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Estimating Variation in Stay-Level and Facility-Level Profitability in Medicare's Inpatient Rehabilitation Facility Payment System

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



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Medicare Payment Advisory Commission



Estimating Variation in Stay-Level and Facility-Level Profitability in Medicare's Inpatient Rehabilitation Facility Payment System

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Medicare beneficiaries who need intensive rehabilitation services following an acute hospital stay are sometimes treated in inpatient rehabilitation facilities (IRFs), where they must be able to tolerate and benefit from intensive therapy, which is often interpreted as three hours of therapy per day. The therapy provided by IRFs includes physical, occupational, and speech therapy. Patients require active and ongoing therapy in at least two modalities, one of which must be physical or occupational therapy. The Medicare program pays IRFs on a per-stay basis. For each stay, Medicare pays an amount that depends largely on a patient's condition. Measures of patient condition that affect payments include diagnoses, age, and (motor) functioning and cognitive status.¹ A base payment rate for each stay is multiplied by a factor to reflect area wage levels, and is then adjusted by a factor that depends on the condition that led to the need for intensive therapy services (the rehabilitation impairment category, or RIC), on the patient's motor and cognitive functioning assigned to case-mix groups (CMGs) that are nested within and specified under each RIC, and on the presence of comorbidities (with patients classified into one of four comorbidity tiers).

The payment weights of the CMG-tier combination are calculated to fit the cost patterns observed in recent years of Medicare data for IRF patients. As a result, Medicare payments for IRF stays are designed to increase proportionately with the expected costs of each patient given the patient's CMG and comorbidity tier. When IRF payments are proportional to patient costs, paymentto-cost ratios should be approximately the same across all RICs, CMGs, and tiers, and therefore all patients would be equally profitable on average. Without having more specific knowledge of a given patient's condition, a typical provider should not face a financial incentive to prefer treating patients in one CMG-tier combination over another.

Medicare Payment Advisory Commission (MedPAC) analyses comparing high- and low-margin IRFs find differences in the mix of patients treated across IRFs, suggesting that patient CMG-tier combinations may not all be equally profitable under the payment system. For example, MedPAC found that IRFs with the highest margins in 2013 had a small share of stroke cases and a relatively large share of other neurological cases (such as neuromuscular disorders and multiple sclerosis) (MedPAC 2016). It further observed differences in the types of stroke and other neurological conditions admitted to high-margin and low-margin IRFs. Stroke cases in the highest-margin IRFs were more likely than those in the lowest-margin IRFs to have no paralysis, suggesting the highest-margin IRFs may have treated the less expensive stroke cases. Similarly, the neurological cases treated in high-margin IRFs were more likely to be less-severe patients with neuromuscular disorder, whereas the neurological cases treated in low-margin IRFs were more likely to be patients with more severe conditions like multiple sclerosis or Parkinson's disease. MedPAC also found that patients treated in high-margin IRFs appeared to have more severe disabilities (as measured by motor impairment score) than those in low-margin IRFs, even though the patients in high-margin IRFs appeared to be less severely ill and less resource intensive during the acute hospital stay preceding admission to an IRF. These findings suggest that some case types under the IRF payment system are more profitable than others, and that provider differences in the coding of functioning status could factor in IRF profitability.

In this brief, we analyze the degree to which profitability varies across IRF patient stays over RICs, CMGs, comorbidity tiers, motor functioning scores, and cognitive functioning scores. Differences in profitability for different types of patients could incentivize providers to selectively admit some types of patients over others, which could adversely affect access to care for some patients and could affect quality of care. We find evidence of substantial variability in profits related to patient type, which could lead IRFs to steer its case-mix towards certain types of patients for financial reasons. We also examine the degree to which overall facility-level profitability can be explained by differences in case-mix profitability.

Data and Key Measures

This analysis is based on Medicare fee-for-service claims data for IRF stays that began in 2017.

Sample of 2017 IRF Stays

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The primary analyses in this brief describe variation in profitability, payments, and costs across payment case-mix groups and across facilities. The data are drawn from 390,633 fee-for-service IRF

claims in the Medicare Standard Analytic File that started in 2017 and ended with a discharge. Approximately 4 percent of these stays were dropped 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 missing risk scores, stays longer than 100 days, missing case-mix group

The resulting file has 376,336 stays. The stays took place at 1,082 IRFs. Overall, 75.8 percent of providers were hospital based, accounting for 47 percent of the IRF stays.

