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Hospital-Specific Relative Value Weights, Cost-Based Weights, and Implications for Medicare Payment to Inpatient Rehabilitation Facilities

A report by the Urban Institute for the Medicare Payment Advisory Commission

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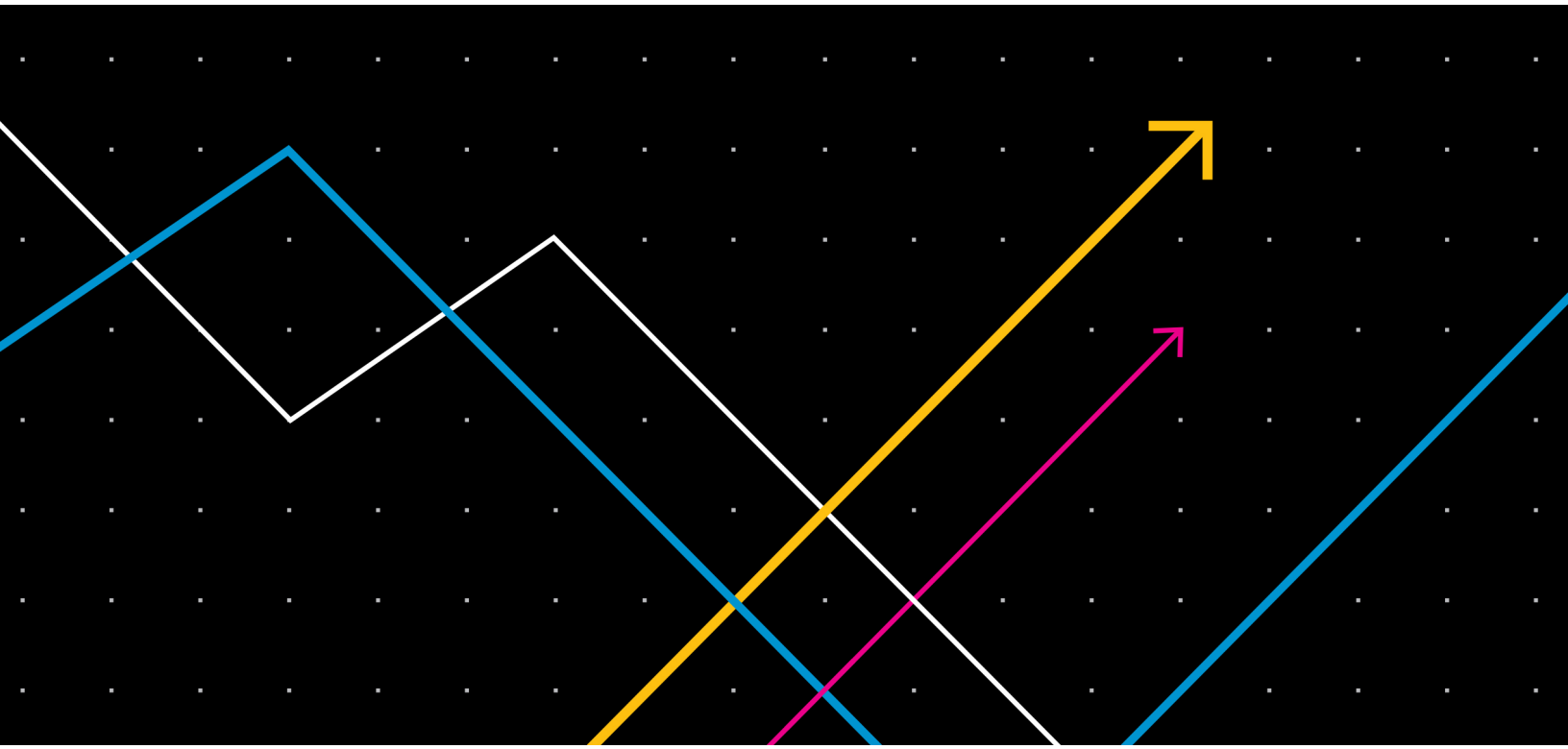

RESEARCH REPORT

Hospital-Specific Relative Value Weights, Cost-Based Weights, and Implications for Medicare Payment to Inpatient Rehabilitation Facilities

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Hospital-Specific Relative Value Weights, Cost-Based Weights, and Implications for Medicare Payment to Inpatient Rehabilitation Facilities

Inpatient rehabilitation facilities (IRFs) provide rehabilitation services to certain Medicare beneficiaries who need intensive rehabilitation care following an acute hospital stay. IRF patients must be able to tolerate and benefit from intensive therapy, which is often interpreted as three hours of therapy per day. In 2022, enrollees in traditional (i.e., fee-for-service) Medicare had 383,000 stays provided by 1,181 IRFs, for which Medicare spent $8.8 billion (MedPAC 2024). Medicare pays IRFs on a per-stay basis (as it also does for acute inpatient hospital care). Medicare pays a base amount for each stay that may be adjusted higher or lower depending on a patient's condition. Measures of patient condition that affect IRF payments include diagnosis requiring rehabilitation, age, motor functioning, cognitive status, and comorbidities. These payment adjustments are intended to compensate providers for higher expected cost of treating patients with higher care needs.

In Medicare's IRF payment system, the base payment rate for each stay is first adjusted to reflect area wage levels. It is then adjusted for case mix by multiplying by a case-mix group (CMG) weight. The CMG weight depends on (1) the condition that led to the need for intensive therapy services, called a rehabilitation impairment category (RIC); (2) CMG within a RIC that is based on age and motor and cognitive functioning; and (3) comorbidity tier. Within each CMG, patients are classified into one of four tiers based on certain comorbidities that increase cost of care.[1]

Using Medicare claims data for 2017, we previously examined the correspondence between IRF payments and costs and found substantial variation in payment-to-cost ratios (PCRs) across stays by RIC (Garrett and Wissoker 2024). Within selected RICs, we found that PCRs vary substantially across CMGs and tiers. The pattern of findings showed that PCRs were generally higher for patients with lower motor and cognitive functioning levels that typically receive higher payments. The systematic variability in profitability for different groups of patients raised concerns about the performance of the IRF payment system. The Medicare program could be paying substantially more than the average cost would justify for some groups of patients while paying less than warranted for others. Differences in

profitability could incentivize providers to selectively admit some types of patients and adversely affect access to or quality of care for others.

In this report, we update our earlier findings on variation in profitability across types of IRF stays using Medicare claims data from fiscal year (FY) 2019. We also describe our investigation into the reasons for variation in PCRs across IRF stays. Ruling out other potential explanations, we attribute the observed pattern of rising PCRs with patient severity to the IRF payment system's use of the hospital-specific relative value (HSRV) method of computing relative payment weights (Carter and Rogowski 1993). We show that the problem with using HSRV weights was not evident in the early years of the IRF payment system but emerged over time. We show that with an alternative method of computing relative payment weights based on average cost, such as is used in Medicare's acute inpatient hospital prospective payment system, PCRs are nearly equal across patient groups and produce a much better correspondence between IRF payments and costs at the facility level. We conduct analyses to help explain why the performance of HSRV weights in the payment system deteriorated over time. Finally, we simulate the financial impact of replacing the current HSRV weights with average-cost-based payment weights in the IRF payment system by type of provider.

Data and Key Measures

This analysis is based primarily on Medicare fee-for-service claims data for IRF stays that began and ended in FY 2019. We also report analyses that use multiple years of IRF rate setting rule files from the Centers for Medicare & Medicaid Services (CMS).

Sample of Fiscal Year 2019 IRF Stays

The primary analyses in this report describe variations in IRF payments, costs, and profitability across payment CMGs and facilities. The data are drawn from 394,151 fee-for-service IRF claims in the Medicare Standard Analytic File that started in FY 2019 and ended with a discharge. Approximately 4 percent of these stays were dropped from the analysis because of one of the following:

- missing provider data from cost reports, such as cost-to-charge ratios
- missing data on charges
- stays without a payment
- being outside the 50 states and Washington, DC (e.g., from Puerto Rico)

- other issues, such as stays longer than three standard deviations above the mean of the logged distribution, or missing CMG

An additional 13,002 stays that ended in FY 2020 were dropped and paid under a newly refined set of CMG definitions (created to incorporate common measures of function across post-acute care settings).

The resulting file has data for 366,843 IRF stays. The stays took place at 1,061 IRFs. Overall, 73.2 percent of providers were hospital-based, accounting for 44.3 percent of the IRF stays.

Medicare Payments and Costs

Payments for Medicare-covered IRF stays are the total of payments made directly to the facility, paid as coinsurance, copayments, and the deductible for blood products. They include outlier payments and add-ons resulting from the facility's teaching status and disproportionate share adjustments. We standardize total payments from IRF claims by each provider's area wage index.

Costs per IRF stay for Medicare beneficiaries include routine and ancillary costs of treating Medicare patients, overhead costs, and the costs associated with teaching programs and treating low-income patients. We estimated routine costs as the average routine cost per day from the 2019 Medicare cost report times the stay's covered length of stay from the claims. We estimated both therapy and nontherapy ancillary costs by converting eligible charges on the IRF claims to costs using facility- and department-specific cost-to-charge ratios from each provider's 2019 Medicare cost report. All costs were standardized using the labor share and the area wage index.[2]

Constructing the IRF CMGs and Tiers

Much of the analysis in this report focuses on the relative profitability of the CMGs used for payment. Each stay is assigned a RIC that describes the primary reason for intensive rehabilitation (for example, neurological or stroke). Within RICs, stays are allocated to CMGs that depend on the patient's age and level of motor and cognitive function. Each stay is further assigned to one of four tiers based on whether the patient has specific comorbidities associated with higher cost of care. A multiplier associated with each grouping of RIC, CMG, and tier is used to adjust a base payment amount for the expected costliness of cases in that grouping relative to the average case.

For most stays, the RIC, CMG, and tier are taken directly from the Medicare claims file.[3] Stays of fewer than four days that did not transfer to another inpatient setting are assigned to a separate CMG (RIC 50–short stay). In addition, stays of persons who died in an IRF (and have a status code indicating "death") are assigned to one of four CMGs of RIC 51 (expired) based on the length of stay and their initial rehabilitation impairment group.

Alternative Measures of Payments

We use these stay-level data to examine alternative measures of payments and approaches to setting IRF payments, and how the alternative payments vary with costs. These measures are intended to address whether stay-level payments are proportional to costs and, relatedly, whether profits are increasing with the complexity of CMG. We examine the patterns of profitability observed with actual costs with alternative measures of payment based on (1) simulated HSRV weights and (2) simulated average standardized cost weights. By computing payments under the two different methods with the same data and then comparing how both payment measures relate to cost, we can attribute differences in outcomes solely to the type of weight method used. We also examined the actual weights CMS uses to generate payments for FY 2019 (also based on HSRV), which are based on 2-year lagged data. Differences in data and between implementations of the HSRV method (despite our best efforts at replication) could create differences between our replicated HSRV weights and actual FY 2019 weights. However, we find that they are quite similar, as described below.

HSRV-BASED WEIGHTS

Carter and Rogowski (1993) describe the general approach to calculating HSRV weights.[4] We simulated the HSRV weights for the IRF prospective payment system (PPS) following descriptions found in the original RAND Corporation research (Carter et al. 2002) and a more recent Research Triangle Institute report (Morley et al. 2019). The steps were as follows:

1. Calculate an average length of stay (ALOS) for each RIC/CMG/tier combination. The ALOS is used to determine which transfer patients qualify for full payments. The ALOS calculations exclude transfer cases and outliers on length of stay.
2. Estimate comorbidity adjusters for each tier and RIC combination to standardize costs for the presence of comorbidities. The adjusters are estimated using a fixed-effects regression of the log of cost on CMG indicators, an interaction between tier and RIC, and provider-specific effects. The approach provides a multiplicative differential associated with each level of

comorbidities—separately by RIC. High-cost cases and short transfer stays are excluded from the estimation sample.

3. Standardize costs using the comorbidity adjuster for the RIC combination.
4. Calculate weights using the HSRV approach. Facility-specific relative adjusted costs for a stay are defined as the ratio of the comorbidity-adjusted cost of the stay to the facility average comorbidity-adjusted cost per stay and multiplied by the facility's case-mix index (CMI). The resulting facility-specific relative costs are then averaged within RIC/CMG across all stays. This yields payment weights for each RIC/CMG, which are then used to calculate the CMI for each provider. The procedure is then repeated, multiplying by the new values of the CMI until the payment weights do not change between iterations. Throughout this procedure, short transfer stays are assigned their proportion of the ALOS for the RIC/CMG/tier.
5. The relative payment weights are then multiplied by the comorbidity adjuster to obtain weights that reflect the variation across tiers within each RIC.
6. Payments are assigned based on the relative weight for the RIC/CMG/tier, with short transfer stays paid their proportion of the ALOS for the grouping and then centered so that the average simulated payment equals the average actual payment.

AVERAGE COST WEIGHTS

As an alternative to the HSRV approach, we calculated average standardized cost weights to simulate what payment weights would look like using average costs rather than the HSRV approach. As with the HSRV weights, we standardized costs for comorbidities using the model-based comorbidity multiplier. We also standardized costs for rural location, teaching status, and disproportionate share using parameters from the current payment formula.[5]

We then calculated the weights as the average standardized cost for each RIC/CMG combination divided by the overall average cost. Short transfer stays are included in the average with a weight reflecting the stay's length as a percentage of the ALOS for their case-mix/tier grouping. We then multiplied these weights by the comorbidity adjuster to obtain weights that reflect the variation across tiers within each RIC.

