Association Between Community Social Capital and Hospital Readmission Rates

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Abstract

Hospital readmissions remain frequent, and are partly attributable to patients' social needs. The authors sought to examine whether local community levels of social capital are associated with hospital readmission rates. Social capital refers to the connections among members of a society that foster norms of reciprocity and trust, which may influence the availability of support for postdischarge recovery after hospitalization. Associations between hospital-wide, risk-stratified readmission rates for hospitals in the United States ($n=4298$) and levels of social capital in the hospitals' service areas were examined. Social capital was measured by an index of participation in associational activities and civic affairs. A multivariate linear regression model was used to adjust for hospital and community factors such as hospital financial performance, race, income, and availability of health care services. Results showed that higher social capital was significantly associated with lower readmission rates ($P<.01$), a finding that held across income-stratified analyses as well as sensitivity analyses that included hospital performance on process quality measures and hospital community engagement activities. A hospital is unlikely to be able to influence prevailing levels of social capital in its region, but in areas of low social capital, it may be possible for public or philanthropic sectors to buttress the types of institutions that address nonmedical causes of readmission.

Keywords: social capital, hospital readmissions, population health

Introduction

DESPITE NATIONAL EFFORTS to reduce unplanned readmission rates, more than 15% of Medicare beneficiaries are readmitted within 30 days of hospital discharge.¹ Previous research has identified several hospital-based practices that have been associated with lower risk-standardized readmission rates, such as improved discharge processes²⁻⁶ and managerial approaches within the hospital.⁷ These results suggest that hospital practices influence readmissions; however, results are mixed across different studies, and overall, the magnitude of effects is relatively modest.⁸

Increasingly, researchers have sought to understand how sociodemographic factors influence risk of hospital readmission. Recent studies have demonstrated that higher readmission rates are associated with lower income,^{9,10} lower educational attainment,^{9,11} and nonwhite race.¹² Personal social ties such as marriage⁹ and having family and friends nearby¹¹ also have been linked to lower readmission rates.

Although these results have been helpful, previous empirical work has been limited in the breadth of community

features examined, with no exploration of the link between readmission rates and local levels of social capital. Social capital, which is associated with a range of positive health outcomes,¹³ refers to the connections among members of a society that foster norms of reciprocity and trust and allow people to work together more effectively.^{13,14} Social capital can be conceived as a property of a community rather than an attribute of individual people. An individual person who is not particularly trusting or cooperative may still benefit from living in a community where his or her neighbors are trusting and cooperative.¹³ In Putnam's influential formulation,^{14,15} social capital is measured in terms of levels of participation in associational activities and civic affairs, as these indicators represent cooperative approaches to community issues. Because social needs exert an important influence on an individual's ability to recover outside of the hospital,¹⁶ the research team hypothesized that higher community levels of social capital may be associated with lower readmission rates.

Accordingly, the team sought to determine the association between hospital risk-stratified 30-day readmission rates

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(RSRR) and levels of social capital, measured using an index based on Putnam's formulation of social capital,¹⁷ which has been used in prior health studies.^{18,19} A deeper understanding of community features that influence readmission risk, including the role of social capital, may help to identify novel levers for assisting patients with postdischarge recovery outside of the hospital, and also to calibrate expectations for the ability of hospitals to influence readmission rates.

Methods

Study design and sample

Social capital data were available for the continental United States; therefore, the research team conducted a cross-sectional analysis of data from all nonfederally owned hospitals in the continental United States with publicly reported RSRRs for all-cause, hospital-wide readmission rates in the Centers for Medicare & Medicaid Services Hospital Compare database for 2011–12. The sample consisted of 4298 hospitals. Hospitals that were missing any of the independent variables in the final model were excluded; this resulted in the exclusion of 223 hospitals, or about 5% of the sample. To link hospitals with data on their local regions the team used Hospital Service Areas (HSAs), which the Dartmouth Health Atlas delineated by assigning US zip codes to the hospital that received the greatest proportion of residents' Medicare hospitalizations.²⁰