We also conducted a preliminary analysis of the relationship of profitability to motor and cognitive scores as measured using data from the Inpatient Rehabilitation Facility-Patient Assessment Instrument (IRF-PAI). This analysis is based on a match of the IRF stays from claims to IRF-PAI assessments. We were able to match 92.6 percent of stays, yielding a sample for this analysis of 348,700 stays.

Medicare Costs and Payments

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 2017 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 2017 Medicare cost report. All costs were standardized using the labor share and the area wage index.

Medicare payments are the total of payments made directly to the facility, paid as coinsurance, copayments, and the deductible for blood products. Total payments from IRF claims are also standardized by each provider's area wage index.

Constructing the IRF Case-Mix Groups and Tiers

Much of the analysis in this brief focuses on the relative profitability of the case-mix groups used for payment. Each stay is assigned a rehabilitation impairment category that describes the primary reason for intensive rehabilitation (for example, neurological or stroke). Within RICs, stays are allocated to case-mix groups 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. A revenue center value of "0024" indicates that the codes for the CMG and tier are located in the Healthcare Common Procedural Coding System field. Stays of fewer than four days are assigned to a separate CMG. In addition, stays of persons who died while in an IRF are assigned to one of four CMGs based on the length of stay and their initial rehabilitation impairment group.

Findings

Variation in Profitability across Patient Groups

Table 1 reports the number of IRF stays, average Medicare payment and average cost per stay, average dollar profit for treating Medicare beneficiaries, and ratio of average payments to average cost for each RIC. Over the more than 376,000 IRF stays for all RICs, the average profit is \$1,975 per stay and the average payment-to-cost (P/C) ratio is 1.11. So on average, payments are 11 percent higher than costs. Excepting short stays, we see substantial but not dramatic variation in profitability across patient groups defined by RIC, with P/C ratios ranging from 1.06 (RIC 08: replacement of lower extremity joint) to 1.26 (RIC 12: osteoarthritis). Several RICs are tied for second lowest with a ratio of 1.07, including 01: stroke (the most common RIC, with nearly 73,700 stays). Among the most profitable RICs, 12: osteoarthritis and 13: rheumatoid, other arthritis are relatively uncommon, accounting for only 731 and 900 stays respectively. RIC 06: neurological is common (53,419 stays) and is quite profitable with a P/C ratio of 1.20 and an average profit of \$3,506. RIC 09: other orthopedic also accounts for many IRF stays (29,485) and is relatively profitable with a P/C ratio of 1.16. RIC 50: short stays loses money on average.

TABLE 1

IRF Medicare Patient Volume and Average Payment, Cost, and Profit by Rehabilitation Impairment Category

		_			Payment-
Rehabilitation impairment category	Number of stays	Payment (\$)	Cost (\$)	Profit (\$)	to-cost ratio
Total	376,336	20,346	18,371	1,975	1.11
01: Stroke	73,696	24,221	22,684	1,537	1.07
02: Traumatic brain injury	12,066	21,694	19,879	1,816	1.09
03: Non-traumatic brain injury	26,463	20,788	18,560	2,228	1.12
04: Traumatic spinal cord injury	2,926	30,455	27,041	3,414	1.13
05: Non-traumatic spinal cord injury	14,867	23,349	21,918	1,431	1.07
06: Neurological	53,419	20,680	17,174	3,506	1.20
07: Fracture of lower extremity	37,691	20,625	18,854	1,771	1.09
08: Replacement of lower extremity joint	15,470	15,376	14,535	841	1.06
09: Other orthopedic	29,485	18,451	15,947	2,503	1.16
10: Amputation, lower extremity	9,246	23,034	21,365	1,668	1.08
11: Amputation, non-lower extremity	381	22,313	20,835	1,479	1.07

					Payment-
Rehabilitation impairment category	Number of stays	Payment (\$)	Cost (\$)	Profit (\$)	to-cost ratio
12: Osteoarthritis	704	(Ψ)			100
	/31	18,644	14,784	3,859	1.26
13: Rheumatoid, other arthritis	900	19,416	16,075	3,341	1.21
14: Cardiac	20,742	18,298	16,777	1,521	1.09
15: Pulmonary	7,457	19,982	17,983	2,000	1.11
16: Pain syndrome	1,162	17,337	16,136	1,201	1.07
17: Major multiple trauma w/o brain/spinal					
injury	7,322	20,991	18,241	2,750	1.15
18: Major multiple trauma w/ brain/spinal					
injury	2,164	24,995	21,923	3,072	1.14
19: Guillain-Barre	731	30,194	27,795	2,399	1.09
20: Miscellaneous	44,437	19,416	17,471	1,945	1.11
21: Burns	212	25,012	22,639	2,373	1.10
50: Short stays	13,786	3,277	3,962	-685	0.83
51: Expired	982	15,590	14,485	1,105	1.08

Source: Urban Institute analysis of Medicare fee-for-service claims data for IRF stays that began in 2017. **Note:** IRF = inpatient rehabilitation facility.