Simulated payments under an average cost method were assigned based on the weights. As before, short transfer stays were paid a proportion of the weight for the RIC/CMG/tier based on their length of stay as a share of the ALOS for the RIC/CMG/tier. The resulting payments were then

centered so that the mean simulated average-cost-based payment equaled the average actual payment. This last step is done to maintain budget neutrality for the alternative cost-based payments.

BENCHMARKING TO FEDERAL REGISTER WEIGHTS

We also simulated payments based on the relative payment weights (based on the HSRV method) in the final rule for FY 2019, as published in the Federal Register.[6] Short transfer stays were again paid a proportion of the weight based on their length of stay. The resulting payments were then centered so that the average Federal Register-based payment equals the average actual payment. Payments based on the Federal Register serve as a check on our simulation of HSRV weights. The correlation across the CMGs between the transfer-adjusted payment weights from the Federal Register and the transfer-adjusted HSRV weights we calculated is 0.995.

Findings

We first update key findings from our earlier report on how PCRs vary across patient groups in 2017 data with FY 2019 data, which show similar results. We also show that patterns of PCRs show similar results regardless of which HSRV-based measure we use while finding PCRs using average-cost-based weights are nearly equal across patient groups. We then present findings of analyses that explore the reasons for the differences and implications of using different types of weights.

Relationship of PCRs to Case-Mix with Alternative Payment Measures

Table 1 of our earlier report showed that PCRs vary considerably across RICs using 2017 data. We found similar patterns using FY 2019 data (see Figure 8-6 of MedPAC 2024). For stroke cases, the PCR was 1.12 (the second-lowest value). Neurological cases had the highest PCR (1.26), and other orthopedic cases had a PCR of 1.20.

In figures 1–3, we examine how overall profitability, measured by PCRs, varies across patient groups (CMGs) within the same three RICs: stroke (01), neurological (06), and other orthopedic (09). Each figure shows how PCRs vary across CMG using simulated payments based on HSRV weights (our replication of the CMS method), weights based on the average cost of each CMG, and actual payments.

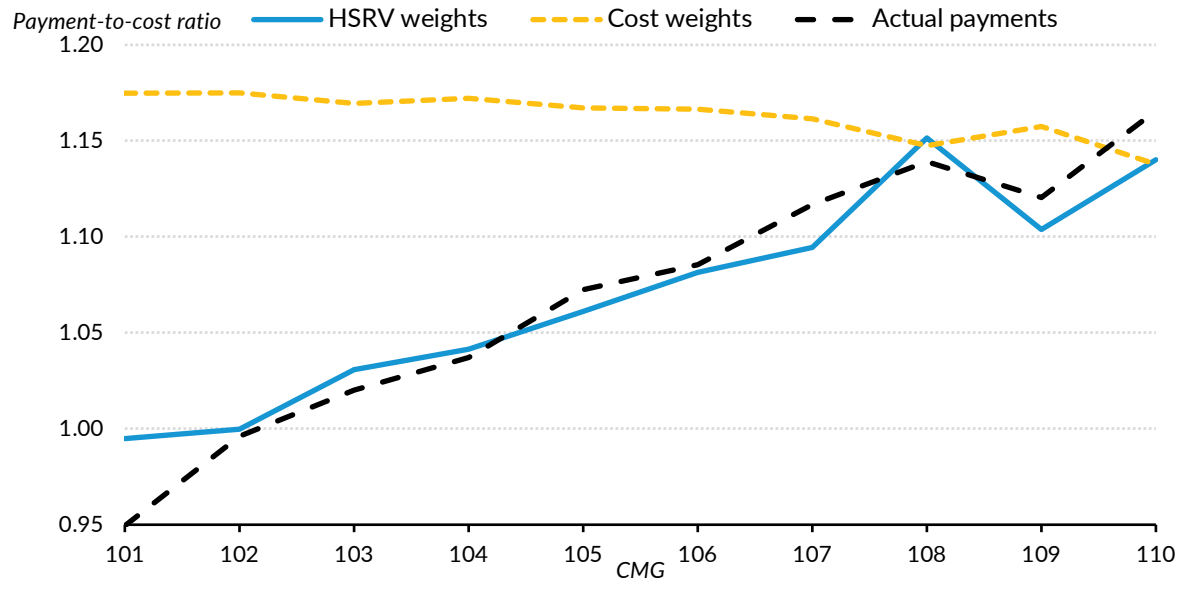
We find that PCRs tend to increase substantially within each RIC as the CMG number within each RIC increases (indicating increasing patient complexity/worse functioning) for the two weights that

use the HSRV method. We also examined the patterns using the Federal Register weights (not shown in figures) and found patterns quite similar to those shown for HSRV weights in each figure. The similarity in findings between using our replication of HSRV weights and using CMS' actual HSRV-based weights for FY 2019 means that any difference in implementation is not the reason for the pattern of PCRs increasing with more complex patient condition. The similarity in findings between both of those HSRV weights and relative payments means that outlier payments and other payment add-on factors, including teaching facility and disproportionate share adjustments, are not the reason for the pattern of PCRs increasing with more complex patient condition.

Using cost-based weights we computed using FY 2019 data, PCRs are relatively constant across CMGs within each RIC in figures 1–3, with a slight negative slope. The flat pattern of PCRs by the complexity of CMG contrasts with the HSRV-based measures. We rule out differences in data files (i.e., differences between our data file and those of CMS) as driving the difference in findings between HSRV-weights and cost-based weights because the findings differ by method for weights calculated solely within our dataset. We, therefore, attribute the pattern of increasing PCRs by CMG complexity to the use of HSRV weights.

FIGURE 1

Medicare Payment-to-Cost Ratios by Case-Mix Group for Stroke Cases (RIC 01), by Payment Measure



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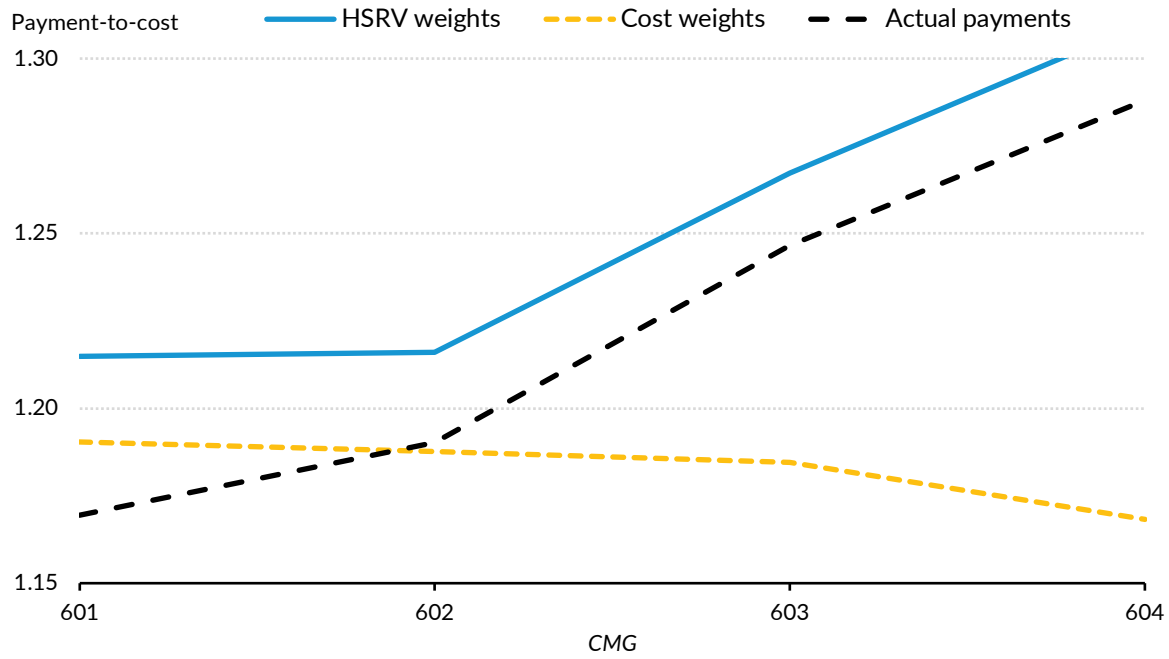
Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began and ended in fiscal year 2019.

Notes: CMG = case-mix group; HSRV = hospital-specific relative value; RIC = rehabilitation impairment category. N = 70,191. Payment amounts apply short transfer stay adjustment. Higher CMG numbers indicate lower functional and cognitive status.

FIGURE 2

Medicare Payment-to-Cost Ratios by Case-Mix Group for Neurological Cases (RIC 06), by Payment Measure



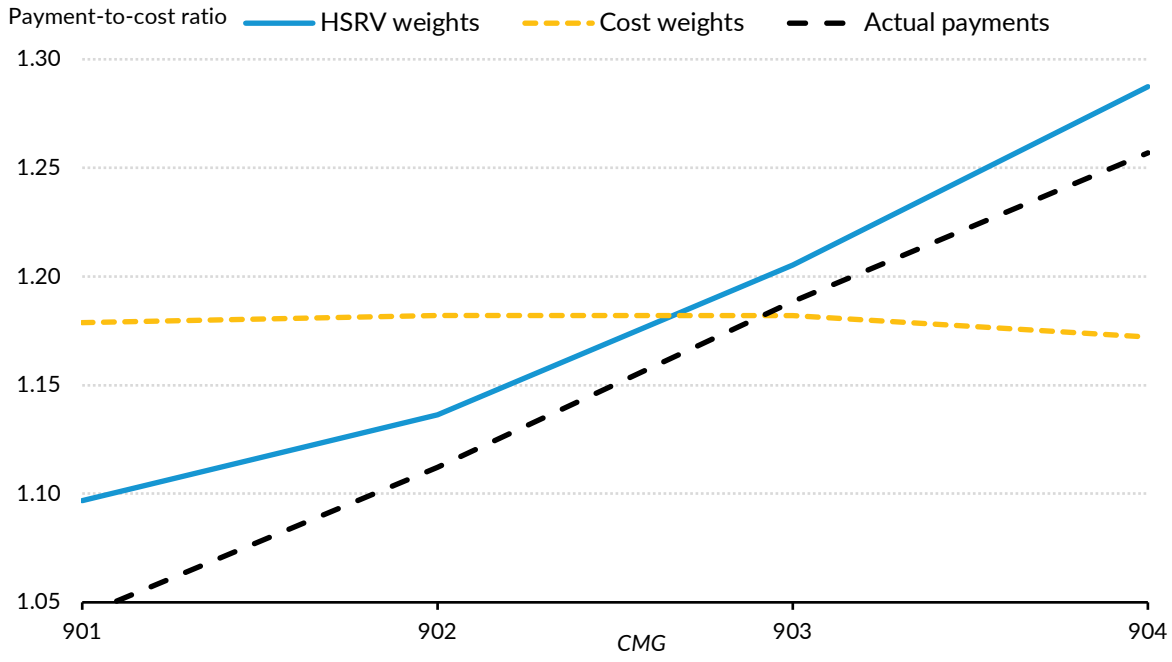
URBAN INSTITUTE

Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began and ended in fiscal year 2019.

Notes: CMG = case-mix group; HSRV = hospital-specific relative value; RIC =rehabilitation impairment category. N=52,209. Payment amounts apply short transfer stay adjustment. Higher CMG numbers indicate lower functional and cognitive status.

FIGURE 3

Medicare Payment-to-Cost Ratios by Case-Mix Group for Other Orthopedics Cases (RIC 09), by Payment Measure



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Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began and ended in fiscal year 2019.
Notes: CMG = case-mix group; HSRV = hospital-specific relative value; RIC = rehabilitation impairment category. N=29,668. Payment amounts apply short transfer stay adjustment. Higher CMG numbers indicate lower functional and cognitive status.

We report similar findings for all RICs containing multiple CMGs in summary form in tables 1 and 2 (we exclude RICs 21[burns] and RIC 50 [short stay], as well as RIC 51-expired with its four CMGs). Table 1 shows how the PCRs vary by CMG for RICs for the three payment measures that use HSRV. For each RIC and payment weight measure, we report a slope that refers to the average increase in the payment-to-cost ratio with an increase of one CMG within a RIC. The CMGs within each RIC are numbered from 1 to the number of CMGs in the group, increasing in patient complexity.

In the first row of Table 1 for RIC 01 (stroke), there are 10 CMGs, numbered from 1 to 10. Using the HSRV weights that we calculated, the payment-to-cost ratio increases by 0.017 (on average) with each one-unit increase in CMG number. The slope is steeper using the published weights and observed payments (0.026 and 0.022). In all cases, the slopes are positive, indicating that PCRs tend to increase for each increment in CMG. For example, the generally increasing patterns of PCRs for stroke

patients in figure 1 correspond to overall slopes in table 1 ranging from 0.017 to 0.026 depending on payment measure.