Data and measures

Outcome. The primary outcome was all-cause, hospital-wide RSRRs for the period of July 1, 2011 – June 30, 2012 obtained from the Hospital Compare database.²¹ This time period was selected to provide a 2-year lag from the data on social capital and hospital characteristics. RSRR is adjusted for patients' sex, age, and clinical risk factors.^{22,23}

Independent variable. *Social capital.* For the measure of social capital the research team used 2009 values of the Social Capital Index,¹⁷ which is available at the county level for all counties within the continental United States. This standardized index was derived from principal component analysis of 4 data sources covering all US counties: voter turnout, census response rate, nonprofit organizations per capita, and associations per capita (eg, religious, civic, social, business, political, professional, labor, sports associations). The first principle component is used as the Social Capital Index. By capturing markers of civic participation (voter turnout and census participation) and markers of formal associations (nonprofit organizations and associations), the index provides a means to compare relative levels of social capital among different counties in the United States.

The research team transformed county-level data to HSA-level data by assigning county-level data to the zip codes constituting the county. When zip codes spanned multiple counties, zip code-level values were calculated as the mean of those counties, weighted by the proportion of the zip code's population residing in each county. HSA-level data were reconstituted by taking population-weighted averages of the HSA's constituent zip codes.

Covariates. *Hospital financial performance.* Data on hospital financial performance were obtained from the 2006

American Hospital Directory,²⁴ including: operating margin ratios (net income divided by total revenue), equity finance ratios (total fund balance divided by total assets), equity turnover ratios (total revenue divided by total assets), and current ratios (current assets divided by current liabilities) for each hospital.

Availability of health care resources in the HSA. Data on the availability of outpatient and inpatient care in each hospital's HSA were obtained from the Dartmouth Health Atlas, including hospital beds per 1000 residents, total physicians per 100,000 residents, and primary care physicians per 100,000 residents. The ratio of primary care physicians to total physicians was calculated.

Other hospital and community characteristics. Data on hospital characteristics were obtained from the 2010 AHA Annual Survey,²⁵ including: census region, teaching status (defined as members of the Council of Teaching Hospitals or hospitals having an accredited residency program), hospital ownership, number of hospital beds, and urban/rural location (defined according to the 2013 urban influence code²⁶ associated with the hospital's county). The American Communities Survey zip code-level data from 2008–2012 were used to calculate population-weighted values of median household income and mean racial composition for each HSA.

Process measures of quality. Data on key process measures of quality for heart failure, acute myocardial infarction (AMI), and pneumonia were obtained from the Hospital Compare database for the year 2012. Process measures for heart failure included the percent of patients who received evaluation of left ventricular systolic (LVS) function, were given an angiotensin converting enzyme inhibitor or angiotensin receptor blocker for LVS dysfunction, and who received discharge instructions. Process measures for AMI included the percent of patients given aspirin at arrival, given aspirin at discharge, and percent of patients treated with percutaneous coronary intervention (PCI) who received intervention within 90 minutes of arrival. Process measures for pneumonia included the percent of patients whose initial emergency room blood culture was performed prior to administration of first dose of antibiotics, and the percent of patients given the most appropriate initial antibiotics. The research team reserved these variables for sensitivity analysis because they were missing for 14%–66% of hospitals in the sample.

Hospital–community engagement. In order to understand the relative roles of social capital and hospital–community engagement, sensitivity analyses were conducted using hospital responses to questions about hospital–community relationships from the 2010 AHA Annual Survey. The survey included a series of 13 yes/no items (Table 1) that together describe the hospital's mission, specific contributions to community benefits and community building, and partnerships with other organizations in the community. Hospital community benefits and community building can include any activities that promote the welfare of the local population, including charity care, public health education or local economic development, among others. The research team reserved these variables for sensitivity analysis because they were incomplete for 32% of hospitals in the sample.