The IRF payment system is designed so that differences in payment for each RIC-CMG combination are calibrated to reflect differences in expected cost of IRF stays. This level of variability in IRF profits at the RIC level would not be expected if the payment system were well calibrated. We cannot tell from these data whether any problem is with the calibration of the payment weights or with some other aspect of the system that determines final payments, which include outlier payments and adjustments for graduate medical education and the share of low-income patients.

PROFITABILITY BY CMG AND FACILITY/OWNERSHIP STATUS FOR SELECTED REHABILITATION IMPAIRMENT CATEGORIES

We look more closely at how the profitability of IRF stays varies by patient characteristic by focusing on three high-volume RICs based on the findings shown in table 1: stroke, neurological, and other orthopedic. We include stroke because it is the highest-volume RIC and we include neurological and other orthopedic because they are common and are among the more profitable RICs. In the figures that follow, we show how the profitability of stays varies over the CMGs. Other orthopedic includes non-hip fractures and bone and joint disorders not covered elsewhere; the most common non-hip fractures are fractures of the lower leg, lumbar spine or pelvis, shoulder or upper arm, and ribs or thoracic spine.

By design, higher-numbered CMGs within a RIC generally have higher expected cost because they include patients with lower motor and/or cognitive functional status or higher age who require more resources to treat. Payment weights are set to vary in proportion with expected costs, so in a well-calibrated payment system, we would not expect P/C ratios to vary substantially or systematically across CMGs.

Figure 1 shows how average cost per stay varies over the 10 CMGs within the stroke RIC, with separate lines shown for stays based on their facility type (i.e., hospital based or freestanding) and further by ownership type). For stays in each of the six facility types, we generally see the expected pattern of higher costs associated with higher-numbered (more functionally and cognitively impaired) CMGs. We also see large differences in average cost across facility types for each CMG. The roughly parallel lines indicate that facility types are generally more or less costly by similar degrees for all CMGs. We also see that freestanding for-profit facilities are uniformly the lowest cost for all the stroke CMGs. We also see that hospital-based facilities, particularly those that are voluntary (nonprofit) and government owned, generally have the highest costs across the CMGs. Such differences in costs by facility and ownership type are in line with what is typically observed for institutional health care providers.

Figure 1



Medicare Cost per Stay by Case-Mix Group for Stroke Cases (RIC 01), by Facility Type and

Ownership

Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: CMG = case-mix group. FS = freestanding. HB = hospital based. RIC = rehabilitation impairment category. Sample sizes as follows: FS for profit=10,667; FS voluntary=2,451; FS government=367; HB for profit=3,134; HB voluntary=12,435; HB government=2,085. Higher case-mix group numbers indicate lower functional and cognitive status.

Figure 2 shows how P/C ratios vary over the CMGs within the stroke RIC, again with separate lines for each of the six facility/ownership types. Mirroring what we see for cost levels, freestanding for-profit facilities have higher profitability for nearly all CMGs (freestanding government facilities have a similar profitability for CMG 110, but it is based on relatively few stays). Within each facility type, profitability is generally higher for higher-numbered CMGs (the more impaired patients). Moreover, P/C ratios are quite high (1.2 or more) for CMGs 104 to 110 in freestanding for-profit facilities. Although different profitability across facility and ownership types may be explained by differences in cost structures, it is not clear why more functionally impaired CMGs would be more profitable within each type of facility. The high variability in ratios for free-standing government-based facilities likely reflects the relatively small number of such facilities.

FIGURE 2

Medicare Payment-to-Cost Ratios by Case-Mix Group for Stroke Cases (RIC 01), by Facility Type and Ownership



Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: CMG = case-mix group. FS = freestanding. HB = hospital based. RIC = rehabilitation impairment category. Sample sizes as follows: FS for profit=10,667; FS voluntary=2,451; FS government=367; HB for profit=3,134; HB voluntary=12,435; HB government=2,085. Higher CMG numbers indicate lower functional and cognitive status.

