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Geographic Region and Profit Status Drive Variation in Hospital Readmission Outcomes among Inpatient Rehabilitation Facilities in the United States

Laura Coots Daras, MS, MA, Melvin J. Ingber, PhD, Anne Deutsch, RN, PhD, CCRN, Jennifer Gaudet Hefele, PhD, Jennifer Perloff, PhD

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Variation in IRF Readmissions

Geographic Region and Profit Status Drive Variation in Hospital Readmission Outcomes among Inpatient Rehabilitation Facilities in the United States

Authors: Laura Coots Daras, MS, MA,1,2 Melvin J. Ingber, PhD,1 Anne Deutsch, RN, PhD, CCRN,1,3,4 Jennifer Gaudet Hefele, PhD,1,5 and Jennifer Perloff, PhD2

1 RTI International
2 Heller School for Social Policy & Management, Brandeis University
3 Rehabilitation Institute of Chicago
4 Northwestern University Feinberg School of Medicine
5 Department of Gerontology, University of Massachusetts Boston

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Corresponding Author: Laura Coots Daras, Program Manager, Health Services Researcher, Quality Measurement and Health Policy, RTI International, 307 Waverley Oaks Road, Suite 101, Waltham, MA 02452, USA. Email: lcoots@rti.org
Variation in IRF Readmissions

Geographic Region and Profit Status Drive Variation in Hospital Readmission Outcomes among Inpatient Rehabilitation Facilities in the United States

ABSTRACT

Objective: To examine whether there are differences in inpatient rehabilitation facilities (IRFs') all-cause, 30-day post-discharge hospital readmission rates by organizational characteristics and geographic regions.

Design: Observational study.

Setting and Participants: We analyzed Medicare claims and administrative data sources for Medicare fee-for-service beneficiaries discharged from all IRFs nationally (N=1,166) in 2013 and 2014.

Main Outcome Measure: We applied specifications for an existing quality measure adopted by CMS for public reporting that assesses all-cause unplanned hospital readmissions for 30 days post-discharge from inpatient rehabilitation. We estimated facility-level observed and risk-standardized readmission rates and then examined variation by several organizational characteristics (facility type, profit status, teaching status, proportion of low-income patients, size) and geographic factors (rural/urban, census division, and state).

Results: The mean IRF risk-standardized hospital readmission rate was 13.00 percent (SD 0.77). After controlling for organizational characteristics and practice patterns, we found substantial variation in IRFs’ readmission rates: for-profit IRFs had significantly higher readmission rates compared to not-for-profit IRFs (p<0.001). We also found geographic variation: IRFs in the South Atlantic and South Central census regions had the highest hospital readmission rates compared to IRFs in New England that had the lowest rates.

Conclusions: Our findings point to variation in the quality of care, as measured by risk-standardized hospital readmission rates following IRF discharge. Thus, monitoring of
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readmission outcomes is important to encourage quality improvement in discharge care planning, care transitions and follow-up.

Key Words: Readmissions; rehospitalizations; post-acute care; inpatient rehabilitation; Medicare

Abbreviations:
CMS = Centers for Medicare & Medicaid Services
FFS = fee-for-service
IMPACT = Improving Medicare Post-Acute Care Transformation Act
IRF = inpatient rehabilitation facility
PAC = post-acute care
RSRR = risk-standardized readmission rate
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Over 40 percent of Medicare fee-for-service (FFS) beneficiaries receive post-acute care (PAC) following discharge from an acute care hospital.\(^1\) Given the high rate of hospital readmission among Medicare beneficiaries—many of which may be potentially avoidable\(^2^4\)—reducing readmissions continues to be an important issue for the Centers for Medicare & Medicaid Services (CMS), providers, and patients. Several health reform initiatives emphasize the need for better care coordination across care transitions, including transitions home. Towards this end, CMS began publicly reporting hospital readmission rates for all types of PAC providers, including inpatient rehabilitation facilities (IRFs).