TABLE 1. HOSPITAL–COMMUNITY ENGAGEMENT QUESTIONS FROM THE 2010 AMERICAN HOSPITAL ASSOCIATION ANNUAL SURVEY

1. Does the hospital's mission statement include a focus on community benefit?
2. Does the hospital have a long-term plan for improving the health of its community?
3. Does the hospital have resources for its community benefit activities?
4. Does your hospital have dedicated staff to manage community benefits?
5. Does your hospital provide support for community-building activities?
6. Does your hospital make financial contributions?
7. Does your hospital partner with your local school system to offer health or wellness programs to help your community?
8. Does the hospital work with other local providers, public agencies or community representatives to conduct a health status assessment of the community?
9. Does your hospital use health status indicators to design new services or modify existing services?
10. Does your hospital work with other local providers, public agencies, or community representatives to develop a written assessment of the appropriate capacity for health services in the community?
11. If yes, has the hospital used the assessment to identify unmet health needs, excess capacity, or duplicate services in the community?
12. Does the hospital work with other providers to collect, track, and communicate clinical and health information across cooperating organizations?
13. Does the hospital, alone or with others, disseminate reports to the community on the quality and costs of health care services?

Data analysis

Multivariable linear regression was used to examine the adjusted association between the outcome RSRR and social capital. The research team adjusted for measures of financial performance, availability of health care resources in the HSA, and other hospital and community characteristics. To fit the model, preliminary analyses were conducted to narrow the 4 candidate variables representing hospital financial performance by modeling RSRR while adjusting for hospital characteristics (census region, teaching status, number of beds, ownership, and urban/rural location) and the 4 financial performance variables. Financial performance variables were retained for use in the full model if they were significant ($P < 0.10$) or if their removal changed remaining parameter estimates of other significant variables by more than 20%.²⁷ In sensitivity analyses, the research team reestimated the final model including process measures and hospital–community engagement variables to assess how their addition might attenuate the association between social capital and RSRR.

Each hospital was assigned the community characteristics of the HSA that it served, but some HSAs included more than 1 hospital. In order to account for clustering of some hospitals within the same HSA, models were fit with clustered standard errors by HSA. The research team anticipated that the influence of social capital or other independent variables might vary by HSA income levels; therefore, the team conducted income-stratified analyses. SAS 9.4 (SAS Institute Inc., Cary, NC) was used for all analyses.

Results

Sample characteristics

Of the 4298 hospitals in the continental United States with data on all-cause hospital-wide readmissions, 223 (5%) were excluded from the final analytic sample because they were missing data for other variables in the model. For the 4075 hospitals remaining in the final analytic sample, the mean all-cause, hospital-wide RSRR was 16.0% (Table 2).

Compared to hospitals with missing data, hospitals included in the final analytic sample had somewhat lower RSRRs and lower social capital levels.

Multivariate analysis

In fully adjusted analyses, hospitals serving HSAs with lower social capital levels had significantly higher RSRRs (Table 3). The mean RSRR of hospitals serving HSAs in the lowest quintile of social capital was 0.55 percentage points higher than the mean RSRR of hospitals in the highest quintile of social capital ($P < .01$). Hospital financial performance also was significantly associated with RSRR, with higher operating margin ratios associated with lower RSRR ($P < .01$). Household income and racial composition of the HSA were significantly associated with RSRR. Having fewer hospital beds per 1000 residents and physicians per 100,000 residents also were associated with lower RSRRs. Hospital teaching status and share of physicians in the HSA who were primary care physicians were not significantly associated with RSRR.

Income-stratified results. In income-stratified results, the significant relationship between lower social capital and higher RSRR was evident within high-, medium-, and low-income strata (Table 4). The relationships between RSRR and several other variables varied by income level, however. Notably, hospital operating margin ratio was significantly associated with RSRR in the highest ($P < .01$) and middle ($P = .04$) income strata, but not in the lowest income stratum.

