



HIDI HealthStats

Statistics and Analysis From the Hospital Industry Data Institute

OCTOBER 2014 ■ HOSPITAL QUALITY SPOTLIGHT ON READMISSIONS

Key Points

- Readmission rates are improving in Missouri, but despite the progress, it will be years until they are fully reflected in Hospital Readmission Reduction Program formula.
- Missouri hospitals face a projected \$12.2 million in penalties for excess readmissions in federal fiscal year 2015.
- It matters where a patient lives: readmission rates in Missouri have a strong correlation with the poverty rate of the patient's ZIP code.
- Recent research from the Hospital Industry Data Institute, BJC HealthCare and Washington University in St. Louis reveal that controlling for socioeconomic status would dramatically reduce the amount of variation in the CMS' readmission measures.
- Recent research on big data applications at hospitals has stated that all health care organizations should "use an algorithm to predict who is likely to be readmitted." HIDI readmission risk predictive models show very strong discriminant ability in identifying high-risk patients.

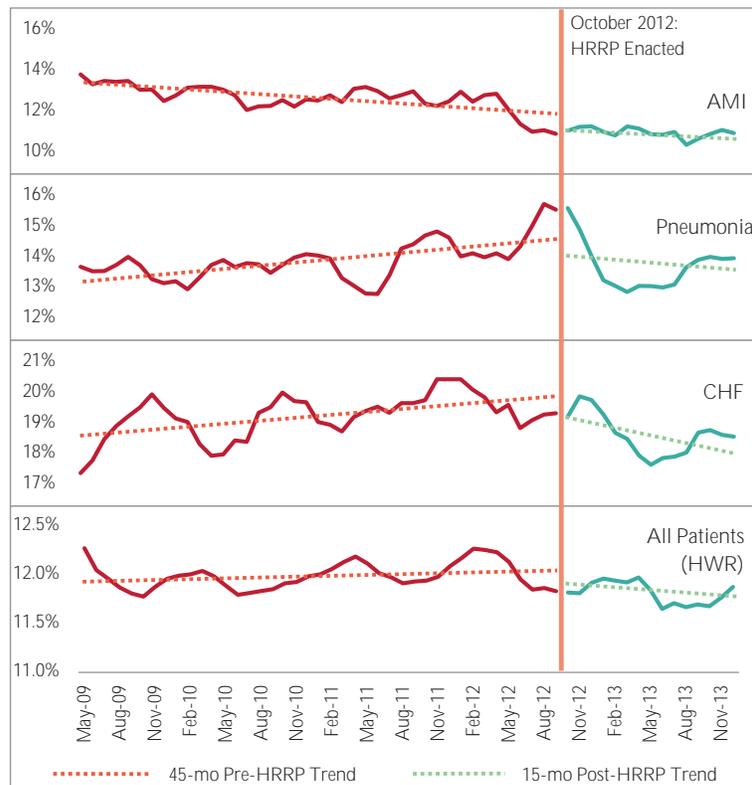


Background

Preventing avoidable readmissions is an important component of hospitals' ongoing quality improvement efforts. Understanding the phenomena and intervening in the most effective manner is essential to success in national efforts to improve patient outcomes and curtail health care spending. Recent clinical researchⁱ, value-based purchasing policiesⁱⁱ and transparency initiatives from the Centers for Medicare & Medicaid Servicesⁱⁱⁱ have focused a growing amount of attention and resource allocation aimed at curbing expensive hospital inpatient readmissions. A recent study places the annual number of 30-day readmissions in the U.S. at 3.3 million, with a price tag of \$41.3 billion.^{iv}

In October 2012, the Affordable Care Act's Hospital Readmission Reduction Program began imposing financial penalties on hospitals with excess readmissions for acute myocardial infarction, heart failure and pneumonia patients with traditional Medicare coverage. Since the enactment of the HRRP, readmissions in Missouri have been trending down among patients with these conditions (Figure 1).¹

Figure 1: Missouri Five-Month Moving Average Observed Readmission Rates for Conditions Included in the HRRP and All Patients



¹ Figure 1 represents readmission rates for Missouri patients ages 18 and older with any payer.