In Table 1, slopes are nearly all positive for the FY 2019 payment weights and actual payment-based weights as well; the only exceptions are for RIC 13 (rheumatoid other arthritis) and RIC 11 (amputation nonlower extremity) (payment-based weights only). These are both low-volume RICs where we might expect some year-to-year variability. These findings show that the PCR patterns for HSRV-based weights in figures 1–3 hold broadly across RICs.

TABLE 1

Relationship Between Payment-to-Cost Ratio and Case-Mix Complexity, by RIC

		Slope of Payment-to-Cost Ratio by CMG Using:		
RIC category	Number of CMGs	Urban Institute replication of CMS procedure (HSRV approach)	Published weights for FY 2019	Observed payments
01-Stroke	10	0.017	0.026	0.022
02-Traumatic brain injury	7	0.030	0.052	0.044
03-Nontraumatic brain injury	4	0.048	0.062	0.054
04-Traumatic spinal cord injury	5	0.031	0.085	0.073
05-Nontraumatic spinal cord injury	6	0.026	0.045	0.038
06-Neurological	4	0.034	0.048	0.041
07-Fracture of lower extremity	4	0.067	0.074	0.066
08-Replacement of lower extremity joint	6	0.050	0.056	0.050
09-Other orthopedic	4	0.064	0.083	0.072
10-Amputation lower extremity	3	0.065	0.112	0.083
11-Amputation nonlower extremity	2	0.094	0.053	-0.035
12-Osteoarthritis	3	0.041	0.033	0.029
13-Rheumatoid other arthritis	3	0.015	-0.027	-0.014
14-Cardiac	4	0.048	0.061	0.051
15-Pulmonary	4	0.053	0.075	0.063
16-Pain syndrome	3	0.100	0.099	0.076
17-Major multiple trauma without brain or spinal injury	4	0.061	0.060	0.051
18- Major multiple trauma with brain or spinal injury	3	0.064	0.128	0.094
19-Guillain-Barré syndrome	3	0.068	0.141	0.109
20-Miscellaneous	4	0.041	0.051	0.047

Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began and ended in FY 2019.

Notes: CMG = case-mix group; HSRV = hospital-specific relative value; RIC = rehabilitation impairment category; CMS =Centers for Medicare & Medicaid Services; FY = fiscal year. N=362,303. The payments using Urban Institute's replication of CMS's HSRV payment weights and published weights are adjusted to account for the payment of a portion of the regular CMG payment to short transfer stays.

Table 2 shows findings for similar analyses as in table 1 but compares the slopes of PCRs for our replication of the HSRV procedure and cost-based weights. These payments calculated are most directly comparable as both are estimated within our FY 2019 data file and differ only concerning the method used to compute the weights. The slopes using cost-based payments are negative but substantially closer to zero in absolute value than those using HSRV-based payments. These findings using FY 2019 data are qualitatively similar to earlier analogous findings we produced using 2017 data (data not shown).

TABLE 2

Comparison of Slopes with HSRV Weights and Average CMG Costs, by RIC

		Slope of Payment-to-Cost Ratio by CMG Using:	
RIC category	Number of CMGs	Urban Institute replication of CMS procedure (HSRV approach)	Payments based on weights at average adjusted costs by CMG
01-Stroke	10	0.017	-0.004
02-Traumatic brain injury	7	0.030	-0.008
03-Nontraumatic brain injury	4	0.048	-0.011
04-Traumatic spinal cord injury	5	0.031	-0.017
05-Nontraumatic spinal cord injury	6	0.026	-0.007
06-Neurological	4	0.034	-0.011
07-Fracture of lower extremity	4	0.067	-0.007
08-Replacement of lower extremity joint	6	0.050	-0.003
09-Other orthopedic	4	0.064	-0.009
10-Amputation lower extremity	3	0.065	-0.012
11-Amputation non-lower extremity	2	0.094	-0.030
12-Osteoarthritis	3	0.041	-0.009
13-Rheumatoid other arthritis	3	0.015	-0.010
14-Cardiac	4	0.048	-0.009
15-Pulmonary	4	0.053	-0.012
16-Pain syndrome	3	0.100	-0.013
17-Major multiple trauma without brain or spinal injury	4	0.061	-0.008
18- Major multiple trauma with brain or spinal injury	3	0.064	-0.022
19-Guillain-Barré syndrome	3	0.068	-0.038
20-Miscellaneous	4	0.041	-0.009

Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began and ended in fiscal year 2019.

Notes: CMG = case-mix group; HSRV = hospital-specific relative value; RIC = rehabilitation impairment category; CMS =Centers for Medicare & Medicaid Services. N=362,303. The payments using Urban Institute replication of CMS's HSRV payment weights and published weights are adjusted to account for the payment of a portion of the regular CMG payment for short transfer stays.

The Pattern of Rising PCRs with Patient Complexity in the IRF Payment System Emerged over Time

The preceding finding makes clear that the substantial positive slope of the PCR with complexity results primarily from the use of HSRV calculation. To help understand the reason for this relationship and, perhaps more to the point, whether it has undesirable incentive effects or other effects that undermine the goals of the payment system, we start by asking whether the variability in PCRs has been a feature of the IRF payment system from the start. The answer appears to be no. Perfect comparisons are difficult, but findings in Carter et al. 2000b (table 7.8, page 180) show ratios of simulated payments under the new payment system design to costs and finds PCRs relatively close to 1 for all RICs (e.g., 1.0 for RIC 01 [stroke], 0.99 for RIC 06 [neurological], and 1.0 for RIC 09 [other orthopedic] before an outlier policy is applied, and similarly after an outlier policy is applied). The report also shows PCRs range from 0.98 to 1.02, with and without comorbidities or outlier policy. Therefore, we do not see any indication of the variability in PCRs in the research supporting the IRF prospective payment system design that we have found in more recent years.

Something seems to have changed since the IRF payment system was implemented in 2002, perhaps because of changed incentives the new payment system introduced (Paddock et al. 2007; Sood, Beeuwkes Buntin, and Escarce 2008; Colla et al. 2010; Thompson and McCue 2010; Sood et al. 2013). In the next set of analyses, we look at trends over time in several measures for clues of what may have caused a systematic relationship between PCRs and the complexity of patient conditions to emerge.

Average IRF Payment Weights Have Increased over Time

One possible implication of higher PCRs for higher-cost CMGs is incentivizing IRFs to prefer higher-cost patients over lower-cost patients. Incentives to select higher-cost patients could harm access for lower-cost patients and drive overall Medicare costs higher. Also, incentives to upcode patients from a lower-paying CMG to a higher-paying one would be higher if PCRs increase as CMG costs increase. Even with uniform PCRs across CMGs, there may still be incentives to upcode, but the incentive would be greater still if PCRs rise with CMG. If IRFs respond to either type of incentive (to upcode or to selectively admit higher-cost patients), we might expect average payment weights to rise.

In table 3, we examine changes in the average payment weight and the distribution of payment weights across facilities over time using IRF Rate Setting Rule files that CMS publishes each year for the IRF PPS. Average weights reported in each year's file are based on applying the payment weights

from the previous year to the distribution of CMGs in the claims files from two years earlier. We use the term "file year" to refer to the year of the rate setting file with the understanding that the constructed measures are estimated from claims data two years prior and the weights are from the prior year.

The mean weight increased from 1.108 in file year 2009 to 1.347 in file year 2023. The variability of weights across facilities within each year, measured by standard deviation, is similar across years but has fallen relative to the mean, suggesting facilities have become somewhat more alike in their average case mix over time. The lower range of weights in 2023 is well above 1, with a 5th percentile of 1.188.

TABLE 3

Mean and Distribution of Average IRF Payment Weights, by File Year

File year	Mean	Standard deviation	5th percentile	Median	95th percentile
2009	1.108	0.105	0.936	1.110	1.264
2014	1.177	0.103	1.008	1.182	1.343
2019	1.248	0.087	1.107	1.251	1.393
2023	1.347	0.094	1.188	1.345	1.493

Source: Urban Institute analysis of Centers for Medicare & Medicaid Services IRF Rate Setting Rule files.
Notes: IRF = inpatient rehabilitation facilities. Short transfer stays are paid a fraction of the full case-mix group weight. "File year" refers to the year of the rate setting file. Average weights reported in each year's file are based on applying the payment weights from the previous year to the distribution of case-mix groups in the claims files from two years earlier.

Average weights within a facility provide a summary measure of the expected relative costliness of a facility's case mix, often referred to as a CMI. Henceforth, we refer to average weights at the facility level as CMIs. The increase in mean CMIs from 1.108 to 1.347 could mean that underlying conditions of patients treated in IRFs shifted in a way that resulted in expected costliness increasing by nearly a quarter over the 14-year period. It could also mean that, for some reason, measured expected costliness rose while the actual mix of patients' conditions did not. Either way, when average CMIs rise in the IRF payment system, average payments rise by the same percent for a fixed base rate.

Rising Payment Weights Drive Up Medicare IRF Spending

From FY 2015 to 2020, average IRF payments per stay increased from $18,527 to $21,765, or 17.5 percent (MedPAC figures provided to authors). The IRF conversion factor (base rate) increased from $15,198 to $16,489, or 8.5 percent. Therefore, average payments increased substantially more than

the base rate because the average weight increased. Accordingly, shifts in the average payment weight over time drive up Medicare spending, whether or not because of actual changes in patients' need for services.

Decomposition of Changes in Average CMS Payment Weights from FY 2011 to 2019

Table 4 examines how IRF payment weights changed from FY 2011 to 2019 overall and within RIC. The payment weights CMS assigns to the CMGs and tiers making up each RIC are updated annually. Within each RIC, average weights could change because the CMS payment weights assigned to the CMGs and tiers making up a RIC change, the composition of CMGs/tiers within a RIC change, or some combination of the two. Across RICs, overall average weights could change because of changes in the average weight within each RIC (for the prior reasons) or in the shares of cases in each RIC.

Overall RICs, we compute that the average stay-level weight changed from 1.287 in 2011 to 1.366 in 2019 (table 4, row 1, columns 4 and 6), an increase of 0.079 (first row, column 7). Thus, the upward trend in payment weights alone contributed to an increase in IRF payments of 0.079/1.287, equaling 6.1 percent over the period.[7]

Within each RIC, we decompose the change in the RIC's average weight (column 7). We compute a counterfactual value for each RIC of what the average weight would be with the 2011 RIC composition but with the 2019 weights applied to the CMGs and tiers of the RIC (column 5). The difference between that value (column 5) and the actual average weight given the 2011 RIC composition and 2011 payment weights (column 4) gives the portion of the change in each RIC due to the change in the CMS weight (column 8). Likewise, subtracting column 5 from the actual 2019 weights in column 6 holds the weights fixed at their 2019 values with the composition changing and gives the change in each RIC's average weight due to compositional changes within the RIC (column 9).

There are differences across RICs in total change in average weights and in whether the change is driven more by changes in the CMS weights or composition. Across all RICs, however, table 4 shows that we can attribute 0.077 of the 0.079 change in the average weight to compositional changes. We further compute (not shown) that 0.052 (65.5 percent) of the total change in weight was due to compositional changes within RICs, and 0.025 (31.9 percent) was due to changes in the distribution of stays across RICs (with the remaining 2.6 percent due to changes in the CMS weights). The most notable changes in the distribution across RICs in table 4 are an increase in neurological (RIC 06) from

about 10 to 14 percent, an increase in nontraumatic brain injury (RIC 03) from 4.5 to 7.5 percent, a decrease in fractures of lower extremity (RIC 07) from about 14 to 10 percent, and a decrease in replacement of lower extremity (RIC 08) from 11 to about 4 percent. Neurological and nontraumatic brain injury RICs with increasing shares had higher than average PCRs (1.26 and 1.18, respectively, in FY 2019), and fracture of lower extremity and replacement of lower extremity RICs with decreasing shares had lower than average PCRs (1.14 and 1.12 in FY 2019) (PCRs not shown in table, see figure 8–6 of MedPAC 2024).

Even though CMS updates the payment weights each year with newer data, across these and other years, we have found the weight levels to be remarkably stable from year to year. We find their stability somewhat surprising, given the low volume of some payment groups and the degree of cost variability across patients.