Sensitivity analyses. The magnitude and significance of associations between RSRR and social capital, hospital financial performance, and other independent variables remained largely unchanged when hospital process measures of quality and hospital–community engagement measures were added as covariates; however, several of the measures added in sensitivity analyses were associated with RSRR in the fully adjusted models. Three hospital process measures were associated with lower RSRR: percent of heart failure

TABLE 2. CHARACTERISTICS OF HOSPITALS AND HOSPITAL SERVICE AREAS IN WHICH THEY ARE LOCATED

	<i>All hospitals (4298)*</i>	<i>Available for analysis (4075)[†]</i>
	<i>Mean or freq (%)</i>	<i>Mean or freq (%)</i>
RSRR		
Mean all-cause RSRR	15.99	16.00
Social capital		
Social capital index	−0.34	−0.33
Census region		
New England	4.2	4.3
Mid-Atlantic	8.9	9.3
East North Central	15.9	16.1
West North Central	14.5	14.5
South Atlantic	15.0	14.9
East South Central	8.6	9.0
West South Central	14.4	14.3
Mountain	8.1	7.6
Pacific	10.5	10.0
Teaching status		
Teaching	18.3	18.2
Nonteaching	81.7	81.8
Hospital size (# beds)		
<200	69.4	69.2
200–399	20.3	20.5
400–599	6.3	6.3
≥600	4.0	4.1
Hospital ownership		
Government (Nonfederal)	22.1	22.6
Private for Profit	17.1	16.7
Private Nonprofit	60.8	60.7
Hospital finances		
Operating Margin Ratio	0.04	0.04
Urban/rural location		
Rural	17.3	17.3
Suburban	23.1	23.6
Urban	59.6	59.1
Household income		
Median household income	46,698	46,547
Race		
Mean % white	80.1	80.3
Health care supply		
Mean hospital beds/ 1000 residents	2.9	2.9
Mean physicians/ 100,000 residents	197.6	197.6
Mean ratio PCPs/total physicians	0.37	0.37

*All hospitals with all-cause, hospital-wide RSRR data.

[†]All hospitals with non-missing data for all model variables (complete cases). Four hospitals were missing social capital data and 219 hospitals were missing operating margin ratio. These 223 hospitals (5% of the sample) were excluded from analysis.

PCP, primary care physician; RSRR, risk-stratified readmission rate.

TABLE 3. FULLY ADJUSTED MODEL OF HOSPITAL-WIDE RISK-STRATIFIED READMISSION RATES

<i>Parameter</i>	<i>Estimate</i>	<i>P</i>
Social capital		
Quintile 1	0.55 (0.39, 0.71)	0.00
Quintile 2	0.29 (0.13, 0.45)	0.00
Quintile 3	0.15 (0.03, 0.28)	0.02
Quintile 4	0.10 (−0.01, 0.21)	0.07
Quintile 5		
Census Region		
New England	0.66 (0.47, 0.86)	0.00
Mid-Atlantic	0.95 (0.74, 1.16)	0.00
East North Central	0.58 (0.38, 0.78)	0.00
West North Central	0.31 (0.14, 0.49)	0.00
South Atlantic	0.37 (0.22, 0.52)	0.00
East South Central	0.49 (0.34, 0.65)	0.00
West South Central	0.1 (−0.06, 0.25)	0.22
Mountain	0.01 (−0.14, 0.16)	0.90
Pacific		
Teaching status		
Teaching	0.04 (−0.07, 0.16)	0.46
Hospital size (# beds)		
<200	−0.31 (−0.53, −0.08)	0.01
200–399	−0.26 (−0.47, −0.04)	0.02
400–599	−0.19 (−0.43, 0.05)	0.11
≥600		
Hospital ownership		
Government (Nonfederal)	0.11 (0.04, 0.19)	0.00
Private for Profit	0.2 (0.1, 0.3)	0.00
Private Nonprofit		
Urban/rural location		
Rural	0.15 (0.05, 0.25)	0.00
Suburban	0.04 (−0.05, 0.13)	0.42
Urban		
Hospital finances		
Operating Margin Ratio	−0.42 (−0.64, −0.2)	0.00
Household income		
Quintile 1	0.21 (0.08, 0.34)	0.00
Quintile 2	0.09 (−0.04, 0.22)	0.17
Quintile 3	−0.02 (−0.16, 0.12)	0.75
Quintile 4	−0.06 (−0.18, 0.06)	0.31
Quintile 5		
Percent white race		
Quintile 1	0.35 (0.18, 0.52)	0.00
Quintile 2	0.20 (0.07, 0.33)	0.00
Quintile 3	0.00 (−0.11, 0.1)	0.94
Quintile 4	−0.07 (−0.16, 0.02)	0.10
Quintile 5		
Health care supply		
Hospital beds/1000 residents	0.12 (0.09, 0.15)	0.00
Physicians/100,000 residents	.002 (.001, .003)	0.00
Ratio PCPs/total physicians	−0.13 (−0.76, 0.51)	0.70