IRFs are institutional PAC providers that deliver intensive therapy and specialized rehabilitation services by an interdisciplinary team, including a rehabilitation nurse and supervision by a physician with physical medicine and rehabilitation expertise. There are nearly 1,200 IRFs in the United States that discharge over 340,000 Medicare patients annually.\(^5\)

CMS recently implemented an IRF Quality Reporting Program and has identified readmissions post-IRF discharge as a key area for quality measurement and monitoring. CMS adopted the *All-Cause Unplanned Readmission Measure for 30 Days Post Discharge from Inpatient Rehabilitation Facilities*\(^6\) for this program and began publicly reporting hospital readmission rates using this National Quality Forum (NQF)-endorsed measure for IRFs nationally in late 2016. Monitoring hospital readmission rates among PAC providers was also highlighted in the Improving Medicare Post-Acute Care Transformation (IMPACT) Act of 2014, which required the development of all-condition, risk-adjusted potentially preventable hospital readmission rates for all PAC provider types, including IRFs.

Despite the focus on hospital readmissions for IRFs, specific evidence on how IRFs perform on the CMS hospital readmission measure remains somewhat limited. Several studies
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have examined IRF readmission rates, but have focused on specific conditions for which patients receive inpatient rehabilitation, such as stroke, \textsuperscript{7-10} orthopedic conditions or joint replacement, \textsuperscript{11,12} debility, \textsuperscript{5} and traumatic brain injury. \textsuperscript{13,14} One study assessed 30-day all-cause hospital readmissions post IRF discharge among the six most frequent rehabilitation diagnoses discharged between 2006 and 2011. They found that unadjusted, patient-level readmission rates varied by rehabilitation diagnosis and risk-adjusted rates varied by geographic region, but found no differences in unadjusted rates by rural location, type of IRF (freestanding vs. hospital-based) or ownership type. \textsuperscript{15} Another study that assessed predictors of unadjusted and risk-adjusted all-cause readmission only among medically complex patients found higher readmission rates among larger IRFs and those located in certain geographic regions. \textsuperscript{16} However, neither study assessed facility-level variation in IRFs’ risk-standardized readmission rates applying the specifications of the NQF-endorsed quality measure and with national data for all Medicare beneficiaries that were discharged from inpatient rehabilitation.

The primary objective of this study was to assess whether IRFs’ hospital readmission rates vary by organizational characteristics and geographic regions. This study aimed to evaluate whether readmission rates vary systematically by selected IRFs’ characteristics. The presence of variation in readmission rates would raise questions about the causes of such variation and how to best target policies or quality improvement strategies.

\textbf{Methods}

This observational study examined the association between key facility characteristics and facility-level all-cause, unplanned hospital readmission rates for IRFs nationally (N=1,166) using secondary data sources for Medicare FFS IRF discharges during calendar years 2013 and 2014. Specifically, we analyzed Medicare claims and other CMS administrative data sources.
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Medicare inpatient claims data are the primary source for calculating IRFs’ readmission rates and provide information including admission/discharge dates, diagnosis, procedure codes, and comorbidities from the prior acute care hospital stay and the index IRF stay. We also used selected demographic and enrollment variables from the Medicare eligibility files for risk-adjustment. After calculating each IRF’s readmission rates, we used variables from the Provider of Services (POS), Provider Specific Files (PSF), and IRF Rate Setting files from 2013 through 2015 to obtain the selected facility characteristics. This study was approved by our institutions’ IRBs and we obtained a data use agreement from CMS for use of the Medicare claims data.

Readmission Rates. Our primary outcome was 30-day all-cause hospital readmission rates, measured as observed (unadjusted) and risk-standardized (i.e., risk-adjusted to account for patient case-mix and allow for fair comparisons of providers). To calculate risk-standardized readmission rates, we used the measure specifications for the All-Cause Unplanned Readmission Measure for 30 Days Post Discharge from Inpatient Rehabilitation Facilities—the NQF-endorsed measure adopted by CMS for the IRF Quality Reporting Program (80 FR 47087 through 47089).