TABLE 4

Decomposition of Changes in IRF Payment Weights from Fiscal Year 2011 to 2019

RIC	2011 proportion of stays in each RIC (1)	2019 proportion of stays in each RIC (2)	Change in RIC share (3)	2011 average with 2011 weight (4)	2011 average with 2019 weight (5)	2019 average with 2019 weight (6)	Change in RIC's average weight (7)	Change in RIC's average weight due to change in CMS weight (8)	Change in RIC's average weight due to compositional change (9)
All	**100%**	**100%**	**0%**	**1.287**	**1.289**	**1.366**	**0.079**	**0.002**	**0.077**
1	19.68	19.69	0.01	1.559	1.559	1.584	0.025	0.000	0.025
2	2.99	3.39	0.4	1.455	1.375	1.397	-0.058	-0.080	0.022
3	4.53	7.54	3.01	1.384	1.302	1.343	-0.040	-0.081	0.041
4	0.73	0.79	0.06	1.928	1.948	2.040	0.112	0.020	0.092
5	3.75	4.07	0.32	1.416	1.403	1.490	0.073	-0.014	0.087
6	9.99	14.33	4.34	1.341	1.306	1.366	0.025	-0.035	0.060
7	13.87	9.98	-3.89	1.244	1.278	1.339	0.095	0.033	0.062
8	10.81	3.74	-7.07	0.859	0.930	1.010	0.151	0.071	0.080
9	7.13	8.1	0.97	1.119	1.144	1.205	0.086	0.025	0.062
10	2.6	2.6	0	1.417	1.449	1.506	0.089	0.032	0.057
11	0.13	0.1	-0.03	1.307	1.356	1.409	0.102	0.049	0.053
12	0.43	0.22	-0.21	1.095	1.125	1.178	0.083	0.030	0.053
13	0.56	0.24	-0.32	1.154	1.154	1.193	0.040	0.001	0.039
14	5.05	6.03	0.98	1.128	1.120	1.175	0.047	-0.008	0.055
15	1.77	1.93	0.16	1.216	1.230	1.270	0.054	0.014	0.040
16	0.93	0.27	-0.66	1.022	1.050	1.111	0.090	0.028	0.062
17	1.51	2.27	0.76	1.348	1.352	1.384	0.035	0.004	0.032
18	0.38	0.6	0.22	1.847	1.647	1.639	-0.208	-0.200	-0.008
19	0.19	0.21	0.02	1.984	2.015	2.132	0.148	0.031	0.116
20	12.9	13.84	0.94	1.218	1.202	1.249	0.031	-0.016	0.047
21	0.07	0.05	-0.02	2.044	1.465	1.455	-0.589	-0.580	-0.009

Source: Urban Institute and MedPAC analysis of Medicare fee-for-service claims data from Standard Analytic Files for stays in inpatient rehabilitation facilities that ended in fiscal year 2011 and 2019.

Notes: IRF = inpatient rehabilitation facilities; HSRV = hospital-specific relative value; RIC = rehabilitation impairment category; CMS = Centers for Medicare & Medicaid Services. See table 1 for RIC descriptions (RIC 21 = Burns). Sample sizes are as follows: 2011: 375,678; 2019: 405,812. Based on case-mix group assignments before reassignment for very short stays, deaths, or the short transfer stay adjustment.

Changes in Average Weights at the Facility Level and Relation to Payments and Costs

Given our finding that stays in higher-cost CMGs are more profitable, we might expect that facilities that treat more costly patients, as measured by facility CMIs, might also be more profitable. In table 5, we examine how payments, costs, and profitability measures vary across CMI quintiles of facilities for 2009, 2014, 2019, and 2023. The CMI quantiles are calculated within each year to maintain evenly sized groups.

The average CMI within each quintile shifts higher each year. For example, the average CMI in the middle quintile (3) increased from 1.097 in 2009 to 1.324 in 2023. Also, in each year, we see that payments increase steadily with CMI quintile, as expected. In 2009, we see costs increase steadily with CMI quintile in a manner that maintains fairly consistent PCRs for each quintile, ranging from 0.990 for quintile 1 to 1.050 for quintile 3. Corresponding dollar profits range from a $135 loss per stay to a $766 profit. After 2009, we find PCRs are substantially higher overall and rise more steeply with the CMI quintile (the steepness moderated somewhat from 2019 to 2023).

Surprisingly, we find that average costs do not rise consistently with increasing CMI quintile after 2009, suggesting a degradation in the correspondence between facility costs and expected costliness (and therefore payment) as measured by the CMI. For example, in 2019, the average cost in the lowest CMI quintile was $19,820. In the second quintile, the average cost was lower ($19,062). In the third and fourth quintiles, average costs were lower still ($17,790 and $17,515 respectively). From the fourth to highest quintile, the average cost increased to $18,436 but was still nearly $1,400 less than in the lowest quintile.[8] At the same time, higher facility CMIs lead, uniformly, to higher payment. Table 5 shows the average payment for 2019, increasing steadily from $19,382 in the lowest quintile to $22,815 in the highest quintile. As a result, we see profitability, both in dollars and as PCRs, increasing steadily across the facilities with a CMI quintile for 2019, unlike in 2009. We see a similar increase in 2014. For 2023, the pattern increases from quintile 1 to 4 but then moderates somewhat, moving from quintile 4 to 5.

TABLE 5

Average IRF Payments, Costs, and Profitability by CMI Quintile and File Year

		CMI Quintile				
File year	Measure	1	2	3	4	5
2009	CMI	0.946	1.036	1.097	1.160	1.245
	Payment	$13,742	$15,092	$16,035	$16,434	$17,970
	Cost	$13,877	$14,844	$15,269	$15,839	$17,284
	Payment–cost	$(135)	$248	$766	$595	$686
	PCR	0.990	1.017	1.050	1.038	1.040
2014	CMI	1.011	1.099	1.155	1.214	1.309
	Payment	$16,588	$17,686	$18,153	$19,121	$20,511
	Cost	$16,819	$17,003	$16,196	$16,406	$17,098
	Payment–cost	$(231)	$683	$1,957	$2,715	$3,413
	PCR	0.986	1.040	1.121	1.165	1.200
2019	CMI	1.104	1.177	1.231	1.284	1.359
	Payment	$19,382	$20,398	$20,698	$21,476	$22,815
	Cost	$19,820	$19,062	$17,970	$17,515	$18,436
	Payment–cost	$(438)	$1,336	$2,727	$3,961	$4,379
	PCR	0.978	1.070	1.152	1.226	1.238
2023	CMI	1.181	1.272	1.324	1.381	1.472
	Payment	$23,317	$23,711	$24,663	$25,773	$27,895
	Cost	$24,323	$21,523	$20,767	$21,568	$24,050
	Payment–cost	$(1,006)	$2,189	$3,896	$4,205	$3,845
	PCR	0.959	1.102	1.188	1.195	1.160

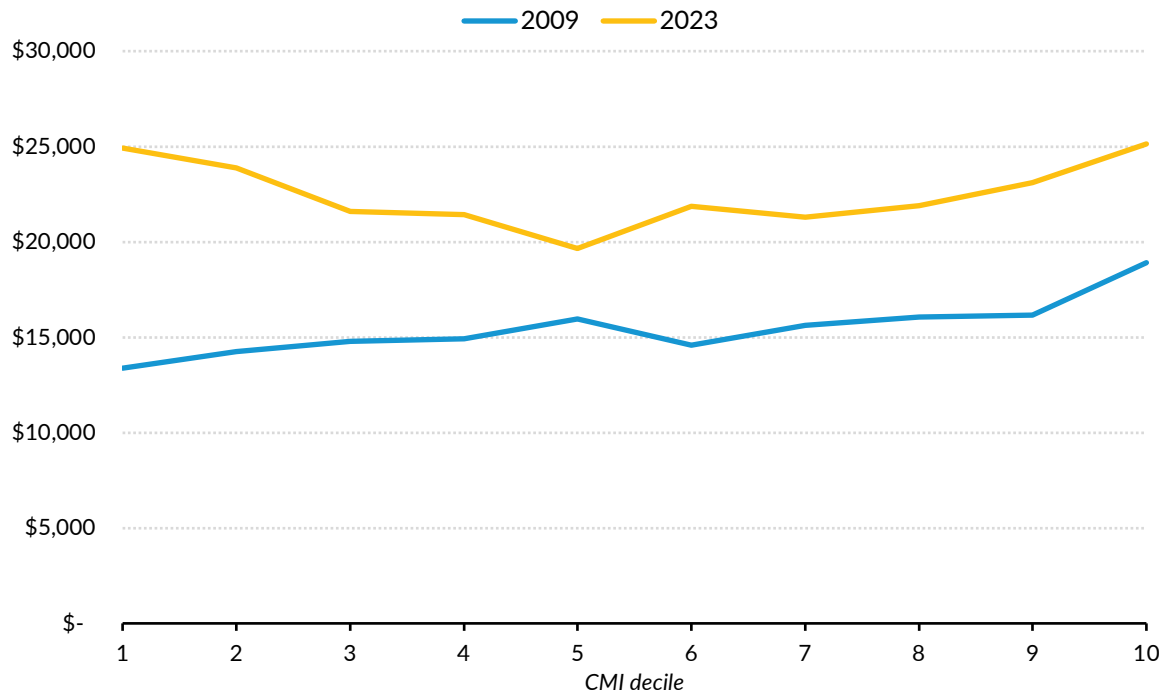
Source: Urban Institute analysis of Centers for Medicare & Medicaid Services IRF Rate Setting Rule files.
Notes: IRF = inpatient rehabilitation facilities; PCR = payment-to-cost ratio; CMI = case-mix index. Data are limited to facilities with 20 or more stays in each year. Average CMI, payments, and costs are weighted by the number of stays in each facility. PCRs are calculated as the ratio of average payments and average costs. CMI quintiles are calculated using the distribution across facilities in each year. Short transfer stays are paid a fraction of the full case-mix group weight. "File year" refers to the year of the rate setting file. Average weights reported in each year's file are based on applying the payment weights from the previous year to the distribution of case-mix groups in the claims files from two years earlier.

Figure 4 highlights the degradation over time in the relationship between facility costs and CMI, as seen in table 5 but in more detail using deciles of the CMI. Whereas average IRF cost tends to increase with CMI decile in 2009, the pattern in 2023 shows costs tending to fall with CMI from decile 1 to 5 and then tending to rise from decile 5 to 10.

In Figure 5, however, payments rise steadily with the CMI decile in both years. Thus, a mismatch between facility-level payments and costs emerged after the early years of the IRF PPS.

FIGURE 4

Average IRF Cost Per Case by Decile of CMI in 2009 and 2023 Rate Setting Rule Files



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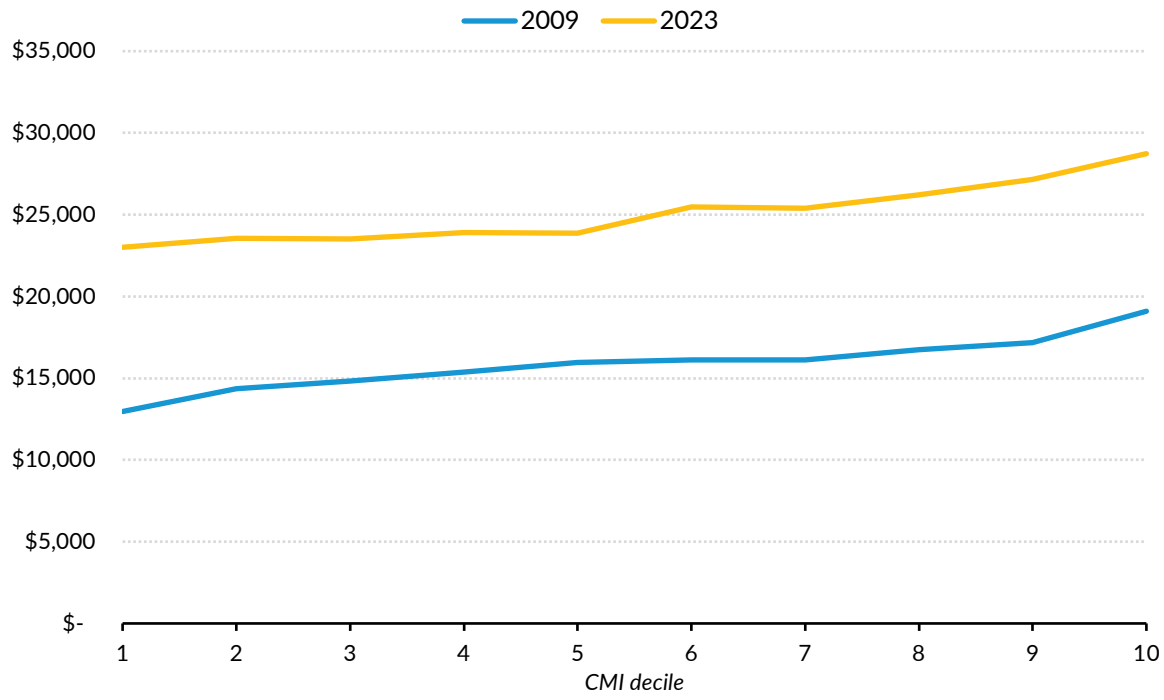
Source: Urban Institute analysis of Centers for Medicare & Medicaid Services IRF Rate Setting Rule files.
Notes: IRF = inpatient rehabilitation facilities; PCR = payment-to-cost ratio; CMI = case-mix index. Data are limited to facilities with 20 or more stays in each year. Average CMI, payments, and costs are weighted by the number of stays in each facility. CMI deciles are calculated using the distribution across facilities in each year. Short transfer stays are paid a fraction of the full case-mix group weight. 2009 and 2023 are the years of the rate setting file. Average weights reported in each year's file are based on applying the payment weights from the previous year to the distribution of case-mix groups in the claims files from two years earlier.