In figures 3 and 4, we report similar analyses for the four CMGs in RIC 6: neurological. Here too, we find that higher-numbered CMGs are associated with higher costs within each facility/ownership

type (figure 3). Freestanding for-profit and government facilities have lower costs for all CMGs, and hospital-based nonprofit and government facilities have higher cost. We also see that freestanding for-profit facilities have relatively high P/C ratios that are uniformly higher for more impaired patients with higher-numbered CMGs (figure 4). Freestanding government facilities have the highest P/C ratios, but they do not increase uniformly with CMG number, possibly reflecting higher variability owing to smaller samples.

FIGURE 3

Medicare Cost per Stay by Case-Mix Group for Neurological Cases (RIC 06), by Facility Type and Ownership



Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: CMG = case-mix group. FS = freestanding. HB = hospital based. RIC = rehabilitation impairment category. Sample sizes as follows: FS for profit=33,355; FS voluntary=2,191; FS government=495; HB for profit=4,561; HB voluntary=11,129; HB government=1,688. Higher CMG numbers indicate lower functional and cognitive status.

Medicare Payment-to-Cost Ratio by Case-Mix-Group for Neurological Cases (RIC 06), by Facility Type and Ownership



Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: CMG = case-mix group. FS = freestanding. HB = hospital based. RIC = rehabilitation impairment category. Sample sizes as follow: FS for profit=33,355; FS voluntary=2,191; FS government=495; HB for profit=4,561; HB voluntary=11,129; HB government=1,688. Higher CMG numbers indicate lower functional and cognitive status.

We examine the four CMGs in RIC 9: other orthopedic in figures 5 and 6. We find similar patterns by facility/ownership type as for the previous two RICs (i.e., stroke and neurological), and similar expected increases in costs for higher-numbered CMGs (figure 5). We also see similar patterns for profitability (figure 6), with P/C ratios generally increasing with CMG number as patient functional and cognitive impairment increases.

Medicare Cost per Stay by Case-Mix Group for Other Orthopedic Cases (RIC 09), by Facility Type and Ownership



Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: CMG = case-mix group. FS = freestanding. HB = hospital based. RIC = rehabilitation impairment category. Sample sizes as follows: FS for profit=17,235; FS voluntary=1,729; FS government=239; HB for profit=2,188; HB voluntary=6,914; HB government=1,180. The other orthopedic RIC includes non-hip fractures and bone and joint disorders not covered elsewhere; the most common non-hip fractures are fractures of the lower leg, lumbar spine or pelvis, shoulder or upper arm, and ribs or thoracic spine. Higher CMG numbers indicate lower functional and cognitive status.

Medicare Payment-to-Cost Ratio by Case-Mix Group for Other Orthopedic (RIC 09) Cases, by Facility Type and Ownership



Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: CMG = case-mix group. FS = freestanding. HB = hospital based. RIC = rehabilitation impairment category. Sample sizes as follows: FS for profit=17,235; FS voluntary=1,729; FS government=239; HB for profit=2,188; HB voluntary=6,914; HB government=1,180. Higher CMG numbers indicate lower functional and cognitive status.

VARIATION IN PROFITABILITY BY COMORBIDITY TIER WITHIN CMG

The IRF payments are further adjusted within each CMG by comorbidity tier (tier 1, tier 2, tier 3, none). Tiers are determined by the presence of one or more comorbidities associated with each tier. Tier 1 comorbidities are associated with the highest expected cost, tier 2 with next highest cost, tier 3 with lower cost, and none with lowest cost. Multiplicative adjustment factors by tier are calculated to reflect differences in expected costs of IRF stays within each RIC. The factors for each tier differ across RICs but are the same for all CMGs within a RIC. For example, the ratio of payments per stay for tier 3 to tier 1 patients is the same across all CMGs among stroke patients. However, this ratio is different than that observed between the same tiers in other RICs.

Tier 1 comorbidities include tracheostomy indicators, dependence on renal dialysis, and, except in the pulmonary RIC, paralysis of vocal chords and swelling of larynx. Among stroke patients, tier 2 comorbidities are related to digestion or intestine difficulties; in other RICs they also include dysphagia

or difficulties swallowing. The list of tier 3 comorbidities is much broader, including conditions ranging from influenza to diabetes to acute ulcers to stroke (among nonstroke patients).²

We would expect some variability in profitability by tier across CMGs within an RIC because the tier adjustment factors are not fit to each CMG. We would not, however, expect to see systematic variability in tier profitability within an RIC overall because the tier adjustment factors are calculated to capture such differences.