This measure counts unplanned readmissions occurring in the 30 days following IRF discharge. Similar to hospital readmission measures used in CMS’ Inpatient Quality Reporting Program (i.e. Hospital Compare), planned readmissions are excluded and defined by the CMS Planned Readmission Algorithm, which identifies a set of procedures for which hospital readmissions may be considered planned or potentially planned. In addition, this measure uses a set of procedures more common among PAC beneficiaries considered to be planned based on technical expert input. There are several exclusion criteria; for example, only index IRF stays are included for Medicare FFS beneficiaries if they are preceded by a prior proximal acute care
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hospital discharge within 30 days of the index IRF admission. Also, because this is a measure of hospital readmissions during the 30-day post-IRF discharge period, index IRF stays must end with a successful discharge to a lower level of care or the community; IRF stays ending in direct transfers to the same or higher levels of care are excluded for the purposes of this post-discharge measure. For complete details on the measure specifications, including the full set of measure exclusions, we refer readers elsewhere.\textsuperscript{6,13}

Risk-standardization of each eligible IRF stay adjusts for 204 risk factors, including age-sex; principal diagnosis coded on the prior proximal acute care claim categorized using the Agency for Healthcare Research and Quality Clinical Classification Software;\textsuperscript{19} surgical indicators from prior hospital stay; IRF case-mix groups used for payment that capture reason for rehabilitation and motor function (based on admission FIM® scores); comorbidities grouped using the CMS Hierarchical Condition Categories (HCCs);\textsuperscript{20} original reason for entitlement codes (disability insurance benefits); dialysis utilization; prior acute intensive care unit and coronary care unit days; prior acute care length of stay; and prior acute care hospital utilization (i.e., count of prior hospital stays during the prior year).

We calculated the \textit{predicted} number of unplanned readmissions for each IRF, taking into account the case mix of the patients and the facility effect, as well as the \textit{expected} number of readmissions if similar patients were treated at the average IRF. The model for estimating the predicted and expected values is a hierarchical logistic regression model. The measure is then calculated by estimating the ratio of the predicted number of readmissions to the expected number of readmissions for each IRF, referred to as the standardized risk ratio. Ratios greater than 1 indicate higher than expected readmission rates (i.e. worse performance) and values less than 1 indicate lower than expected readmission rates (i.e. better performance). This model
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accounts for the clustering of patients within IRFs, treating the facility effects as random effects. The use of random effects—which results in an estimator that brings the rates for smaller facility samples closer to the mean—was used to provide more reliable estimates for smaller providers.\(^{33}\)

The standardized risk ratio is then multiplied by the national readmission rate for all IRF stays, which yields the risk-standardized readmission rate (RSRR). The risk-standardization described is necessary to allow for fair comparison of IRFs. For this study, IRFs’ observed and risk-standardized readmission rates were analyzed allowing for an evaluation of both outcomes; readmission rates were analyzed as continuous outcomes.

**Facility Characteristics.** Selected facility characteristics were derived from CMS administrative sources and include facility type (freestanding rehabilitation hospitals vs. hospital-based rehabilitation units), ownership (for-profit/private, not-for-profit/private, government/public), teaching status, disproportionate share hospital (DSH) defined as a low-income patient adjustment greater than 20 percent, and rural/urban location. IRF size was calculated based on patient volume or number of eligible Medicare FFS discharges, which was categorized into deciles. We assessed geographic variation using census divisions and states independently.

**Analysis.** We calculated descriptive statistics and conducted bivariate analyses to assess whether there are significant differences in facilities’ rates by organizational and geographic characteristics, including analysis of variance (ANOVA) and t tests. The unit of analysis is the IRF. We created a choropleth or heat map displaying mean risk-standardized readmission rates by state to illustrate regional variation.

We developed multivariable linear regression models to predict IRFs’ observed and risk-standardized readmission rates using facility characteristics and census divisions. We included
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state Medicare hospitalization rates from 2013, derived from the Health Indicators Warehouse,\textsuperscript{21} as an independent variable in the models in order to control for local practice patterns. We assessed goodness of fit of the models using R-squared values and tested for multicollinearity using variance inflation factors. All analyses, including the state map, were conducted using Stata version 13.0 (StataCorp, College Station, TX).

\textbf{Results}

The distribution of organizational characteristics of the 1,166 IRF are shown in Table 1: 78 percent were hospital-based; 59 percent were not-for-profit; 11 percent had teaching programs; 25 percent had a high share of low income patients (i.e., DSH); and 84 percent were in urban areas.

As shown in Table 1, the mean observed readmission rate for IRFs was 12.4 percent (SD 3.6) and the mean risk-standardized readmission rate was 13.00 percent (SD 0.8). When we examined differences in observed readmission rates by organizational characteristics, we found some significant differences. Freestanding IRFs had significantly higher observed readmission rates compared to hospital-based, as did for-profit IRFs when compared to not-for-profit and government and urban IRFs compared to rural. However, only differences in profit status remained significant after risk-standardization.