FIGURE 5

Average IRF Payment Per Case by Decile of CMI in 2009 and 2023 Rate Setting Rule Files



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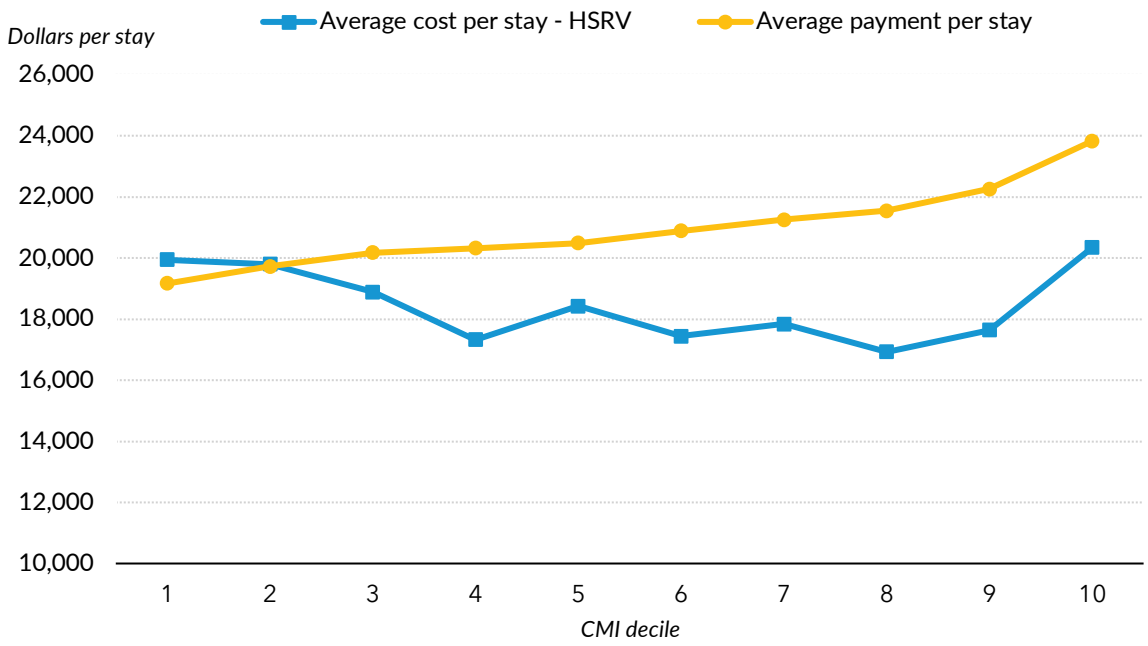
Source: Urban Institute analysis of Centers for Medicare & Medicaid Services IRF Rate Setting Rule files.
Notes: IRF = inpatient rehabilitation facilities; PCR = payment-to-cost ratio; CMI = case-mix index. Data are limited to facilities with 20 or more stays in each year. Average CMI, payments, and costs are weighted by the number of stays in each facility. CMI deciles are calculated using the distribution across facilities in each year. Short transfer stays are paid a fraction of the full case-mix group weight. 2009 and 2023 are the years of the rate setting files. Average weights reported in each year's file are based on applying the payment weights from the previous year to the distribution of case-mix groups in the claims files from two years earlier.

In figure 6, we obtain similar findings using the stay-level claims files for FY 2019 as those shown in figures 4 and 5 based on the 2023 rate-setting files. Using FY 2019 stays, we collapsed data to the facility level, averaging costs, payments, and CMS payment weights. The facility's average payment weight is the CMI. Figure 6 plots the average payment and cost by each decile of CMI. Average payments per stay rise with CMI as expected, but average cost per stay does not. That is, IRFs with higher CMIs received higher average payments, but average costs did not track with their CMIs. In fact, average costs appeared to decline between the 1st and 8th decile. The average costs for IRFs in the 10th decile of CMI were higher than those in the 9th decile, but they were only slightly higher than the average costs of IRFs in the first decile of CMI.

FIGURE 6

IRF-Level Changes in Average Cost Do Not Track with Changes in Average Payment as CMI Increases, FY 2019



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Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began and ended in FY 2019.

Notes: IRF = inpatient rehabilitation facility; FY = fiscal year; CMI = case-mix index. This figure excludes facilities with fewer than 20 cases. The CMI is the average payment weight for each IRF. CMI deciles are calculated using the distribution across facilities.

CMIs Increased Over Time in All Facility Types, but Costs Declined or Remained Stable Even as CMIs and Payments Increased in For-Profit Freestanding IRFs from 2009 to 2019

The patterns in table 5 and figures 4 and 6 show that groups of IRFs with higher CMIs that are expected to cost more do not necessarily have higher average costs. Facilities of different types may differ in cost, case mixes treated, and responsiveness to financial incentives. Table 6 examines how facility CMIs, payments, costs, and profit vary across facility types and over time.

TABLE 6

Average IRF Payments, Costs, and Profitability, by Facility Type and File Year

Facility ownership and type	Measure	File Year			
		2009	2014	2019	2023
Government (HB)	CMI	1.099	1.157	1.226	1.320
	Payment	$15,890	$19,322	$22,104	$28,240
	Cost	$16,709	$19,580	$22,392	$28,955
	Payment-cost	$(818)	$(258)	$(289)	$(715)
	PCR	0.951	0.987	0.987	0.975
Government (FS)	CMI	1.095	1.260	1.251	1.407
	Payment	$15,834	$18,728	$22,133	$27,877
	Cost	$14,209	$15,867	$21,799	$26,247
	Payment-cost	$1,625	$2,861	$334	$1,630
	PCR	1.114	1.180	1.015	1.062
Nonprofit (HB)	CMI	1.080	1.140	1.210	1.315
	Payment	$15,911	$18,768	$21,561	$26,289
	Cost	$15,934	$18,877	$21,607	$26,900
	Payment-cost	$(23)	$(109)	$(47)	$(611)
	PCR	0.999	0.994	0.998	0.977
Nonprofit (FS)	CMI	1.125	1.220	1.296	1.390
	Payment	$16,112	$19,327	$22,864	$26,988
	Cost	$15,107	$15,864	$19,455	$23,680
	Payment-cost	$1,005	$3,463	$3,408	$3,308
	PCR	1.067	1.218	1.175	1.140
For-profit (HB)	CMI	1.087	1.154	1.242	1.341
	Payment	$16,451	$18,708	$21,225	$25,064
	Cost	$16,765	$18,337	$20,393	$23,405
	Payment-cost	$(314)	$370	$832	$1,659
	PCR	0.981	1.020	1.041	1.071
For-profit (FS)	CMI	1.164	1.212	1.273	1.360
	Payment	$15,902	$18,104	$20,382	$24,153
	Cost	$14,179	$13,288	$14,763	$18,060
	Payment-cost	$1,723	$4,816	$5,619	$6,093
	PCR	1.121	1.362	1.381	1.337

Source: Urban Institute analysis of Centers for Medicare & Medicaid Services IRF Rate Setting Rule files.
Notes: IRF = inpatient rehabilitation facilities; PCR = payment-to-cost ratio; CMI = case-mix index; HB = hospital-based; FS = freestanding. Average CMI, payments, and costs are weighted by the number of stays in each facility. Short transfer stays are paid a fraction of the full case-mix group weight. "File year" refers to the year of the rate setting file. Average weights reported in each year's file are based on applying the payment weights from the previous year to the distribution of case-mix groups in the claims files from two years earlier.

In 2009, CMIs varied from 1.080 in nonprofit hospital-based (HB) facilities to 1.164 in for-profit freestanding (FS) facilities. Average costs in 2009 varied from $14,179 in for-profit FS facilities to

$16,709 in government HB facilities. PCR varied from 0.951 in government HB facilities to 1.121 in for-profit FS facilities. Over time, CMIs increased by similar amounts within each facility type. The mean CMI for nonprofit HB facilities increased from 1.080 in 2009 to 1.315 in 2023. The mean CMI in for-profit FS facilities increased from 1.121 in 2009 to 1.337.

Costs generally increased over time for most facility types, as we might expect. For-profit FS facilities were an exception, however. Their costs fell from $14,179 in 2009 to $13,228 in 2014, then increased to $14,763 in 2019. It is rather surprising that FS facilities could restrain cost growth by so much over the decade. Their costs then increased to $18,060 in 2023. For-profit FS facilities reduced or held costs steady even while their CMIs and, even more so, payments increased substantially. As a result, their PCRs reached as high as 1.38 in 2019, yielding a profit of $5,619 per case at a cost of $14,763. Their mean PCR moderated slightly to 1.337 in 2023, translating to $6,093 in profit per case.

Payments and costs for nonprofit HB facilities were nearly equal each year. Both grew at similar rates, maintaining PCRs just below 1 in each year.

Although the findings in table 6 do not tell us why CMIs have risen so substantially from the 2009 to 2023 data, they do tell us about the character of those changes under different potential explanations:

- If the strong pattern of rising CMIs is largely because of upcoding, then table 6 would suggest the practice is widespread across facility types.
- If rising CMIs are largely because of which patients IRFs choose to admit, those selection practices appear widespread across facility types.
- If the rising CMIs are because of real changes in the patient pool in need of IRF care, then for-profit FS facilities stand out for not experiencing cost growth in line with their rising CMIs. Perhaps they are simply becoming more efficient at treating patients even as their case mix grows more complex in ways other facility types are not. Alternatively, the increases in their CMIs may not indicate true changes in the costliness of services their patients require.

There Has Been a Substantial Shift in IRF Stays Away from More Costly (and Less Profitable) Nonprofit HB Facilities Toward Less Costly (and More Profitable) For-Profit FS Facilities

To add further context to the patterns observed in table 6, it is useful to understand the changes in patient volume by facility type. We report changes in the number of facilities and patients treated by

facility type in table 7. Two facility types, nonprofit HB and for-profit FS, serve most of the patient volume. In 2009, there were 172,101 cases treated in 649 HB nonprofit IRFs. The number of nonprofit HB IRFs has fallen to 510, along with patient volume (105,439 in 2023). The number of for-profit FS IRFs has nearly doubled from 138 in 2009 to 265 in 2023. The number of stays in those facilities increased from 91,784 to 178,505 over the same period.

TABLE 7

IRF Payments, Costs, and Number of Facilities and Stays, by Facility Type and File Year

		File Year			
Facility ownership and type	**Measure**	**2009**	**2014**	**2019**	**2023**
Government (HB)	CMI	1.099	1.157	1.226	1.320
	Payment	$15,890	$19,322	$22,104	$28,240
	Cost	$16,709	$19,580	$22,392	$28,955
	Facilities	64	134	111	101
	Number of stays	14,016	28,033	24,091	20,057
Government (FS)	CMI	1.095	1.260	1.251	1.407
	Payment	$15,834	$18,728	$22,133	$27,877
	Cost	$14,209	$15,867	$21,799	$26,247
	Facilities	3	7	4	4
	Number of stays	2,783	4,803	1,863	1,698
Nonprofit (HB)	CMI	1.080	1.140	1.210	1.315
	Payment	$15,911	$18,768	$21,561	$26,289
	Cost	$15,934	$18,877	$21,607	$26,900
	Facilities	649	609	559	510
	Number of stays	172,101	149,840	132,390	105,439
Nonprofit (FS)	CMI	1.125	1.220	1.296	1.390
	Payment	$16,112	$19,327	$22,864	$26,988
	Cost	$15,107	$15,864	$19,455	$23,680
	Facilities	80	70	53	59
	Number of stays	44,778	49,099	32,669	38,964
For-profit (HB)	CMI	1.087	1.154	1.242	1.341
	Payment	$16,451	$18,708	$21,225	$25,064
	Cost	$16,765	$18,337	$20,393	$23,405
	Facilities	246	144	166	162
	Number of stays	49,486	30,257	36,279	36,743
For-profit (FS)	CMI	1.164	1.212	1.273	1.360

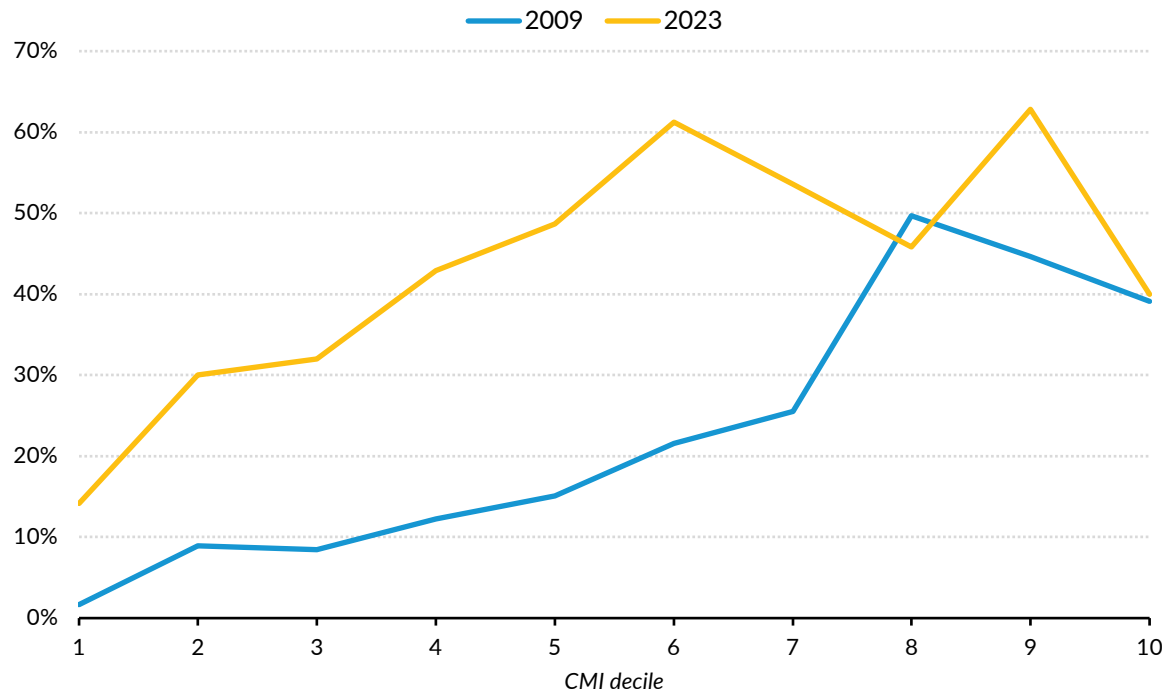
Payment	$15,902	$18,104	$20,382	$24,153
Cost	$14,179	$13,288	$14,763	$18,060
Facilities	138	157	222	265
Number of stays	91,784	120,623	175,948	178,505

Source: Urban Institute analysis of Centers for Medicare & Medicaid Services IRF Rate Setting Rule files.
Notes: IRF = inpatient rehabilitation facilities; HB = hospital-based; FS = freestanding; CMI = case-mix index. Data are limited to facilities with 20 or more stays in each year. Average CMI, payments, and costs are weighted by the number of stays in each facility. Short transfer stays are paid a fraction of the full case-mix group weight. "File year" refers to the year of the rate setting file. Average weight (CMI) reported in each year's file is based on applying the payment weights from the previous year to the distribution of case-mix groups in the claims files from two years earlier.