In figure 7 we show how P/C ratios vary across tiers for each CMG of the stroke RIC. In 8 of the 10 CMGs, we find that profitability is highest for the high-comorbidity tier. And for two of the CMGs, the medium tier is most profitable. The low- and no-comorbidity tiers are always less profitable than the high and medium tiers. Thus, the patterns suggest that the higher two comorbidity tiers are systematically more profitable within the stroke RIC.



FIGURE 7

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Medicare Payment-to-Cost Ratios by Tier within Case-Mix-Groups for Stroke (RIC 01) Cases

Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: CMG = case-mix group. RIC = rehabilitation impairment category. Number of stays included by CMG: CMG 101=2,018; CMG 102=4,388; CMG 103=1,241; CMG 104=8,294; CMG 105=7,338; CMG 106=7,056; CMG 107= 6,751; CMG 108=7,803; CMG 109=5,342; CMG 110=23,449. Number of stays included by tier: high=2,528; medium=1,255; low=31,139; none=38,758. Higher CMG numbers indicate lower functional and cognitive status. Tier indicates the extent of comorbidities present. Figures not shown for CMG-tier combinations with 10 or fewer stays. Figures 8 and 9 report analogous findings for the four CMGs in the neurological and other orthopedic RICs, respectively. In both cases, we find that the high-comorbidity RIC is the most profitable for each of the CMGs. The low-comorbidity tier is often the second most profitable. So again, we find systematic variability in profitability across comorbidity tiers, although the source of this variability is unclear because the payment factors are designed to capture such systematic variability in the expected costs of IRF stays.

FIGURE 8





Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: CMG = case-mix group. RIC = rehabilitation impairment category. Number of stays included by CMG: CMG 601=1,644; CMG 602=8,773; CMG 603=17,738; CMG 604=25,264; number of stays included by tier: high=4,413; medium=8,004; low=22,791; none=18,211. Higher CMG numbers indicate lower functional and cognitive status. Tier indicates the extent of comorbidities present.

Medicare Payment-to-Cost Ratios by Tier within Case-Mix-Groups for Other Orthopedic (RIC 09) Cases



Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: CMG = case-mix group. RIC = rehabilitation impairment category. Number of stays included by CMG: CMG 901=1,219; CMG 902=6,028; CMG 903=10,710; CMG 904=11,528; number of stays included by tier: high=823; medium=1,709; low=10,738; none=16,215. Higher CMG numbers indicate lower functional and cognitive status. The other orthopedic RIC includes non-hip fractures and bone and joint disorders not covered elsewhere; the most common non-hip fractures are fractures of the lower leg, lumbar spine or pelvis, shoulder or upper arm, and ribs or thoracic spine. Tier indicates the extent of comorbidities present.

VARIATION IN PROFITABILITY BY MOTOR FUNCTIONING SCORE AND COGNITIVE

FUNCTIONING SCORE

We have already shown evidence of higher profitability levels in higher-numbered CMGs within the stroke, neurological, and other orthopedic RICs. The higher-numbered CMGs within these RICs represent generally increasing levels of functional impairment (e.g., higher age and lower levels of motor and cognitive functioning). In this section we look directly at the relationship between the motor and cognitive scores and profitability over all RICs to better understand the slope and shape of their relationship with the profitability of IRF stays.

In figure 10, we plot how average stay payments and costs (y-axis) vary with the motor functional score (x-axis) for all stays, excluding short stays and those during which the patient died. Motor scores

can range from 12 to 84, with higher scores indicating higher levels of functioning. Because there are relatively few stays with a motor score higher than 60, we top-coded the score at 61 for plotting purposes (all cases with a score higher than 60 are coded to 61). As expected, we see that average IRF-stay costs are lower for patients with higher levels of motor function. We also observe that the relationship between average cost and motor score is quite linear. Payments decline as the motor-function score increases in a roughly linear way, as we would expect. But payments are systematically higher than costs for patients with motor-function scores of 40 or lower, with payments exceeding costs by the most substantial amounts for patients with motor scores at the lower end of the range. In contrast, payments are similar to or somewhat less than costs for stays with a motor score greater than 40. To better see the magnitude of profitability differences, we plot the resulting P/C ratios against motor score in figure 11. The P/C ratios generally decline as functional ability increases. Patients with motor scores in the low to mid 20s have high P/C ratios near or exceeding 1.2. The P/C ratios are lowest for patients with motor scores in the low 50s.