PCP, primary care physician.

patients who received evaluation of LVS function, percent of AMI patients given aspirin at discharge, and percent of AMI patients treated with PCI who received intervention within 90 minutes of arrival. Two hospital–community engagement measures were associated with lower RSRR: use

of a community assessment to identify unmet health needs or excess capacity in the community, and making financial contributions for community-building activities. The total number of community engagement activities reported by the hospitals was negatively associated with RSRR.

TABLE 4. FULLY ADJUSTED MODEL OF HOSPITAL-WIDE RISK-STRATIFIED READMISSION RATES, STRATIFICATION BY MEDIAN HOUSEHOLD INCOME

Parameter	Low income		Middle income		High income	
	<i>n</i> = 1432		<i>n</i> = 1434		<i>n</i> = 1432	
	Estimate	P	Estimate	P	Estimate	P
Social capital						
Quintile 1	0.57 (0.34, 0.79)	0.00	0.53 (0.3, 0.75)	0.00	0.61 (0.29, 0.92)	0.00
Quintile 2	0.19 (0, 0.39)	0.05	0.23 (−0.02, 0.48)	0.07	0.41 (0.12, 0.7)	0.01
Quintile 3	0.24 (0.06, 0.42)	0.01	0.03 (−0.15, 0.21)	0.71	0.21 (−0.07, 0.48)	0.15
Quintile 4	0.07 (−0.08, 0.23)	0.36	−0.05 (−0.22, 0.11)	0.52	0.31 (0.07, 0.56)	0.01
Quintile 5						
Census Region						
New England	0.15 (−0.15, 0.45)	0.33	0.76 (0.35, 1.18)	0.00	0.87 (0.59, 1.14)	0.00
Mid-Atlantic	0.78 (0.31, 1.25)	0.00	1.08 (0.77, 1.39)	0.00	1 (0.73, 1.27)	0.00
East North Central	0.42 (0.16, 0.68)	0.00	0.6 (0.28, 0.93)	0.00	0.63 (0.32, 0.93)	0.00
West North Central	0.13 (−0.12, 0.39)	0.31	0.21 (−0.08, 0.5)	0.15	0.49 (0.2, 0.79)	0.00
South Atlantic	0.3 (0.09, 0.51)	0.01	0.2 (−0.06, 0.46)	0.13	0.66 (0.37, 0.95)	0.00
East South Central	0.45 (0.22, 0.68)	0.00	0.43 (0.15, 0.71)	0.00	0.75 (0.4, 1.11)	0.00
West South Central	0.27 (0.05, 0.5)	0.02	−0.02 (−0.28, 0.24)	0.88	−0.11 (−0.33, 0.12)	0.36
Mountain Pacific	−0.05 (−0.3, 0.19)	0.67	−0.09 (−0.35, 0.17)	0.49	0.16 (−0.09, 0.41)	0.21
Teaching status						
Teaching	0.41 (0.07, 0.75)	0.02	−0.14 (−0.31, 0.02)	0.09	0 (−0.16, 0.16)	0.99
Hospital size						
<200	−0.28 (−0.78, 0.21)	0.26	−0.24 (−0.6, 0.12)	0.19	−0.3 (−0.63, 0.04)	0.08
200–399	−0.25 (−0.75, 0.25)	0.33	−0.22 (−0.59, 0.14)	0.23	−0.23 (−0.53, 0.08)	0.14
400–599	−0.12 (−0.73, 0.48)	0.69	−0.04 (−0.43, 0.34)	0.82	−0.28 (−0.6, 0.05)	0.09
≥600						