The Risk Standardized Readmission Rates, reported publicly on Hospital Compare and used by CMS to determine penalties for excess readmissions, are derived from Hierarchical Generalized Logistic Models developed by researchers at Yale’s Center for Outcomes Research and Evaluation.^v The HGLM measures have faced scrutiny for:

- their resistance to change despite the increasing allocation of resources by hospitals to reduce readmissions^{vi}
- not controlling for patient contextual factors such as socioeconomic status
- failing to account for the patient’s competing risk of mortality^{vii}

Although clinically robust, the HGLM-derived measures do not control for socioeconomic and socio-demographic factors that positively influence the risk of readmission but cannot be mediated by the quality of the care provided by hospitals. The readmission measures reported by CMS also do not lend themselves to rapid-cycle quality improvement efforts. This is primarily due to the following four attributes of the models and underlying data.

- measures are released at a significant lag
- models draw from three years of pooled data to increase statistical reliability
- measures are limited to traditional Medicare patients ages 65 and older
- models are impossible for hospitals to replicate independently^{viii}

To address these issues, the Hospital Industry Data Institute developed the capability to replicate the CMS readmission measures on a more timely basis by applying the Yale methodologies to state-level discharge data. With this capability, HIDI produces quarterly hospital-specific dashboards for the acute myocardial infarction, heart failure, pneumonia and hospital-wide readmissions measures

for hospitals with sufficient data. In early 2015, the dashboards will be expanded to include newer CMS measures for stroke, chronic obstructive pulmonary disease, and hip and knee arthroplasty.

Financial Implications

Medicare’s pay for performance programs are beginning to affect inpatient prospective payments and gaining attention from hospital leaders throughout Missouri. In fiscal year 2015, the pay for performance programs can reduce Medicare inpatient PPS payments by as much as 5.5 percent. For FY 2015, the readmissions payment reductions can influence hospitals’ Medicare IPPS payments more than the hospital acquired conditions and value-based program adjustments combined. In addition to heart attack, heart failure and pneumonia, CMS is adding total hip and total knee arthroplasty and acute exacerbation of chronic obstructive pulmonary disease for payment

determination in FY 2015, and coronary artery bypass graft for FY 2016.

Missouri hospitals have a good reason to focus on the readmission program as performance is trailing most other states in the country. Although Missouri hospitals have improved throughout the past few years, results are still well below the 50th percentile. In FY 2014, Missouri ranked 38th highest in the amount of revenue cut from inpatient payments. Although CMS has not released the final readmission adjustment factor for hospitals in FY 2015, Missouri is on track to improve its ranking to 35th in the country. Missouri’s estimated payment reduction for FFY 2015 is \$12.2 million.

The Importance of Risk-Adjustment for Socioeconomic Status

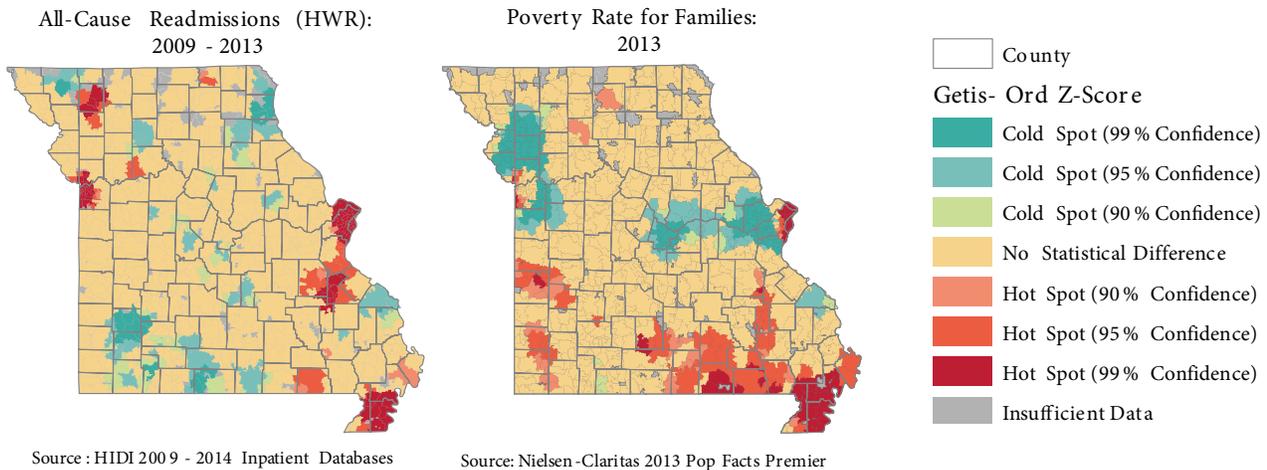
Numerous studies have linked patient outcomes to socioeconomic status, access to quality community-based

Table 1: Readmission Rates and Demographic Profiles by Poverty Rate of Patients’ ZIP Codes in Missouri: 2009 - 2013