FIGURE 10



Average Medicare Cost and Payment per Stay, by Motor-Functioning Score

Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: Data include all stays that matched to an IRF-PAI assessment, except for short stays and stays during which death occurred (N=334,730). Motor-functioning score is a weighted average of 12 motor-related FIM (functional independence) measures from the Inpatient Rehabilitation Facility-Patient Assessment Instrument, each scored on a scale of 1 to 7. Higher scores indicate greater independence. Motor scores greater than 60 are top-coded to 61 for figure.

FIGURE 11 Medicare Payment-to-Cost Ratio, by Motor-Functioning Score



Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: Data include all stays that matched to an IRF-PAI assessment, except for short stays and stays during which death occurred (N=334,730). Motor-functioning score is a weighted average of 12 motor-related FIM (functional independence) measures from the Inpatient Rehabilitation Facility-Patient Assessment Instrument, each scored on a scale of 1 to 7. Higher scores indicate greater independence. Motor scores greater than 60 are top-coded to 61 for figure.

Cognitive functioning scores can range from 5 to 35, with higher scores reflecting better functioning. Figure 12 shows how average payments and costs per stay vary with the cognitive function score. Higher-function scores are associated with lower costs and lower payments as we would expect, though the relationship is not as steep as what we see for the motor score in figure 10. Payments exceed costs for patients with cognitive scores of 30 or lower, and payments are similar to costs for patients with cognitive scores higher than 30.





Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: Data include all stays that match to an IRF-PAI assessment, except for short stays and stays during which death occurred (N=334,730). Cognitive-functioning score is the sum of five cognition-related FIM (functional independence) measures from the Inpatient Rehabilitation Facility-Patient Assessment Instrument, each scored on a scale of 1 to 7. Higher scores indicate greater independence.

The profile of costs to cognitive score shows a curious pattern of sizable dips coinciding with scores ending with a 0 or 5 as the last digit (e.g., 5, 10, 15, ..., 35). In the frequency distribution, we observe a distinctly higher concentration of stays at these points. The mass points could be consistent with a coding practice whereby providers record the same level (e.g., all 3s, 4s, or 5s) for all five questions that make up the cognitive score. Coding the same level across the board for items intended to measure different dimensions of cognitive function may reflect a time-saving practice for providers, but the rough coding could obscure differences across patients. The cost pattern we observe could arise if this practice were more common in lower-cost facilities. We see the same pattern in much more attenuated form in the profile of payments with cognitive scores.

Figure 13 shows how the P/C ratios vary with cognitive score. Abstracting over the spikes and dips, we see similar levels of profitability for scores lower than 25. The highest-functioning patients, with scores higher than 30, are less profitable.



FIGURE 13

Medicare Payment-to-Cost Ratio by Cognitive Score

Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: Data include all stays that match to an IRF-PAI assessment, except for short stays and stays during which death occurred (N=334,730). Cognitive-functioning score is the sum of five cognition-related FIM (functional independence) measures from the Inpatient Rehabilitation Facility-Patient Assessment Instrument, each scored on a scale of 1 to 7. Higher scores indicate greater independence.

Even though the motor-functioning and cognitive-functioning scores are key inputs to the formation of CMGs and payments are intended to reflect differences in expected costs among the case-mix groups, we find systematic variation in profitability related to these patient characteristics. The patterns in figures 10 and 12 suggest that payments are being adjusted upward by an amount more than necessary to account for the higher expected cost of patients with lower levels of functioning. It is unclear where in the design of the payment system these unexpected and undesired patterns arise.

Variation in Profitability across Providers

Given the differences we observe in profitability by patient characteristics, case-mix group differences across providers could drive differences in profitability across IRFs. Here, we examine the degree of facility-level variation in profitability, and the extent to which that variation can be explained by observed facility case-mix variation. A detailed accounting of factors associated with variation in facility-level profitability is beyond the scope of this brief. As a first step, we assess whether facility-level profitability is driven more by facility case-mix differences or more by other factors separate from observed case mix. We limit the analysis to facilities with 20 or more stays and conduct the facility-level analysis after dropping short stays and deaths to focus on the primary CMGs.

DISTRIBUTION OF PAYMENT-TO-COST RATIOS ACROSS IRF PROVIDERS

Among the 1,082 IRFs represented in our data, some are low volume. We would expect profitability for low-volume facilities to be highly variable owing largely to small sample size. Low-volume facilities may also have very spotty representation of patients across CMGs. Accordingly, we exclude facilities with 20 or fewer IRF stays, leaving us with an analysis sample of 1,071 IRFs. The median IRF in this restricted sample has 213 stays. Analyses of specific RICs are based on the slightly larger sample.