Hospital ownership						
Government (Nonfederal)	−0.03 (−0.15, 0.09)	0.58	0.11 (−0.01, 0.22)	0.06	0.41 (0.24, 0.59)	0.00
Private for Profit	0.16 (0, 0.32)	0.06	0.24 (0.07, 0.41)	0.01	0.2 (0.03, 0.38)	0.02
Private Nonprofit						
Hospital finances						
Operating Margin Ratio	−0.19 (−0.59, 0.21)	0.35	−0.33 (−0.64, −0.02)	0.04	−0.69 (−1.14, −0.25)	0.00
Urban/rural location						
Rural	0.16 (0, 0.32)	0.04	0.15 (0, 0.3)	0.05	0.14 (−0.11, 0.39)	0.27
Suburban	−0.01 (−0.14, 0.12)	0.88	0.1 (−0.03, 0.24)	0.14	0.31 (0.08, 0.53)	0.01
Urban						
Percent white race						
Quintile 1	0.16 (−0.04, 0.36)	0.11	0.71 (0.36, 1.06)	0.00	0.46 (0.18, 0.73)	0.00
Quintile 2	0.07 (−0.12, 0.26)	0.48	0.37 (0.13, 0.61)	0.00	0.36 (0.12, 0.6)	0.00
Quintile 3	−0.18 (−0.36, 0)	0.05	0.11 (−0.06, 0.27)	0.21	0.18 (−0.02, 0.38)	0.08
Quintile 4	−0.12 (−0.27, 0.03)	0.13	−0.02 (−0.15, 0.11)	0.80	0.02 (−0.16, 0.2)	0.84
Quintile 5						
Health care supply						
Hospital beds/1000 residents	0.1 (0.06, 0.15)	0.00	0.15 (0.11, 0.2)	0.00	0.13 (0.06, 0.2)	0.00
Physicians/100,000 residents	0.002 (0, 0.003)	0.01	0.002 (0, 0.003)	0.03	0.001 (0, 0.003)	0.13
Ratio PCPs/total physicians	−0.7 (−1.61, 0.21)	0.13	0.37 (−0.56, 1.3)	0.43	−0.19 (−1.54, 1.15)	0.78

PCP, primary care physician.

Discussion

This study found that social capital was significantly associated with RSRR. The association remained significant even after adjusting for financial performance, the availability of hospital beds and physicians in the HSA, and local so-

cioeconomic context. Put in terms of the national distribution of hospital-wide RSRR, the .55 percentage point difference between hospitals in the highest and lowest quintiles of social capital is equivalent to moving from the median RSRR performance down to the 25th percentile or up to the 75th percentile.¹ Given the difficulty of isolating internal processes

of hospitals that are consistently associated with RSRR, the present study findings offer another perspective – identifying that community-based resources and hospital–community partnerships may be critical. Although this is consistent with previous results,^{9–12} the present findings extend previous work by examining a broader set of community resources in models adjusted for a broader range of hospital features.