	Poverty Rate	Readmission Rate	Mean Patient Age	Percent Minority
AMI	0% to 9%	11.9%	67.8	6.8%
	10% to 19%	12.3%	66.5	8.6%
	20% to 29%	14.3%	65.2	41.5%
	30% or more	17.2%	63.9	67.4%
	All ZIPs	12.4%	67.0	11.7%
CHF	0% to 9%	18.0%	75.7	9.7%
	10% to 19%	18.0%	73.2	13.7%
	20% to 29%	19.7%	67.4	60.7%
	30% or more	19.6%	65.0	79.5%
	All ZIPs	18.2%	73.3	20.3%
Pneumonia	0% to 9%	13.6%	70.0	6.2%
	10% to 19%	13.0%	68.5	7.4%
	20% to 29%	14.7%	65.1	35.0%
	30% or more	14.8%	62.1	62.0%
	All ZIPs	13.5%	68.7	10.7%
All Patients	0% to 9%	11.7%	64.0	8.4%
	10% to 19%	12.0%	62.4	11.2%
	20% to 29%	13.7%	59.4	50.4%
	30% or more	15.2%	57.2	71.6%
	All ZIPs	12.1%	62.7	15.3%

care and other post-acute resources.^{ix} The link between a patient’s risk of readmission and SES in Missouri is evident. Table 1 contains Missouri’s five-year, all-cause readmission rates for patients from ZIP codes with varied percentages of families living below the federal poverty level, the average age of patients from these ZIP codes, and the percent of patients who are racial minorities. For each of the cohorts included, readmission rates increase with poverty rates, patients from lower-income neighborhoods are hospitalized at younger ages, and the portion of patients belonging to a racial minority group increases

Figure 2: Spatial Distribution of ZIP Code Level Readmissions and Poverty Hot Spots in Missouri

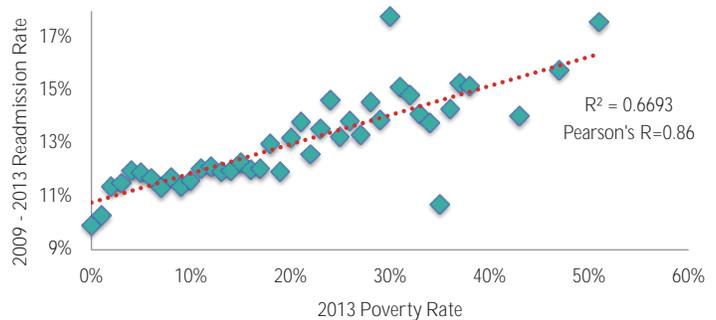


significantly with the poverty rate.

Using AMI as an example, patients living in ZIP codes with 30 percent or more families living in poverty have a readmission rate 45 percent higher than patients living in ZIP codes with poverty rates lower than 10 percent. In addition, they are on average four years younger and 10 times more likely to be a racial minority. Similarly, Figure 2 shows the spatial distribution of excess readmissions and clusters of high poverty in Missouri at the ZIP code level. Figure 3 shows the scatter distribution of readmission rates and poverty for Missouri ZIP codes. The positive correlation between the two variables is very significant. Independently, poverty explains two-thirds of the variation in readmissions at the Missouri ZIP code level ($R^2 = 0.67$).

The call to control SES as a determinant of the probability of 30-day readmission has been the most prevalent topic of contention during public comment periods at both CMS and the National Quality Forum, the entity responsible for endorsing readmission measures based on impact and methodological rigor. The responding justification for the continued exclusion of controls for SES from CMS and NQF has been that doing so would mask disparities and impose different expectations for the quality of care based on the socioeconomic mix of patients treated at different facilities. During NQF’s review of the

Figure 3: Observed Readmission Rates for All Patients (HWR) by Poverty Rates for Missouri ZIP Codes



Hospital-Wide All-Cause Unplanned Readmission measure, NQF stated, “While the [readmissions] differences are driven in part by variation in quality within hospitals, differences in readmissions performance are also influenced by the availability of support for patients as they transition from the hospital into the community.” NQF went on to state “the hospital is dependent on resources available in the community.” More recently, the Obama administration convened a national expert panel to investigate both sides of the debate and put forth a formal recommendation to NQF. In a super-majority, the panel endorsed risk-adjustment for socioeconomic and sociodemographic factors which would induce sweeping changes in performance measurement and reimbursement policies.^x CMS vigorously opposed the panel’s recommendations.^{xi}