This shift in where patients are treated is large enough, combined with the large differences in costs, to potentially be important in explaining the changing patterns in PCRs we observe for HSRV weights and how the IRF payment system functions. Figure 7 shows the share of IRF stays treated by for-profit FS facilities in 2009 and 2023 by decile of CMI computed for each year. The wider differences in shares treated in for-profit freestanding IRFs from 2009 to 2023 for the middle deciles (4, 5, 6, 7) of CMI than on the lower and higher deciles suggests a larger shift from more costly to less costly settings for facilities with mid-range CMIs. This pattern may relate to the U-shaped pattern of cost by CMI decile in figure 4.

FIGURE 7

Share of IRF Stays Treated in For-Profit Freestanding Facilities by Decile of CMI in 2009 and 2023 Rate Setting Rule Files



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Source: Urban Institute analysis of Centers for Medicare & Medicaid Services IRF Rate Setting Rule files.
Notes: IRF = inpatient rehabilitation facilities; PCR = payment-to-cost ratio; CMI = case-mix index. Data are limited to facilities with 20 or more stays in each year. Average CMI, payments, and costs are weighted by the number of stays in each facility. CMI deciles are calculated within each year. Short transfer stays are paid a fraction of the full case-mix group weight. 2009 and 2023 are the years of the rate setting files. Average weights reported in each year's file are based on applying the payment weights from the previous year to the distribution of case-mix groups in the claims files from two years earlier.

The Original Rationale for the Use of HSRV Weights over Cost-Based Weights in the IRF PPS is No Longer Evident

Designers of the IRF PPS devoted substantial attention to deciding whether to use HSRV or cost-based weights throughout their work, and the decision was not clear-cut (Carter et al. 2000a, 2000b, 2002). Ultimately, the decision to use HSRV weights rested largely on the weights' performance on two criteria: (1) the accuracy of the weights at the stay level in predicting and being proportional to costs, and (2) the correspondence between costs and CMIs (averaging the relative weights) at the facility level. RAND researchers found that HSRV weights were more accurate at the stay level than cost-based weights. However, CMIs generated from both weights varied less than proportionately with costs at the facility level, with cost-based weights being somewhat more proportional (Carter et

al. 2002). Studies have also compared the performance of HSRV and charge- and cost-based weights in Medicare's acute inpatient PPS (Cotteril, Bobula, and Connerton 1986; Rogowski and Byrne 1990; Carter and Rogowski 1992; Carter and Rogowski 1993; Wynn and Scott 2008). Typically, comparisons of HSRV and cost-based weights showed they performed similarly.

In the next set of tables, we examine how well the HSRV and cost-based weights we calculated in FY 2019 data perform on these criteria. It was important to the designers of the IRF PPS that the correspondence and proportionality between costs and payment weights be monitored over time once the payment system took effect and providers responded to the incentives of the new payment system (Carter et al. 2002).

Whether HSRV or Cost-Based Weights More Accurately Predict Costs at the Stay Level Depends on What Yardstick We Use

Table 8 examines the accuracy of alternative weight measures in predicting stay-level costs. The first four models evaluate accuracy using log-log linear models. Models 5–8 evaluate accuracy using linear models. The first set of results follows the RAND approach and minimizes errors of fit in log dollars. We produce the second set to evaluate predictability in models that minimize errors in prediction on the dollar scale to see whether they rank model performance in the same way.

TABLE 8

Accuracy of Alternative Relative Weights at the Stay Level, by Cost and Weight Measure and Model

Model and dependent variable	Weight measure	Controls	R-squared	Coefficient on weight	Robust SE
1. Log wage-adjusted cost	Log HSRV weight	Rural, log disproportionate share, log teaching	0.407	0.968	(0.0077)
2. Log wage-adjusted cost	Log cost-based weight	Rural, log disproportionate share, log teaching	0.417	1.063	(0.0072)
3. Log wage-adjusted cost	Log HSRV weight	Facility fixed effects	0.653	1.025	(0.0035)
4. Log wage-adjusted cost	Log cost-based weight	Facility fixed effects	0.633	1.076	(0.0039)

5. Wage-adjusted cost	Payment proportional to HSRV weight	Rural, log disproportionate share, log teaching	0.331	0.883	(0.0126)
6. Wage-adjusted cost	Payment proportional to cost-based weight	Rural, log disproportionate share, log teaching	0.341	0.963	(0.0129)
7. Wage-adjusted cost	Payment proportional to HSRV weight	Facility fixed effects	0.615	0.942	(0.0106)
8. Wage-adjusted cost	Payment proportional to cost-based weight	Facility fixed effects	0.597	0.974	(0.0112)

Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began and ended in fiscal year 2019.
Notes: HSRV = hospital-specific relative value. N=321,601 inpatient rehabilitation facility stays. Analyses exclude short-stay transfer cases. HSRV weights are simulated using the HSRV method applied to fiscal year 2019 data. Robust standard errors are clustered by provider.

In the first two models regressing log cost on the log weight using facility payment factors as controls in table 8, the R-squared is lower for the HSRV weight than for the cost-based weight (0.407 in model 1 vs 0.417 in model 2). But the HSRV weight is more proportionate to cost (model 1, CMI coefficient = 0.968) than is the cost-based weight (model 2, CMI coefficient = 1.063). This presents mixed evidence on which is more accurate. In the RAND work, the HSRV weight performed better on both counts (Carter et al. 2002).

The next two models regressing log cost on the log weight include provider fixed effects. The HSRV weight has a higher R-squared and is more proportionate than the cost-based weight (model 3). So, HSRV is more accurate on both counts in this specification. RAND did not use fixed effects in its evaluation, but we do here as an additional test. It is not surprising that the HSRV weight outperforms in this model since HSRV weights in their basic form can be computed from coefficients of a log cost regression model on CMGs with provider fixed effects (Quinn and Davies 2015).[9] This evaluation model tests in a manner the HSRV weights are computed to optimize for (best fit across facilities of within-facility relative costs).[10]

When we estimate the relationship between dollar payments and dollar costs, we find the cost-based weights have a coefficient closer to 1, and the R-squared is higher (model 6 vs. model 5). Here, it is not surprising the cost-based weights perform better because setting the weight proportional to cost weights (based on average cost) by group minimizes squared deviations between cost and payment and produces closer to a 1:1 relationship between changes in payments and costs across and within facilities. In similar linear models, but adding facility fixed effects (models 7 and 8), changes in payments track changes in costs more closely with payments proportional to cost-based weights

(model 8). However, the R-squared is higher when using payments proportional to HSRV weights (model 7).

The overall finding of the analyses in table 8 is that in the first pair of regressions (models 1 and 2), matching RAND's tests that weighed heavily in their recommendation to use HSRV weights, there is no unambiguous winner in the FY 2019 data. HSRV weights were more proportional (coefficient closer to 1), but cost-based weights had the higher R-squared. We would need to better understand the value of additional ability to predict cost across and within facility (R-squared) compared with more exact proportionality (coefficient closer to 1) to choose one approach over the other based on this test. In the two middle specifications (model 3 versus 4 and 5 versus 6), where the method of evaluation was more aligned with how one of the two weights was estimated, the more likely result was obtained. In the top and bottom sets, where the likely relative performance is hard to predict (and likely data dependent), the results are mixed in both cases.

At the Facility Level with FY 2019 Data, Percent Changes in CMIs are Associated with Percent Changes in Costs that Are Only Half as Large with HSRV Weights, with Cost-Based Weights Being More Proportional

Table 9 examines relative weight compression at the facility level using the FY 2019 data under alternative model specifications and CMI measures based on alternative weights. CMI coefficients different than 1 indicate a lack of proportionality between the weights (which payments are proportional to) and costs. A coefficient greater than 1 means the weights are compressed, and payments vary less than proportionately with cost (Pettengill and Vertrees 1982). A coefficient less than 1 means the weights are "decompressed" and vary more than proportionately with cost. Most commonly, analyses of this sort have tended to find (and were motivated by concerns about) CMI compression rather than its opposite (Cotterill, Bobula, and Connerton 1986).

TABLE 9

Accuracy of Alternative Relative Weights at the Facility Level Using 2019 IRF Stay File, by CMI Measure and Estimation Method

Dependent variable (log)	CMI measure (log)	Adjusted for short transfer stay cases	Weighted	R-squared	CMI coefficient	Robust standard error
Wage-adjusted cost	HSRV	Yes	No	0.320	0.505	0.099
Wage-adjusted cost	HSRV	No	No	0.318	0.484	0.104
Wage-adjusted cost	HSRV	Yes	Yes	0.422	0.497	0.114

Wage-adjusted cost	HSRV	No	Yes	0.423	0.526	0.118
Wage-adjusted cost	Cost-based	Yes	No	0.344	0.849	0.111
Wage-adjusted cost	Cost-based	No	No	0.341	0.821	0.115
Wage-adjusted cost	Cost-based	Yes	Yes	0.449	0.957	0.128
Wage-adjusted cost	Cost-based	No	Yes	0.452	0.983	0.129

Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began and ended in fiscal year 2019.
Notes: N=1,034 facilities. CMI=case mix Index. Analyses exclude facilities with fewer than 20 stays. HSRV weights are simulated using the HSRV method applied to FY 2019 data; all models include controls for urban/rural, log disproportionate share, log teaching, and whether a free-standing facility.

For HSRV weights and cost-based weights in turn, we estimate four model specifications: unweighted (i.e., facility weighted) with and without adjusting the weights for short transfer stay cases, then weighted by number of stays (again, with and without adjusting for short transfer stay cases).

For each of the four models using HSRV weights, CMI coefficients are very decompressed, with values ranging from 0.484 to 0.526. These values mean that for every 10 percent increase in the CMI (and therefore payment), the average facility costs increase by about 5 percent. CMIs based on weights published in the Federal Register for FY 2019, also using HSRV weights, perform similarly with CMI coefficients ranging from 0.466 to 0.515 (not shown in table). In the second set of four models of table 9, CMI coefficients using cost-based weights are much less decompressed, ranging from 0.821 to 0.983. The standard errors are relatively large in all these models and specifications. The imprecisely estimated CMI coefficients using cost-based weights are not statistically significantly different from 1. The CMI coefficients using the HSRV weights are all significantly different from 1.

When the IRF PPS Was Introduced, Facility-Level Costs Varied Somewhat More than Proportionately with CMIs, but Now Costs Vary Far Less than Proportionately with CMIs

In developing the IRF payment system, researchers found that CMIs using HSRV weights were compressed (CMI coefficient = 1.267), with CMIs using cost-based weights being somewhat less compressed (CMI coefficient = 1.185) (Carter et al. 2000b, table 5.5). In the initial implementation at least, RAND recommended that the HSRV weights be "stretched out" away from 1 on both sides to decompress the compressed weights to be proportional with costs (Carter et al. 2002). The IRF payment system final rule referred to this decompression step,[11] but we understand it does not now occur.

The findings in table 9 for FY 2019 are markedly different than in the original research, with CMI coefficients for HSRV weights around 0.5, indicating severe decompression. Did some abrupt change occur, or did the shift happen gradually? We address this next by examining how CMI coefficients evolved.

Table 10 provides a similar analysis of CMI compression as table 9, also using an approach similar to that used by RAND, but examines how compression has changed over time using CMIs based on HSRV weights using IRF Rate Setting Rule files for multiple years. We estimate two model specifications (A and B), each of which is alternately estimated unweighted (i.e., weight = 1 for each facility) and weighted by the number of stays for a facility. In addition to a constant term and the CMI, model A controls for facility payment adjusters (disproportionate share and teaching status) and freestanding status. Model B additionally controls facility type, region, and categories of patient volume.

In the 2009 data, as shown in table 10, CMI coefficients range from 1.005 to 1.080 across models and weighting methods and are not statistically significantly different from 1. The findings for file year 2009 indicate that in the earlier year of the PPS, the weights were nearly proportionate to costs at the facility level or somewhat compressed.