We categorized IRF size by deciles based on the number of eligible discharges, which ranged from 1 to 6,610. Figure 1 displays the distributions of risk-standardized readmission rates by size, from smallest to largest. Though there were significant differences in risk-standardized readmission rates by IRF size, the relationship is not linear and the pattern is not clear. For example, deciles 3 (159-205 discharges), 5 (263-326 discharges), and 7 (405-526 discharges) have median rates below 13.0 percent. This figure illustrates that there are somewhat wider interquartile ranges among higher-volume IRFs (illustrated by the black boxes), notably in...
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deciles 9 (757-1,136 discharges) and 10 (1,138-6,610 discharges). The fact that smaller IRFs have tighter interquartile ranges associated with risk-standardized readmission rates is also a result of the shrinkage towards the mean. In contrast, we found a significantly positive relationship between IRF size and observed readmission rates (results not shown).

There was considerable geographic variation in readmission rates—both observed and risk-standardized. The state variation in average risk-standardized readmission rates is shown in the map in Figure 2. Among states in the south, including Texas and Florida, risk-standardized readmission rates were higher. In contrast, the New England states, except Maine, had considerably lower average risk-standardized readmission rates. We found similar differences among census divisions—rates among IRFs located in New England, Pacific, Mountain, and Mid-Atlantic census divisions were lower, on average, relative to those in the West South Central, South Atlantic, and East South Central division (results not shown).

Results of two multivariable linear regression models predicting observed and risk-standardized readmission rates are summarized in Table 2. Profit status, size, and geographic region were all significantly associated with observed readmission rates. Results of the model predicting the risk-standardized readmission rates showed that not-for-profit IRFs had significantly lower risk-standardized readmission rates compared to for-profit IRFs, after controlling for other organizational characteristics, census division, and state Medicare hospitalization rate (to control for practice patterns). There were no major differences in readmission rates based on the volume of patients discharged. Risk-standardized readmission rates for the census regions differed significantly when compared to New England and Puerto Rico; all were higher except for the Mid-Atlantic, which did not differ.
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Sixteen percent of the variance in IRFs’ observed readmission rates and 8 percent of the variance in RSRRs were explained by the models.

Discussion

Using recent and national facility-level data from 2013 and 2014, we found variation in IRFs’ all-cause, unplanned observed and risk-standardized 30-day post-discharge readmission rates. Specifically, not-for-profit status was associated with lower readmission rates. Variation was mostly driven by geographic region. We found variation in risk-standardized readmission rates by state and by census division. Many census divisions were also significantly associated with risk-standardized readmission rates even after controlling for other IRF characteristics and state Medicare acute care hospitalization rates. State Medicare hospitalization rates strongly predicted readmission rates, demonstrating that controlling for practice patterns is important in evaluating geographic variation. Though we found some slight variation in risk-standardized readmission rates by IRF size, it was not a linear relationship and it did not remain after adjusting for other IRF characteristics.

Our findings regarding geographic variation are consistent with one previous study that found variation in other rehabilitation outcomes (e.g. community discharge, length of stay, and discharge function) for stroke, the most common reason for inpatient rehabilitation. This study found variation in stroke rehabilitation outcomes across the CMS regions—variation that persisted even after accounting for differences in demographic and clinical characteristics for discharge destination and length of stay. Geographic variation, such as that found in this study and the stroke study, suggest differences in quality of care among IRFs nationally. Furthermore, variation in quality, as measured by readmission rates, demonstrate potential delivery system inefficiencies which point to opportunities for quality improvement and cost savings. Identifying
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Variation in quality of care for IRFs. These findings are also consistent with broader research identifying regional variation in health care outcomes and practice patterns (Fisher, 2003 #4).

Even though location and facility characteristics are not modifiable, this study provides information for policymakers about where quality improvement efforts would be best directed as well as how IRFs with certain characteristics may be impacted by the variety of policy initiatives assessing readmissions.

