850	0.0771	0.27	1.09 (0.94–1.27)
Asthma	0.1299	0.0478	0.007	1.14 (1.04–1.25)
Pneumonia	0.1571	0.0323	<0.0001	1.17 (1.10–1.25)
End-stage renal disease or dialysis	0.2904	0.0739	0.0001	1.34 (1.16–1.55)
Renal failure	0.1663	0.0346	<0.0001	1.18 (1.10–1.26)
Nephritis	0.0586	0.0937	0.53	1.06 (0.88–1.27)
Other urinary tract disorders	0.0975	0.0478	0.041	1.10 (1.00–1.21)
Decubitus ulcer or chronic skin ulcer	0.2477	0.0473	<0.0001	1.28 (1.17–1.41)

AHRQ indicates Agency for Healthcare Research and Quality; CABG, coronary artery bypass grafting; CI, confidence interval; DM, diabetes mellitus; OR, odds ratio; and SES, socioeconomic status.

(95% CI, 1.16–1.55), other psychiatric disorders 1.31 (95% CI, 1.14–1.49), and decubitus or chronic skin ulcer 1.28 (95% CI, 1.17–1.41).

Changes in Hospital Profiling After Inclusion of the AHRQ SES Index

The mean hospital-level AHRQ index score was 54.6. The median and interquartile range for the RSRR estimated based on the CMS model was 30.3 (28.6–31.6) and similar to the model that included the AHRQ SES index 30.2 (28.5–31.6). The agreement between the RSRR from the 2 models was high (κ=0.88). After adjustment for the SES index, the quality rating changed for 1 hospital, from worse than average to average. The ratings of no other hospitals changed with adjustment for the SES index score.

In the secondary analysis of minority-serving hospitals, the median RSRR and interquartile range were 30.7 (29.8–31.7) in minority-serving hospitals and 29.6 (28–30.6) in nonminority-serving hospitals (Table 3). Among minority-serving hospitals, 19 of 21 hospitals were categorized as no different than

Table 3. Hospital RSRR With and Without Adjusting for the AHRQ SES Index

Hospital Characteristics	All Hospitals	Minority-Serving Hospitals	Nonminority-Serving Hospital
No. of hospitals	48	21	27
Median (range) patients per hospital	541 (56–2636)	256 (56–897)	762 (57–2636)
Mean AHRQ index score	54.6	53.1	55.8
Median and range hospital mean AHRQ index score	54.3 (47.2–60.7)	52.8 (47.5–60.6)	56.2 (47.2–60.7)
RSRR based on CMS model			
Median and (IQR, 25%–75%) (%)	30.3 (28.6–31.6)	30.7 (29.8–31.7)	29.6 (28.0–30.6)
Range (min–max) (%)	25.7–35.3	27.7–35.3	25.7–33.4
RSRR with inclusion of AHRQ index Score in CMS model			
Median and (IQR, 25%–75%) (%)	30.2 (28.5–31.6)	30.6 (30.0–31.6)	29.5 (28.1–30.6)
Range (min–max) (%)	25.8–35.2	27.8–35.2	25.8–33.3

AHRQ indicates Agency for Healthcare Research and Quality; CMS, Centers for Medicare & Medicaid Services; IQR, interquartile range; RSRR, risk-standardized readmission rates; and SES, socioeconomic status.

NYC average, and 2 hospitals were categorized as worse than NYC average. After inclusion of SES index in the model, the RSRR and interquartile range were 30.6 (30.0–31.6) in minority-serving hospitals and 29.5 (28.1–30.6) in nonminority-serving hospitals (Table 3). One minority hospital improved its status from worse than NYC average to no different than NYC average. This was the same hospital that changed ranking in the primary analysis. Among the nonminority-serving hospitals, 24 hospitals were no different than NYC average, 1 hospital was worse than NYC average, and 2 hospitals were better than NYC average. No hospitals changed status after adjustment for the AHRQ SES index score.

Discussion

There is a large variation in wealth, education, and income in NYC neighborhoods. We examined whether inclusion of a measure of community SES, in NYC, in the 30-day CHF models impacted hospital-level profiling. The impact of the community-level measure of SES on 30-day CHF readmission models was small. As such, even in NYC, where differences in SES status are stark, inclusion of this measure had minimal impact on hospital-level RSRR.