Social capital: potential mechanisms of action

The mechanisms by which social capital influences RSRR cannot be determined from the data; however, other literature suggests potential pathways. Prior literature on the positive relationship between social capital and health suggests that community-level mechanisms as well as individual-level mechanisms likely are involved.²⁸ The present study measure of social capital focuses on associational activities and civic participation. To the extent that some nonprofit organizations and associations (eg, churches, elder service organizations) provide charitable services for vulnerable individuals in the community, the association between social capital and RSRR may reflect greater support for services that address social determinants of health such as food, housing, and income support.^{29,30} Populations that are more engaged with civic affairs also may influence health care and social services organizations, making these services more responsive to community needs and thus better able to prevent hospital readmissions. Prior research has demonstrated that social capital influences the ability of community representatives on hospital governing boards to influence provision of community-oriented services,³¹ and that social capital also influences integration of social services with health care.³²

In addition to influencing hospital readmission through the community-level processes described, the norms of trust and reciprocity represented by social capital also foster social network ties for individuals.³³ Neighbor-to-neighbor assistance to address social needs may contribute to avoidance of readmissions. Furthermore, individuals with more interpersonal relationships have better health and lower mortality rates^{34–36}; therefore, communities that encourage formation of social ties could be expected to display better aggregate measures of health status such as readmissions rates.

Hospital financial performance

This study is the first to examine the relationship between hospital operating margin ratio and RSRR, and found that higher hospital operating margins were associated with lower RSRRs. Financial strain may lead to fewer staff available to assist with discharge planning, lack of time to establish relationships with community-based providers, and absence of funding to support care transitions programs, all of which could elevate readmissions risk. The fact that operating margin ratio was significantly associated with RSRR only in higher income areas suggests that readmissions in higher income areas may be more attributable to hospital factors, whereas readmissions in lower income areas may have more to do with social challenges outside of the hospital.

Hospital–community engagement

Findings in the sensitivity analyses demonstrating an association between hospital–community engagement activities

and RSRR suggest that hospital–community links may assist in transitions of care. Although this analysis was missing 32% of the hospitals in the full sample, it still included 2771 hospitals across the United States. The research team does not have details on the types of organizations that hospitals worked with but they are likely diverse, as hospital–community benefits and community building can include activities such as charity care, coalition building, community health advocacy, workforce development, and support for housing, economic development, and the environment.³⁷ Hospital participation in Accountable Care Organizations and related programs may further encourage ties between hospitals and other community organizations,³⁸ making the impact of these emerging links an important area for future study.

These results should be interpreted in light of several limitations. First, cross-sectional associations cannot be used to infer causality, and this study only involves data at the ecological level; it would be helpful to follow up these results with multilevel data at both patient and HSA level. Still, these results from a nationwide sample of hospitals corroborate smaller scale qualitative observations on the relationship between community resources and readmissions^{7,39} and highlight this nexus as an important area for further study. Second, 5% of hospitals with reported RSRR values were missing other data required for the model and therefore could not be included in the analysis. The research team believes the missing data likely biased the key findings toward the null, however, because hospitals with missing data also had significantly lower social capital and higher RSRR than hospitals included in the analysis, so removing these observations would only weaken the observed inverse relationship found between social capital and RSRR. Third, the team did not have data on all community-level health resources – such as public health infrastructure or home health services – that could be related to social capital and hospital readmissions, although the team did adjust for availability of hospital, physician, and primary care resources.

Conclusion

In conclusion, these results suggest that social capital is associated with lower RSRR, providing additional insight into the mechanisms by which community resources influence readmissions. A hospital is unlikely to be able to influence prevailing levels of social capital in its region, but in areas of low social capital, it may be possible for the public sector to buttress the types of institutions that address non-medical causes of readmission. For example, investment in formal social services such as income, food, and housing supports may provide a safety net for the most vulnerable recently hospitalized patients. Hospitals have been advised to build relationships with post-acute providers as a strategy to reduce hospital readmissions.⁴⁰ The results suggest that relationships between hospitals and other community organizations matter as well. Hospitals seeking to reduce readmissions rates might benefit from making strategic investments in strengthening links with their communities more broadly.

Author Disclosure Statement

The authors declare that there are no conflicts of interest. This research was supported by a grant from The Commonwealth Fund, New York, NY.

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