High readmission rates among the Medicare population and associated expenditures have prompted readmissions to the forefront as an area of great policy focus, motivating several quality improvement initiatives and outcome measures adopted for CMS programs. Given that such a large proportion of Medicare beneficiaries utilize PAC services, analysis of readmissions following PAC discharge provides much-needed empirical evidence for the IRF setting.

Results of this study are relevant for several CMS initiatives. First, these findings are relevant for evaluation which types of IRFs have the greatest room for improvement for IRFs in the IRF Quality Reporting Program, where this measure was adopted. These results are also relevant in the context of value-based purchasing (VBP) models; for example, as required by the Protecting Access to Medicare Act (PAMA) of 2014, CMS has implemented Skilled Nursing Facility Value-Based Purchasing and the performance measures adopted for that program are similar to the readmission measures adopted for the IRF Quality Reporting Program. However, the policy relevance also extends to other programs that utilize hospital readmission rates as an outcome, including the Hospital Readmission Reduction Program, a CMS program that imposes financial penalties to hospitals with excessively high readmission rates, as well as for other health reform initiatives involving care coordination, such as shared savings programs (e.g., Accountable Care Organizations) and bundled payment models. Reducing hospital readmissions
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among IRFs has the potential to translate into better performance in these other health reform initiatives.

Though this IRF readmission measure does not count readmissions for procedures that are potentially planned (roughly 10% of readmissions) as they are not reflective of poor quality, the IMPACT Act required measures for readmissions that are considered potentially preventable for PAC. CMS adopted two potentially preventable hospital readmission measures for the IRF Quality Reporting Program during fiscal year 2017. Potentially preventable readmissions are a subset of all-cause readmissions. Additional research will be needed to assess variation in potentially preventable hospital readmission rates.

The ability to understand which care processes or specific interventions are associated with IRFs’ readmission outcomes is essential to reducing readmissions. For example, process measures such as discharge planning or other aspects of care coordination have been shown to reduce readmission rates, and there is evidence demonstrating the effect of specific interventions on reducing readmissions among Medicare beneficiaries. However, neither staffing nor discharge planning and care coordination are available in existing administrative data sources. Additional research is needed to further explore specific factors, especially understanding interventions and processes that impact readmission rates post-discharge as well as regional factors. In addition, given that 78 percent of all IRFs in this study are hospital-based, the selected IRF organizational characteristics alone may not be sufficient in characterizing relationships between hospital-based rehabilitation units within larger acute care hospitals or health care systems which are likely to be more complex and varied.

Study Limitations
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There are some specific limitations to note. First, the outcome measure which is based on claims data and limited to Medicare FFS beneficiaries—as is the case for all hospital readmission measures publicly reported by CMS. Therefore, beneficiaries enrolled in private health insurance, Medicaid or managed Medicare (i.e., Medicare Advantage) plans are excluded, which may represent up to 30 percent of this population.\(^1\) In regions where the managed Medicare penetration is higher, the exclusion of these beneficiaries may limit our assessment of quality related to this outcome. In fact, research has shown differences in rehabilitation outcomes based on type of Medicare.\(^25\) However, readmission rates among FFS Medicare does provide an important measure of quality for FFS beneficiaries, which comprise, on average, 61 percent of all IRF discharges.\(^1\)

Another limitation relates to the risk adjustment which—despite adjusting for over 200 risk factors—is somewhat limited in capturing admission function given it uses aggregates of the IRF payment case-mix groups. Though these are significant predictors, they are less precise than continuous measures of motor and cognitive function. Several studies have demonstrated the predictive power of function on readmission rates,\(^5,7,12,15,16,26-28\) and future measure refinements are likely to include more detailed, standardized function data.

Conclusions

The goal of measuring and public reporting of readmission rates for PAC providers, including IRFs, is to provide information that will enable providers to improve the quality of care and enable Medicare beneficiaries to make informed decisions when selecting inpatient rehabilitation. Assessing the quality of inpatient rehabilitation requires a combination of quality measures reflecting different aspects of care processes and outcomes. Readmission rates in particular provide important information about the quality of care transitions across the
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Continuum and the quality of discharge care planning. Understanding which characteristics of IRFs are associated with readmission rates will allow CMS and providers to further focus policies and quality improvement efforts in this important area.

Figure 1 Legend:
The box encompasses the interquartile range, and the horizontal line within the box depicts the median. Dots refer to outlier values.