As a concession, the NQF Board of Directors implemented a standing advisory panel on health disparities and implemented a trial period where measures submitted for endorsement must evaluate any

deterministic relationship between the measure and SES at the patient-level, or by stratifying providers according to their sociodemographic patient mix.^{xii}

Congress also has weighed in on the debate. Two pieces of legislation were recently drafted – one in the House and one in the Senate – that would mandate CMS control for SES in pay for performance policies. Rep. Jim Renacci (R-Ohio) introduced the *Establishing Beneficiary Equity in the Hospital Readmissions Program Act of 2014*,^{xiii} and Sen. Joe Manchin (D-W. Va.) introduced the *Hospital Readmissions Program Accuracy and Accountability Act of 2014*. Each bill enjoys wide bipartisan support.

Missouri-specific research on the subject was published in the May 2014 issue *Health Affairs*. The study was developed by a research team from BJC HealthCare, Washington University in St. Louis and HIDI.^{xv} The study investigated readmissions in Missouri for Medicare patients admitted for heart attack, heart failure and pneumonia between 2009 and 2012. Comparing results for two sets of risk-adjustment models, the study investigated the extent to which the socioeconomic attributes of patients' communities influence their risks of being readmitted. The first models were identical to the methods that CMS currently employs for the HRRP.

The second set extended the baseline methods to include socioeconomic factors such as poverty rate, educational attainment and housing vacancies in patients' census tracts. The competing models produced dramatically different results in the risk-adjusted performance for hospital readmissions. The SES-adjusted models reduced the risk-standardized readmission rates for AMI patients by 72 percent. The HF model RSRRs were reduced by 47 percent while the variance in the risk-adjusted performance

for pneumonia patients decreased by 50 percent.

Leveraging Decision Support From Big Data

Predictive modeling designed to supplement clinical decision making is a topic of growing attention in health care. A recent study published in *Health Affairs*, covering big data applications in health care, found that predictive applications that stratify patients into high- and low-risk groups, will become increasingly important as health care providers assume more financial risk for patient outcomes and accountability for population health management. The authors stated "health care organizations should all use an algorithm to predict who is likely to be readmitted to the hospital."^{xvi}

Using its robust, longitudinal discharge databases, HIDI has recently developed several readmission risk predictive models intended to assist

hospitals in identifying patients at high-risk of readmission for acute myocardial infarction, heart failure and pneumonia prior to discharge. The algorithms require input data involving the patient's clinical comorbidities, demographic and payer information, and the number of inpatient admissions during the previous year. The models are currently deployed in online calculator applications. However, HIDI is exploring options to deploy the algorithms in near real-time with electronic health record integration. The risk assessment models can be used to target discharge planning interventions and resources to patients who are statistically most likely to be readmitted during the 30 days following an index admission.

The models were developed using the CMS/Yale methods, supplemented with additional information on the patient's SES and utilization during the previous year. The data used to standardize the models covered 36 months of state-level discharge

Moving the Readmissions Needle

Reducing and preventing hospital readmissions is not achieved within a hospital's four walls. Hospitals within the Missouri Hospital Engagement Network have done tremendous work inside their facilities. Currently, they are working with partners in the health care community to encourage post-acute facilities, physician offices, and entire communities, as well as patients and families, to become involved in reducing readmissions. By ensuring high-quality care is provided in the hospital and continuity of care across the continuum, Missouri hospitals have seen a decrease in readmissions.

Now, more than ever, it is important to engage patients and their families in care planning to optimize post-acute health outcomes. By gaining the engagement of patients and their families, health care providers throughout Missouri are increasingly able to provide patient and family-centered care. The Missouri HEN has collaborated with Health Literacy of Missouri to pilot literacy work at a select group of Missouri hospitals. The project included handouts, instructions and education that were more easily received and understood. This increased the health literacy of the patients involved. Which, in turn, decreased readmissions and increased the health literacy of our communities.