TABLE 10

Accuracy of Alternative Relative Weights at the Facility Level Using CMS Rate Setting Rule Files for Selected Years Using CMIs Based on HSRV Relative Weights

Model specification	Regression weighting	Statistic	File year			
			2009	2014	2019	2023
A. Facility payment adjusters and free-standing indicator	Facility	R-squared	0.186	0.261	0.241	0.266
		CMI coefficient	1.080	0.889	0.670	0.623
		Robust SE	0.084	0.086	0.106	0.107
B. Model A controls plus facility type, region, and volume category	Facility	R-squared	0.283	0.406	0.374	0.346
		CMI coefficient	1.002	0.866	0.675	0.659

		Robust SE	0.083	0.077	0.098	0.106
A. Facility payment adjusters and free-standing	Number of stays	R-squared	0.185	0.353	0.340	0.340
		CMI coefficient	1.058	0.635	0.520	0.679
		Robust SE	0.084	0.095	0.121	0.119
B. Model A controls plus facility type, region, and volume category	Number of stays	R-squared	0.261	0.458	0.457	0.436
		CMI coefficient	1.005	0.688	0.605	0.679
		Robust SE	0.082	0.088	0.115	0.121
N			1,180	1,121	1,115	1,101

Source: Urban Institute analysis of CMS IRF Rate Setting Rule files.
Notes: CMI = case mix index. Data are limited to facilities with 20 or more stays in each year. Short transfer stays are paid a fraction of the full CMG weight. "File year" refers to the year of the rate setting file. Average weights reported in each year's file are based on applying the payment weights from the previous year to the distribution of CMGs in the claims files from two years earlier.

In the 2014 data, the weights show CMI decompression, with CMI coefficients ranging from 0.635 to 0.889 (not statistically significant at the high end of the range). In 2019 data, the CMI coefficients range from 0.520 to 0.675 and are statistically significantly different from 1 in each model specification. The CMI coefficients we estimate using 2023 data range from 0.623 to 0.670 (all statistically significant), indicating that HSRV weights remain decompressed in the 2023 data to lesser or greater degrees than in the 2019 data, depending on the model specification.

The HSRV weights are now highly decompressed, while the cost-based weights we compute, arguably, are not. Decompression in the HSRV weights at the facility level is consistent with IRFs with high CMIs being paid more in relation to cost and IRFs with low CMIs being paid less in relation to cost.

Simulations Show How Shifts in Case Types across IRFs Can Cause HSRV and Cost-Based Weights to Diverge and Create Unequal PCRs for HSRV Weights

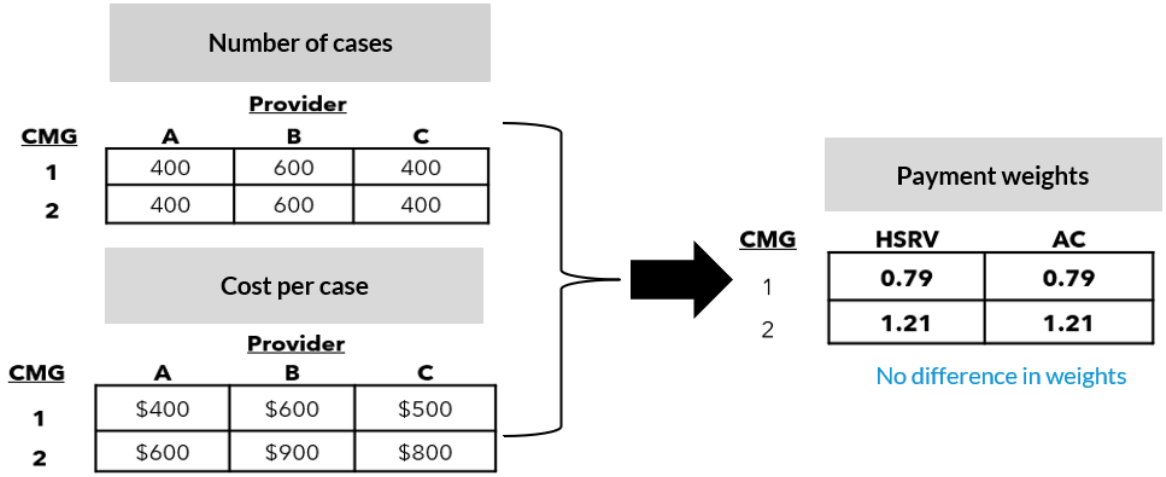
We use illustrative simulations to show how HSRV and average cost weights could change in response to growth in the share of cases treated by low-cost providers. In each scenario, three providers (A, B, and C) have cases in two case-mix groups (CMG 1 and 2). The providers vary in the number of cases they treat and in the average costs of those cases. We calculate the resulting HSRV and average-cost weights. We start with a scenario where HSRV and average-cost weights are the same (figure 8). We

then show how these weights change when provider A selectively grows its share of higher-cost stays (figure 8).

As shown in figure 8, provider B has more cases than providers A and C, and the cases are evenly distributed by CMG within each provider. CMG 2 is more costly than CMG 1 across all providers. Provider A has the lowest average cost for both CMGs. Provider B has the highest average cost, and provider C has costs in the middle. Based on the numbers selected, the calculated payment weights are the same under the HSRV and average-cost approaches.

FIGURE 8

Illustrative Example Comparing Average-Cost and HSRV Relative Payment Weights



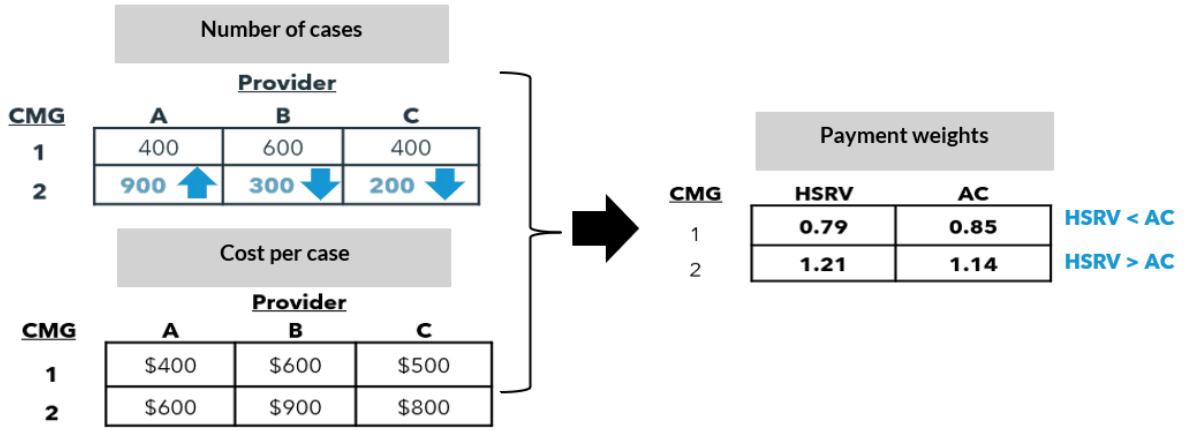
URBAN INSTITUTE

Source: MedPAC and Urban Institute simulations using illustrative data points.
Notes: HSRV = hospital-specific relative value; CMG = case-mix group; AC = average cost.

Next, we illustrate the effect on weights if there is a shift in cases such that provider A grows (from 400 to 900 cases in CMG 2, as shown in Figure 9. The total number of cases remains the same, so providers B and C serve fewer CMG 2 cases. Essentially, the low-cost provider (A) grew while the other providers shrunk, and this growth was selective among higher-cost cases. HSRV weights did not change from the scenario in figure 8 because the relative costs across different case-mix groups within facilities did not change. But average-cost weights changed: the weight for CMG 2 decreased while the weight for CMG 1 increased. This happened because averaging in low-cost provider A's cases resulted in a reduction to the average cost of all cases in CMG 2. Although CMG 1 did not change regarding the provision of cases by providers, it became relatively more costly with the reduction in the average cost of CMG 2.

FIGURE 9

Illustrative Example of Average Cost and HSRV Weights When Provider A Selectively Grows



URBAN INSTITUTE

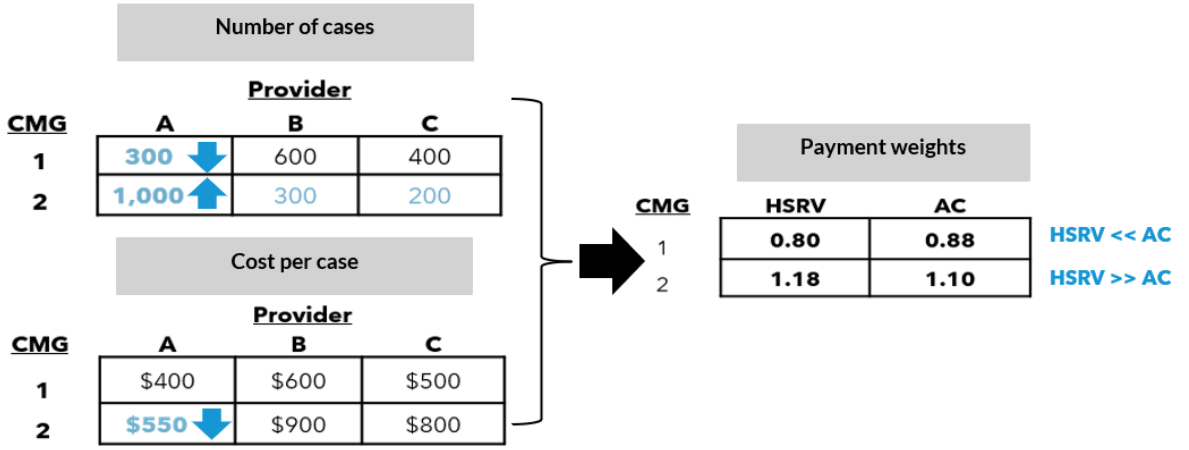
Source: MedPAC and Urban Institute simulations using illustrative data points.
Notes: HSRV = hospital-specific relative value; CMG case-mix group; AC = average cost.

Simulations Show How Differential Upcoding of Case Complexity Can Cause HSRV and Cost-Based Weights to Further Diverge

Here, we illustrate a scenario where, in addition to the shifts in the mixes of cases within and across providers, some of provider A's cases are upcoded from CMG 1 to CMG 2 (figure 10). In this scenario, 100 of provider A's cases that should be classified into CMG 1 are instead coded to CMG 2. This decreases the average costs of CMG 2. This scenario resulted in a further divergence between the average cost and HSRV weights. The average-cost method further lowers the weight of CMG 2 and increases the weight of CMG 1. The HSRV weight moves slightly in the opposite direction, increasing the weight of CMG 2 and decreasing the weight of CMG 1 because of changes in the relative costs of cases within provider A.

FIGURE 10

Illustrative Example of Average Cost and HSRV Weights When Some of Provider A's Stays Are Upcoded



URBAN INSTITUTE

Source: MedPAC and Urban Institute simulations using illustrative data points.
Notes: HSRV = hospital-specific relative value; CMG = case-mix group; AC = average cost.

These analyses show that compared with the HSRV payment weights, the average-cost payment weights are more responsive to shifts in costs resulting from shifts in cases across provider types and upcoding. More responsive weights could be beneficial for the IRF PPS. If cases in certain CMGs are increasingly treated by lower-cost IRFs, possibly because of selection incentives, cost-based payment weights would adjust downward for those CMGs and upward for others while still rewarding more efficient providers with higher profits. Cost-based weights would also rebalance more quickly to reduce the payment weights of CMGs subject to upcoding to offset inappropriate profits and reduce incentives to upcode relative to HSRV weights.

Incentives to Prefer Some Types of Patients and Avoid Others under HSRV and Cost-Based Weights

IRFs have considerable scope in selecting which patients they admit. They screen patients before admission to ensure they meet Medicare's coverage criteria (MedPAC 2024). The screening involves judgment, which may involve some degree of subjective discretion about the ability of patients to participate in and benefit from therapy and whether they require an intensive and coordinated team approach to care under the supervision of a rehabilitation physician. IRFs admit less than 40 percent of patients referred to them because they are deemed not to meet Medicare coverage requirements,

not to require intensive therapy, or to lack sufficient potential to improve after treatment (AMRPA 2023).

The IRF payment system seeks to set relative payments in relation to relative costs to avoid creating incentives for providers to prefer some types of patients over others based on payment considerations. Both HSRV and average-cost-based weights produce estimates of relative patient costs but in different ways. A conceptual argument that might be made in favor of HSRV weights is that, by aiming to best equate within-facility PCRs across patient types across facilities, the method could minimize a facility's incentive to select one type of patient over another.[12] If this were true in practice, policymakers would need to ask to what degree they are willing to tolerate aggregate-level mispricing (i.e., Medicare systematically overpaying for some patient groups and underpaying for others) as the price to pay any marginal reduction in selection incentives from using HSRV weights over cost-based weights. We question, however, the idea that best equating within-facility PCRs translates into less incentive to select patients on multiple grounds.