Figure 2 Legend:
Red values reflect RSRRs between 13.00-13.86.
Yellow values reflect RSRRs between 12.65-13.00.
White values reflect RSRRs between 10.74-12.65.
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References

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22. Stata v 13.0 [computer program].


Table 1: Observed and Risk-Standardized Readmission Rates by Organizational Characteristics, 2013-2014

<table>
<thead>
<tr>
<th>Organizational characteristic</th>
<th>Number (%)</th>
<th>Mean Observed Readmission Rate (SD)</th>
<th>P value</th>
<th>Mean Risk-Standardized Readmission Rate (SD)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1,166</td>
<td>12.38</td>
<td></td>
<td>13.00</td>
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</tr>
<tr>
<td></td>
<td>100%</td>
<td>3.61</td>
<td></td>
<td>0.77</td>
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</tr>
<tr>
<td><strong>Type</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital-based</td>
<td>908</td>
<td>12.06</td>
<td>*</td>
<td>12.98</td>
<td>NS</td>
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<td>Freestanding</td>
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<td>13.50</td>
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<td>13.05</td>
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<tr>
<td></td>
<td>22%</td>
<td>0.21</td>
<td></td>
<td>0.89</td>
<td></td>
</tr>
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<td><strong>Operating status</strong></td>
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<td></td>
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</tr>
<tr>
<td>For-profit</td>
<td>336</td>
<td>13.57</td>
<td>*</td>
<td>13.15</td>
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<tr>
<td></td>
<td>29%</td>
<td>3.63</td>
<td></td>
<td>0.80</td>
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<tr>
<td>Not-for-profit</td>
<td>684</td>
<td>11.93</td>
<td>*</td>
<td>12.92</td>
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</tr>
<tr>
<td></td>
<td>59%</td>
<td>3.56</td>
<td></td>
<td>0.75</td>
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</tr>
<tr>
<td>Government</td>
<td>146</td>
<td>11.73</td>
<td></td>
<td>13.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12%</td>
<td>3.16</td>
<td></td>
<td>0.69</td>
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<td><strong>Teaching status</strong></td>
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<tr>
<td>Teaching</td>
<td>124</td>
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<td>12.91</td>
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<td></td>
<td>11%</td>
<td>0.11</td>
<td>NS</td>
<td>0.07</td>
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<td>Non-teaching</td>
<td>1,042</td>
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<td></td>
<td>89%</td>
<td>0.27</td>
<td></td>
<td>0.02</td>
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<tr>
<td><strong>Disproportionate Share Hospital (DSH)</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>DSH patient percentage &gt;20%</td>
<td>286</td>
<td>12.39</td>
<td>NS</td>
<td>13.00</td>
<td>NS</td>
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<tr>
<td></td>
<td>25%</td>
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<td></td>
<td>0.71</td>
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<tr>
<td>DSH patient percentage ≤20%</td>
<td>880</td>
<td>12.38</td>
<td></td>
<td>13.00</td>
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<tr>
<td></td>
<td>75%</td>
<td>0.12</td>
<td></td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td><strong>Rural/Urban</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>189</td>
<td>11.35</td>
<td></td>
<td>12.98</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16%</td>
<td>0.30</td>
<td>*</td>
<td>0.69</td>
<td>NS</td>
</tr>
<tr>
<td>Urban</td>
<td>977</td>
<td>12.58</td>
<td></td>
<td>13.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>84%</td>
<td>0.11</td>
<td></td>
<td>0.78</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors' analysis of inpatient rehabilitation facilities' all-cause unplanned 30-day post-discharge hospital risk-standardized readmission rates from discharges in 2013-2014, based on Medicare claims, enrollment data, and organizational characteristics from the Provider of Services and Provider Specific File.