The Missouri HEN offers a number of tools and checklists, and also can provide strategies and assistance to implement patient and family engagement projects. Current initiatives include, but are not limited to: teachback, physician/staff engagement, post-acute collaboration, follow-up/post discharge checklist, care coordination and transitions, patient-family engagement, and health literacy.

records for Missouri and surrounding metropolitan areas. After exclusions, more than 1.5 million records were used to build the index cohorts for each condition. Two years of historic data covering more than 12 million diagnosis and procedure codes were used for clinical risk-adjustment. The patient’s age, gender, race, health insurance provider and number of admissions during the previous 365 days were used for demographic and contextual risk-adjustment. The observed readmission rates for AMI, heart failure and pneumonia were 12.02, 18.7, and 13.66 percent during the study period, respectively. With c-statistics ranging from 0.86 in the AMI model to 0.78 for heart failure, each model demonstrated strong discriminant ability in correctly predicting which index admissions were most likely to result in readmission.²

The model results were used to estimate the probability a patient will be readmitted in 30 days after adjusting for clinical history, and demographic and contextual characteristics. Patients were assigned to high-risk groups if their predicted probability of readmission fell in the top percentile above the observed readmission rate for each condition. For example, the 12.02 percent of index admissions with the highest predicted probability of readmission made up the high-risk group in the AMI cohort. AMI patients with a predicted probability lower than 12.02 percent were assigned to the low-risk group. All other patients were considered mid-risk. Risk stratification can be assigned by customized definitions such as quintiles, deciles or clinically comorbid patient cohorts. For example, Figure 4 contains the distribution of index admissions by the patient’s predicted probability — or risk — of being readmitted. Users may choose to focus post-discharge planning resources on the 49 percent of patients with a predicted probability of 9 percent or higher who actually accounted for 91 percent of all readmissions in the state during the study period.

Figure 4: Distribution of Missouri AMI, HF & PN Patients Ages 18+ by Predicted Probability of 30-day Readmission

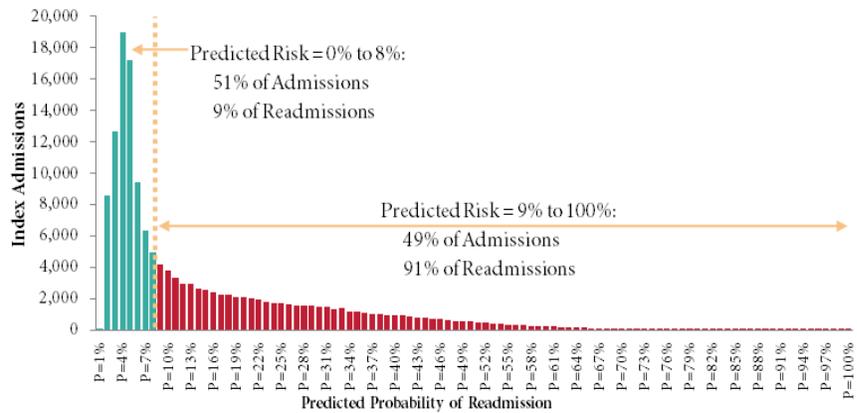


Figure 5: Portion of Total Admissions and Readmissions by Risk Group for HIDI Predictive Readmission Models for AMI, Heart Failure and Pneumonia Patients

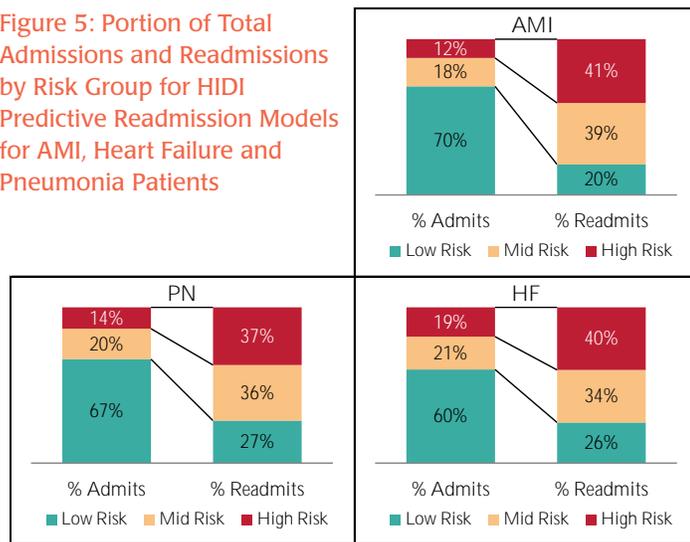


Figure 5 shows that the top 12 percent highest-risk AMI admissions accounted for 41 percent of all readmissions during the three-year study period; the top 19 percent highest-risk heart failure patients accounted for 40 percent of all observed readmissions; and the high-risk pneumonia group accounted for 14 percent of all admissions and 37 percent of all readmissions.

2 A c-statistic with a value of 1 implies a model with perfect ability to identify which patients will be readmitted, conversely, a value of 0.5 implies the model is no better at predicting readmissions than random chance.

Suggested Citation

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The Data Company of the Missouri Hospital Association

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