First, unequal aggregate PCRs across patient types could drive patient selection at a market level through selective exit and entry of providers. Facilities that achieve no worse than industry-average costs but disproportionately treat patient groups with low PCRs would face sub-par profitability and be more likely to exit, perhaps harming access to care for the less profitable patient groups. Facilities that achieve no better than industry-average costs but disproportionately treat patient groups with higher PCRs would have superior profitability and would be more likely to expand to treat increasing numbers of more profitable high-cost patients. Likewise, potential market entrants with no better than industry-average cost would achieve superior profits by specializing in treating the most profitable patient groups or entering markets with high numbers of potential patients in the most profitable groups.

Second, it is not necessarily (or even generally) the case that best-equalizing PCRs across patients within a facility (as HSRV seeks to do) neutralizes incentives for an individual IRF to prefer one type of patient over another. The incentives very much depend on the specifics of the context of the choice. Four cases illustrate this point. Suppose a facility has a fixed number of beds it can fill over a fixed number of days, and the pool of potential patients available is more than sufficient to fill those bed days, so the provider can select whom it admits. In this case, profit maximization amounts to maximizing dollar profit per bed day. Such a facility would be indifferent among patients that give them the same dollar profit per day. Maximizing dollar profit per day is not the same in general as maximizing PCR per stay, but the two may be similar if differences in average cost per stay are driven primarily by length of stay rather than by average cost per day.

Alternatively, a facility with one bed available facing a limited and uncertain flow of potential patients might, if presented with the choice, prefer to lock in more days with a longer-stay patient at a lower PCR per stay (but higher total dollar profit per stay) than to admit a shorter stay with a higher PCR. For a third case, suppose a facility routinely operates below its capacity. It would maximize profits by accepting all qualifying patients that become available regardless of their PCR. If it could choose, a facility would prefer its next patient to have the higher dollar profit, not necessarily the higher PCR.[13] The aggregate occupancy rate was 64 percent in hospital-based IRFs and 71 percent in freestanding IRFs in 2022 (MedPAC 2024), so this case may apply to many IRFs. The fourth case is the presence of a fixed cost for admitting a new patient. An IRF could prefer one 16-day stay over two eight-day stays, each with the same measured PCR and yielding the same measured dollar profit if there are fixed costs per admission.[14]

With the above possibilities in mind, we examine how alternative measures of profitability vary across patient groups using the example of stays in neurological RIC 06 for two very different groups of hospitals. RIC 06 is a good example because it has high volume, is a case where high PCRs are a concern, and is divided into multiple (four) CMGs, but not a number that would overcomplicate a simple analysis. In table 11, we report average payment, cost, relative payments and costs, average length of stay (LOS), profit per stay, dollar profit per patient day, and PCRs for the four neurological CMGs of RIC 06. We show data for for-profit FS facilities and nonprofit HB facilities.

TABLE 11

Mean Payments and Costs, Relative Payments and Costs, Length of Stay, and Profitability Measures for the Four Neurological CMGs of RIC 06

Sample	CMG	Mean payment	Mean cost	Relative payment	Relative cost	LOS	Mean profit	Dollar profit per patient day	PCR	Number of stays
For-profit FS	601	$12,188	$9,470	0.583	0.628	7.6	$2,718	$359	1.287	1,002
	602	$15,754	$11,848	0.754	0.786	9.4	$3,905	$415	1.330	5,063
	603	$19,173	$13,892	0.918	0.921	11.3	$5,281	$467	1.380	11,160
	604	$23,804	$16,987	1.139	1.126	14.3	$6,817	$476	1.401	18,519
Nonprofit HB	601	$12,991	$12,819	0.616	0.630	7.5	$172	$23	1.013	355
	602	$16,522	$16,301	0.784	0.802	9.8	$222	$23	1.014	2,074
	603	$20,216	$19,459	0.959	0.957	11.9	$758	$64	1.039	3,418
	604	$25,321	$24,233	1.201	1.192	15.2	$1,088	$71	1.045	3,599

Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began and ended in fiscal year 2019.
Notes: CMG = case-mix group; LOS = length of stay; PCR = payment-to-cost ratio; FS = freestanding; HB = hospital-based; RIC = rehabilitation impairment category. Payments are actual fiscal year 2019 payments.

Though for-profit FS and nonprofit HB facilities differ substantially in average cost for the same CMGs, their patterns of relative costs are similar. Similar patterns of within-group relative costs across facility types with very different average costs would appear to fit well with what HSRV weights seek to estimate. Even though the average cost for for-profit FS hospitals is considerably lower, their patterns of length of stay are similar to nonprofit HB facilities for the same CMGs. Just as payments based on HSRV weights do not equalize PCRs by group, they do not equalize dollars per patient day. Profits per patient day are higher for the most costly CMG in this example, as are the PCRs. Because IRF average stay costs are highly aligned with LOS, we find similar patterns for the two measures.

PCRs and Dollar Profit per Patient Day Would Both be More Uniform for Neurological Cases Using Cost-Based Weights than Using HSRV Weights, Reducing Incentives to Select Patients at the Facility Group Level

In table 12, we provide similar information for the same groups of facilities. But instead of actual payments, we report our replication/simulation of HSRV-based and cost-weight-based payments. We compute PCRs and dollar profit per patient day under each payment type.

At this group level (between aggregate and individual facility level) along the important dimension of facility type with substantially different average cost, we find that PCRs and dollar profit per patient day are more uniform within the group using cost-based weights than HSRV weights. For for-profit FS facilities, PCRs and profits per day are high under both payment methods but somewhat lower using cost-based weights. Cost-based weights also result in lower payments for neurological cases for nonprofit hospital-based facilities, with PCRs falling below 1. The reason is that this RIC is dominated by lower-cost, for-profit FS facilities. Nonprofit HB facilities treat a lower share of these patients, and as we see in the next section, overall, nonprofit HB providers would see higher payments overall using cost-based weights.

TABLE 12

Mean Simulated HSRV-Based and Cost-Based Payments, Mean Costs, Length of Stay, and Profitability Measures for the Four Neurological CMGs of RIC 06

Sample	CMG	Mean simulated HSRV payment	Mean simulated cost-based payment	Mean cost	LOS	PCR under HSRV payment	PCR under cost-based payment	Dollar profit per day under HSRV payment	Dollar profit per day under cost-based payment
For-profit FS	601	$13,094	$12,804	$9,470	7.6	1.383	1.352	$478	$440
	602	$16,707	$16,219	$11,848	9.4	1.410	1.369	$517	$465
	603	$20,322	$18,837	$13,892	11.3	1.463	1.356	$568	$437
	604	$26,099	$22,970	$16,987	14.3	1.536	1.352	$636	$418
Nonprofit HB	601	$13,116	$12,826	$12,819	7.5	1.023	1.001	$40	$1
	602	$16,658	$16,172	$16,301	9.8	1.022	0.992	$37	$(13)
	603	$20,229	$18,751	$19,459	11.9	1.040	0.964	$65	$(59)
	604	$25,924	$22,816	$24,233	15.2	1.070	0.942	$111	$(93)

Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began and ended in fiscal year 2019.
Notes: CMG = case-mix group; LOS = length of stay; PCR = payment-to-cost ratio; FS = freestanding; HB = hospital-based; RIC =- rehabilitation impairment category. Payments are simulated payments using HSRV and cost-based weights, respectively.

Use of Average-Cost Payment Weights Would Modestly Shift Dollars to Hospital-Based Nonprofit and Small IRFs

Finally, we simulate the shifts in payments that would occur if cost-based weights were used in the IRF PPS in place of HSRV weights. In table 13, we report simulated impacts by IRF characteristics in FY 2019, assuming no change in admission patterns. We assume budget neutrality, that is, total payments to IRFs remain the same in both scenarios. While some IRFs would receive lower payments and some would receive higher payments, the overall shifts are modest.

TABLE 13

Estimated Impacts of Replacing HSRV with Average-Cost Payment Weights in the IRF PPS, FY 2019

	Percent of stays	Estimated percent change in payment
All	100%	0.0%
Hospital-based	44%	1.6
For-profit	9	0.2
Nonprofit	29	2.0
Government	6	1.8
Freestanding	56	–1.2
For-profit	50	–1.5
Nonprofit	5	0.7
Government	1	1.3
Rural	6	0.7
Urban	94	0.0
Small	6	2.5
Medium	34	1.3
Large	60	–1.0

Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in IRFs that began and ended in FY 2019.
Notes: IRF = inpatient rehabilitation facility; FY = fiscal year; HSRV = hospital-specific relative values; PPS = prospective payment system. "Estimated change in payment" was calculated by subtracting HSRV-based payments from average-cost-based payments divided by HSRV-based payments. IRF size (small, medium, and large) was based on the number of fee-for-service Medicare stays in the year (IRFs with less than the 25th percentile in number of stays were designated small, IRFs with greater than the 75th percentile in the number of stays were designated large, and all others were medium).

Payments to hospital-based IRFs would increase by 1.6 percent (2.0 percent for nonprofit HB facilities). Payments would decline by 1.2 percent for freestanding facilities overall (a decline of 1.5 percent for for-profit FS facilities). Small IRFs would see an estimated 2.5 percent increase in payments. Freestanding for-profit IRFs would see an estimated 1.5 percent reduction in payments. Rural IRFs would see a slight boost in payments of 0.7 percent.

Discussion

The current functioning of the IRF payment system differs substantially from the original intent. Design considerations included payment accuracy at the stay and facility levels as well as payment equity across patient groups and categories of providers. The differences in PCRs we observe across patient groups and facilities were much smaller in the earlier years of the IRF PPS and in the research findings on which the system is based.

The research findings that led to the adoption of the HSRV weights no longer seem to hold. Cost-based weights seem to perform better on the criteria set out for the system originally, and that continue to seem relevant. The severe decompression of the current IRF payment weights is a cause for concern and appears to be related to the differences in PCRs we observe under HSRV weights. Cost-based weights would substantially improve the correspondence between payments and costs at the facility level in the current IRF PPS.

While the HSRV method is intended to reflect differences in within-facility relative costs, ignoring differences in costs across facilities seems to have unintended consequences. It does not appear to have neutralized incentives to select patients—in this case, favoring more expensive patients rather than the more usual concern of favoring less expensive patients. Average payment weights and CMIs have risen over time, increasing Medicare payments. HSRV weights also seem to have undesirable properties in that they resist adapting to provider or system efficiency changes. A shift to cost-based weights may benefit the IRF PPS and better meet Medicare's objectives.

Notes

[1] See MedPAC, "Inpatient Rehabilitation System Payment Basics," October 2023, Washington, DC: MedPAC.

[2] Routine costs per day were capped at the 1st and 99th percentiles within IRF free-standing and IRF hospital-based facilities separately. We used cost-to-charge ratios for narrow sets of revenue centers unless they were outside +/− 3 standard deviations around mean log of cost-to-charge ratios. In that case, we used the ratio calculated at a more aggregated level or from a previous year. Finally, we capped costs per stay separately for wage-adjusted routine, wage-adjusted therapy, and wage-adjusted nontherapy ancillary costs in the 99.5th percentile.

[3] In the Standard Analytic File, a revenue center value of "0024" indicates that the codes for the RIC, CMG, and tier are located in the Healthcare Common Procedural Coding System field.

[4] The HSRV method is attributed to Pettengill and Vertrees with the method described in Lave et al. (1981).

[5] Standardized cost per stay = (Costs standardized for comorbidity multipliers) / ([1+0.149*Rural location] * ([1+Disproportionate share]^0.3158)*([1+Teaching status]^1.0163)), where Rural location indicates that the facility is in a rural Core-Based Statistical Area; Disproportionate share is the disproportionate share measure for the facility, and Teaching status is the facility's number of interns and residents divided by average daily census, and ^ indicates the element in parentheses is raised to the indicated power.

[6] "CMS-1688-F," CMS.gov, accessed March 21, 2024, https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/InpatientRehabFacPPS/List-of-IRF-Federal-Regulations-Items/CMS-1688-F.

[7] The change in weights reported here does not include any effect of short transfer stay adjustment but the changes from the rate setting files do.

[8] The observed relationship of costs with quintile is partly due to the varying mix of facility types across quintiles, as explored in Tables 6 and 7.

[9] Kevin Quinn and Bud Davies to Belinda Rowan, memorandum, June 17, 2025, "Applicability of Hospital Specific Relative Value (HSRV) DRG Weights."

[10] Because within-facility relative costs vary across IRFs, the HSRV method seeks a best regression fit to those relative costs across facilities. It does not produce a separate set of relative costs for each facility.

[11] "Medicare Program; Prospective Payment System for Inpatient Rehabilitation Facilities," HHS, Federal Resister 66 (152), August 7, 2001.

[12] See note 9.

[13] A theme running through these examples is the application of the fundamental rule of benefit-cost analysis: in any choice situation, select the alternative that produces the greatest net benefit (Stockey and Zeckhauser 1978). As Stockey and Zeckhauser remind us about use of benefit/cost ratios (i.e., PCRs), "In many circumstances, the benefit/cost ratio criterion will lead to the same choice as the maximize net benefits criterion. But when choices must be made among mutually exclusive projects or when resources are constrained, the two criteria may lead to inconsistent choices" (Stockey and Zeckhauser 1978, p. 146).

[14] This case would not be applicable if estimated costs fully reflected patterns of costs per day by varying lengths of stay. The routine cost measure in the IRF PPS, however, is an average routine cost per day (independent of day of stay) multiplied by length of stay.

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