In facilities with more than 20 IRF stays, we find the average facility-level P/C ratio is 1.03 (median = 0.995), but with substantial variation as seen in figure 14 (the average facility-level P/C ratio of 1.03 differs from the average case-level P/C ratio of 1.11 shown in table 1, as these are different calculations that weight cases differently). At the low end, 10 percent of facilities have P/C ratios of less than 0.77, and at the high end, 10 percent of facilities have P/C ratios of more than 1.35. As can be seen in figure 15, we find that IRF profitability generally increases with stay volume, and the smaller facilities are more likely to have payment-to-cost ratios below 0.6.



Distribution of Medicare Payment-to-Cost Ratios across IRF Providers

Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: IRF = inpatient rehabilitation facility. This figure indicates the proportion of facilities with a payment-to-cost ratio below a given ratio. Only facilities with more than 20 stays are included (N=1,071).





Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: Facility number of stays (x-axis) is shown on a log scale. Only facilities with more than 20 stays are included (N=1,071).

HOW MUCH VARIATION IN FACILITY-LEVEL PROFITABILITY CAN CASE-MIX EXPLAIN?

The variation in IRF profitability observed in figure 14 likely owes to cross-facility variation in both patient case mix and profitability of patients within case-mix groups. To attempt to separate these sources of variation, we created the following two indices:

- The *facility case-mix profitability index* calculates what each facility's profit rate would be given its mix of patients across CMGs, evaluated at national average payments and costs for each CMG.
 - » For example, using RICs as the case-mix grouping variable, the index value for each IRF is the case-mix-weighted national average payment divided by the case-mix weighted national average cost of each RIC weighted by the IRF's share of cases in each RIC.
 - » This index captures variation across facilities owing to variation in facility case-mix profitability for a standardized level of profitability in each CMG.³

- The facility profitability index calculates what the profitability of each facility would be given each facility's average payments and costs of each CMG, applied to the national share of IRF stays in each CMG.
 - » For example, using RICs as the case-mix grouping variable, the index is a facility's weighted average payment for each CMG weighted by national case-mix share of cases in each RIC, divided by the facility's weighted average cost for each CMG weighted by national case-mix shares in each RIC.
 - This index varies across facilities with variation in profitability of stays by CMG for a standardized mix of cases.⁴ This variation could owe to factors such as greater or lesser economies of scale or selection of more profitable patients within a given CMG.

We assess the relative importance of case mix and profitability of a given case mix by comparing the extent to which each index is related to facility P/C.

In table 2, we report the shares of the variation in facility-level P/C ratios that can be explained by variation in each facility's case mix and profitability. Column A reports the R-squared statistic from univariate facility-level regressions in which the dependent variable is the IRF P/C ratio and the explanatory variable is the facility case-mix profitability index (i.e., the index of facility case mix standardized to national profitability). Column B reports the R-squared from parallel regressions in which the dependent variable is also the facility P/C ratio and the explanatory variable is also the facility P/C ratio and the explanatory variable is the facility profitability index (i.e., the index of facility case mix). Estimates in the first set of rows are based on stays from all RICs, first using RICs as the case-mix grouping variable, followed by similar indexes for RIC and CMG combinations and for RIC, CMG, and tier combinations.⁵

The findings show the facility case-mix profitability index is a much weaker predictor of facility profits than is the facility profitability index. For example, in the first row, case mix is defined as the 21 RIC groupings. The facility case-mix index, standardized for profitability, explains 21.5 percent of variance in IRF profitability across facilities (column A). In contrast, the facility profitability index, standardized for case mix, explains 99.1 percent of variation in IRF profitability (column B).

More detailed groupings of case mix show similar results. With case mix measured by all CMGs nested within the RICs (87 groups), case mix can explain 32.1 percent of the variability in IRF profitability. Using all CMGs (347 RIC/CMG/tier combinations), case mix explains 32.6 percent of the variability of IRF profitability. The finding for the index of facility-level profitability is similar if we use the more detailed groupings (98.8 using RIC/CMGs and 98.9 using RIC/CMG/tier). We also repeated this exercise using facility-level average dollar profit, defined as average payments less average costs. The results are essentially the same.