The lack of impact of SES on RSRR could be because community-level SES, represented by the AHRQ SES index, was an inadequate indicator for individual patient-level socioeconomic and social risk. Better measures may be needed to assess the impact of socioeconomic factors on hospital profiling based on 30-day readmission. Recent research has demonstrated that social risk factors, such as cocaine use, missed clinic visits, multiple address changes, and excessive emergency department use, are associated with higher risk of 30-day readmission.[10] These factors are more prevalent in low SES populations but are also not available in Medicare administrative data and not available for hospital profiling.

The importance of including data on socioeconomic and social risk factors in assessing healthcare outcomes was highlighted by an editorial featured by the Centers for Disease Control.[18] The editorial lamented the inadequacy of current data systems to examine health outcomes because they do not include economic and social factors that influence the health of individuals and communities as a whole. Hospitals that serve the poor may require more resources because vulnerable patients have higher admission rates and longer hospital admissions.[19,20] In other countries, for example, hospitals that cater to the poor are given more, not less, resources. In the National Health Service system in England, until 2004, primary care general practitioner payments were partially based on the poverty of their patient population, as measured by percentage of unemployment.[21] In the United States, hospitals that cared for the uninsured poor had been given increased resources through disproportionate share hospital payments, but with the number of uninsured to be greatly reduced, starting in 2014, the Affordable Care Act allows CMS to phase out these supplemental payments. The new readmission penalization policy of CMS, and the Hospital Value-Based Purchasing program of CMS, may further diminish resources to hospitals that serve poor vulnerable patients.[22] As evidenced by emerging data from the Value-Based Purchasing Program, some hospitals with significant resources have been able to move from a CMS penalty to bonus, whereas some resource-poor hospitals have been penalized.[22] More research to fully explore the impact of the new policies of CMS on hospital profiling is clearly needed.

Our study has several key strengths and limitations that deserve comment. This study focused on hospitals in NYC that limit the generalizability of the findings. We chose NYC because of the vast differences in health and SES between different neighborhoods. For example, East Harlem is the poorest neighborhood in Manhattan (median income in 1999 was $22 000) and is immediately adjacent to the Upper East Side, which is the wealthiest (median income in 1999 was $77 000).[23] East Harlem has the highest rates of obesity and diabetes mellitus of the city, and the Upper East Side has the lowest rates.[24] Although the local nature of this study limits its generalizability because we did not see an impact of SES represented by zip code on hospital profiling in NYC, it is doubtful that SES would impact hospital profiling in areas with a less extreme gradient in wealth and health. In addition, we used a validated measure of SES designed for Medicare[25] and used zip code as a proxy for neighborhood because this

was a practical and readily available demographic variable available for all Medicare patients. However, the use of zip code-level data may be an inadequate measure of SES status. Past research has demonstrated that the socioeconomic and social risk factors are associated with 30-day readmission in a largely uninsured population.[10] Future research should examine the link between SES and 30-day readmission in the Medicare program. Finally, we followed the publicly available CMS methodology with a limitation. We had access to the Inpatient and Beneficiary Annual Summary files and could correctly identify index hospitalizations and readmissions. We used hierarchical models for prediction of 30-day readmissions and bootstrapping technique for estimation of 95% CI. We also categorized the comorbidities using the CMS list for patients with CHF. However, we did not have access to the outpatient hospital and Part B physician data. Comorbidities in the Beneficiary Annual Summary files were developed by CMS using both part A and part B data. Therefore, it is possible that we underestimated the prevalence of comorbid conditions among patients. However, we performed sensitivity analysis using comorbid conditions available in the Medicare Beneficiary Annual Summary files and obtained a similar result.

In conclusion, we found that the measure of SES available in Medicare did not appreciably impact risk of readmission or RSRR for hospitals in NYC. Community-level SES, represented by the AHRQ SES index, may be an inadequate indicator for individual patient-level socioeconomic and social risk. More research examining the impact of SES on 30-day CHF readmission is needed to determine the link between SES and hospital readmissions in the Medicare program.

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Disclosures

None.

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