Note: * p<0.001
Table 2: Results of regression models predicting IRFs' all-cause 30-day post-discharge readmission rates, 2013-2014

<table>
<thead>
<tr>
<th>Organizational characteristic</th>
<th>Regression-Model Predicted Observed Readmission Rate</th>
<th>Regression-Model Predicted Risk-Standardized Readmission Rates</th>
</tr>
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<tr>
<td></td>
<td>Coefficient</td>
<td>Std Error</td>
</tr>
<tr>
<td>Intercept</td>
<td>1.77</td>
<td>1.66</td>
</tr>
<tr>
<td>Control: Medicare hospitalization rate</td>
<td>0.03</td>
<td>0.01</td>
</tr>
<tr>
<td>Type: Hospital-based (Ref: Freestanding)</td>
<td>0.10</td>
<td>0.32</td>
</tr>
<tr>
<td>Operating status: Not-for-profit (Ref: For-profit)</td>
<td>-1.31</td>
<td>0.26</td>
</tr>
<tr>
<td>Operating status: Government (Ref: For-profit)</td>
<td>-1.66</td>
<td>0.36</td>
</tr>
<tr>
<td>Teaching status (Ref: Not teaching)</td>
<td>0.48</td>
<td>0.34</td>
</tr>
<tr>
<td>Disproportionate share hospital (Ref: DSH&lt;20%)</td>
<td>0.29</td>
<td>0.24</td>
</tr>
<tr>
<td>Rural (Ref: Urban)</td>
<td>-0.85</td>
<td>0.28</td>
</tr>
<tr>
<td>Patient volume: (Ref: Smallest decile)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decile 2: 107-158 discharges</td>
<td>1.67</td>
<td>0.43</td>
</tr>
<tr>
<td>Decile 3: 159-205 discharges</td>
<td>0.70</td>
<td>0.43</td>
</tr>
<tr>
<td>Decile 4: 206-262 discharges</td>
<td>1.49</td>
<td>0.43</td>
</tr>
<tr>
<td>Decile 5: 263-326 discharges</td>
<td>0.92</td>
<td>0.44</td>
</tr>
<tr>
<td>Decile 6: 327-404 discharges</td>
<td>2.20</td>
<td>0.44</td>
</tr>
<tr>
<td>Decile 7: 405-526 discharges</td>
<td>1.61</td>
<td>0.44</td>
</tr>
<tr>
<td>Decile 8: 527-756 discharges</td>
<td>2.67</td>
<td>0.44</td>
</tr>
<tr>
<td>Decile 9: 757-1,136 discharges</td>
<td>2.40</td>
<td>0.46</td>
</tr>
<tr>
<td>Decile 10: 1,138-6,610 discharges</td>
<td>2.16</td>
<td>0.49</td>
</tr>
<tr>
<td>Census division: (Ref: New England &amp; Non-states*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle Atlantic</td>
<td>0.51</td>
<td>0.62</td>
</tr>
<tr>
<td>East North Central</td>
<td>1.35</td>
<td>0.61</td>
</tr>
<tr>
<td>West North Central</td>
<td>1.32</td>
<td>0.62</td>
</tr>
<tr>
<td>South Atlantic</td>
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<td>0.59</td>
</tr>
<tr>
<td>East South Central</td>
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</tr>
<tr>
<td>West South Central</td>
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<td>0.58</td>
</tr>
<tr>
<td>Mountain</td>
<td>1.93</td>
<td>0.68</td>
</tr>
<tr>
<td>Region</td>
<td>Pacific</td>
<td>1.27</td>
</tr>
</tbody>
</table>

Source: Authors’ analysis of inpatient rehabilitation facilities’ all-cause unplanned 30-day post-discharge hospital readmission rates from discharges in 2013-2014, based on Medicare claims, enrollment data, and organizational characteristics from the Provider of Services and Provider Specific File. State Medicare hospitalization rates are derived from the Health Indicators Warehouse data available from the Centers for Disease Control and Prevention.

* Non-states refers to 4 IRFs in Puerto Rico
Figure 1: Distributions of Risk-Standardized Readmission Rates by IRF Size, 2013-2014

Note: The x axis illustrates deciles based on the number of eligible Medicare discharges and are ordered from smallest to largest.

Source: Authors’ analysis of inpatient rehabilitation facilities’ all-cause unplanned 30-day post-discharge hospital risk-standardized readmission rates from discharges in 2013-2014, based on Medicare claims and enrollment data.
Figure 2: Average State Risk-Standardized Readmission Rates for Inpatient Rehabilitation Facilities, 2013-2014

Source: Authors’ analysis of inpatient rehabilitation facilities’ all-cause unplanned 30-day post-discharge hospital risk-standardized readmission rates from discharges in 2013-2014, based on Medicare claims and enrollment data.