The two approaches yield different results because the two indexes are correlated (e.g., r = 0.453 using CMG/tier). One way this could occur is if facilities with less functional patients also have higher profits per patient across the CMGs it serves. The first approach attributes the common variation to case mix, and the second attributes it to facility-specific profitability. Under either approach, we can

conclude that differences in case mix can explain no more than a third of the variability in profitability across IRFs and may well explain even less.

TABLE 2

Share of Variation in Profitability (Payment/Cost Ratios) Explained by Facility Case-Mix and Facility Profitability, by RIC, CMG, and CMG Tier

	Share of variation explained by facility case mix (A)	Share of variation explained by facility profitability within case-mix groups (B)	Number of case- mix groups	Average share of case-mix groups covered by facility stays
All case-mix groups (N=1,071)				
Grouping by RIC	0.215	0.991	21	0.943
Grouping by RIC/CMG	0.321	0.988	87	0.825
Grouping by RIC/CMG/Tier	0.326	0.989	347	0.650
RIC 01: Stroke (N=1,081)				
Grouping by CMG	0.203	0.982	10	0.933
Grouping by CMG/Tier	0.207	0.978	40	0.806
RIC 06: Neurological (N=1,051)				
Grouping by CMG	0.064	0.966	4	0.890
Grouping by CMG/Tier	0.084	0.956	16	0.680

Source: Urban Institute analysis of Medicare fee-for-service claims data for stays in inpatient rehabilitation facilities that began in 2017.

Notes: CMG = case-mix group. N = facilities. RIC = rehabilitation impairment category. Calculations exclude short stays and deaths. Estimates for all case-mix groups exclude facilities with 20 or fewer such stays. Share of groups covered equals the total share of the national sample covered by groups for which the facility has at least one stay.

The second and third sets of rows in table 2 repeat the analysis but limit the samples to the stroke stays facilities treat and the neurological cases facilities treat. The number of facilities differs from the first row because they include facilities with 20 or fewer patients while also excluding facilities without patients in these RICs. We reach the same conclusions focusing on these RICs: variation in facility-level profitability is driven only to a very limited degree by case-mix differences (case-mix varies within RIC by CMG and comorbidity tier). We also conducted analyses analogous to those in table 2 using facility-level average dollar profit as the dependent variable and reached the same conclusions (the share explained by case-mix is even smaller than shown in column A of table 2).

Conclusion

Even though the payment weights of Medicare's payment system for IRFs are updated each year to reflect recent cost patterns, we find substantial differences in ratios of payments to costs across RICs. Within selected RICs, we show that P/C ratios vary substantially across CMGs and tier. Our findings show that P/C ratios are generally higher for patients with lower levels of motor and cognitive functioning. The reason for the variability in profitability across case-mix groups is not clear. Possibilities to examine in future work include: shifts in practice patterns that affect costs, the

influence of outlier or facility-level add-on payments, how functional status is coded, and how the relative weights are constructed. These differences in profitability for different types of patients could incentivize providers to selectively admit some types of patients and adversely affect access to care for some patients and could affect quality of care.

We find P/C ratios vary substantially at the facility level as well. At most a third of facility-level variation in P/C ratios can be explained by facility-level differences in case mix. Other facility-level profitability factors appear to play a larger role. Further analysis is needed to quantify the key drivers of variation in profitability across IRFs.

Notes

- ¹ Cognitive status was removed from the case-mix group system in fiscal year 2020.
- ² The complete list of tier comorbidities as of 2017 can be found at https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/InpatientRehabFacPPS/Downloads/FY2017_datafiles_final.zip.
- ³ The facility case-mix index is constructed by first calculating the case-mix-weighted averages of national average payments and average costs for each case-mix category and then calculating the index value as the ratio of case-mix-weighted payments to case-mix-weighted costs. Not all IRFs have cases in all CMGs. The facility share of cases or weight for a group is zero if a facility has no cases in that group.
- ⁴ The facility profitability index is constructed as the ratio of the facility payments and costs of each group weighted by the national share of IRF stays in each group. Not every IRF has a case in every CMG. As a result, the IRF payments and costs for such CMGs cannot be included in the facility profitability index. In these instances, we exclude the category and deflate by the national share of IRF stays in the covered groups.
- ⁵ Using the more detailed groupings more fully captures differences in patient mix, but fewer facilities would have cases in all groups. This can be observed in the last column of table 2, which shows the share of groups covered by facility stays for the average facility, ranging from 94 percent for RICs to 65 percent for RIC/CMG/tier groupings.

Reference

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