

Characteristics, Costs, and Payments for Stays within a Sequence of Post-acute Care

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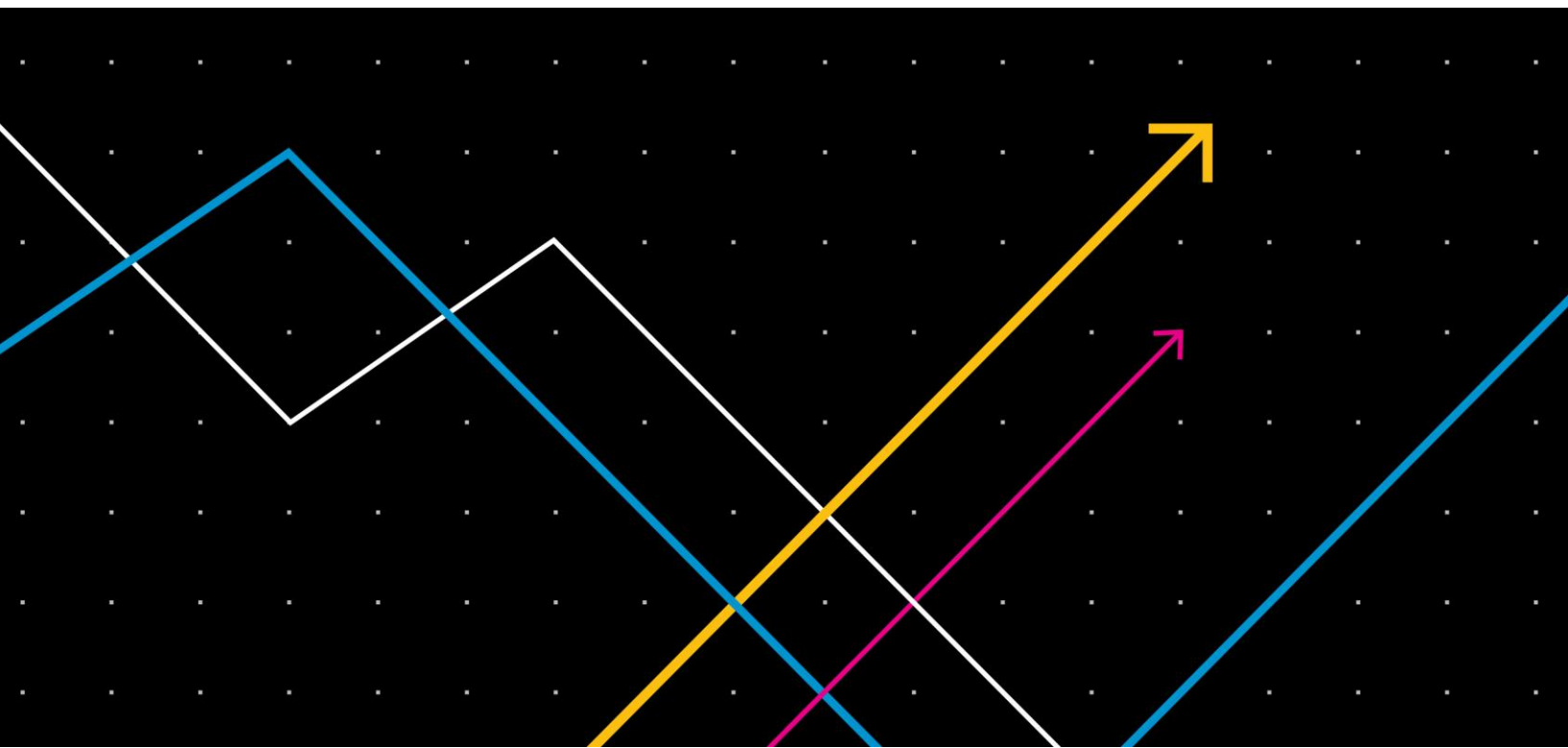
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Characteristics, Costs, and Payments for Stays within a Sequence of Post-acute Care

For its fee-for-service beneficiaries, Medicare currently pays for post-acute care (PAC) under four different prospective payment systems (PPSs) in its three separate institutional settings (skilled nursing facilities, inpatient rehabilitation facilities, and long-term care hospitals) as well as home health. Instead of having four different systems, the Medicare Payment Advisory Commission (MedPAC) concluded that it was feasible to design a unified PAC PPS that would base payments on currently available data (MedPAC 2016). In the prototype unified system, institutional facilities would be paid the same risk-adjusted amount for a given patient stay regardless of the setting. Home health agency patients would be paid a fixed fraction of that amount. In June 2017, the Commission recommended that a PAC PPS be implemented beginning in 2021 with a three-year phase in. As the Commission continues its work on a unified PAC PPS, it is considering refinements that would improve the design.

The Urban Institute is providing data and analytic support to MedPAC as it focuses on one such refinement: increasing the accuracy of payment for cases that involve a sequence of multiple PAC stays. We assess whether the profitability of a stay under the prototype PAC PPS differs by whether a stay is preceded or followed by other stays. If the profitability of a stay varies according to its timing within a sequence of stays, providers could have a financial incentive to extend care episodes when it is unnecessary, or they could have trouble placing beneficiaries who need extended care in appropriate settings. In such a circumstance, the payment model may require modification to account for the position of a stay in a sequence of stays.

In this report, we review the method of measuring costs and constructing PAC PPS payments for the universe of 2013 stays updated to reflect 2017 payments. This analysis is based on data and constructed payments previously reported by Wissoker and Garrett (2016) and Wissoker (2017). We then describe our construction of care episodes by combining successive stays for individual patients into sequences of PAC care (i.e., episodes), and report the frequency of the most common sequences of stays. Finally, we compare the ratios of PAC PPS payments to costs by type (institutional or home health) and where the stay fell among all stays within that episode. We find that later home health “stays” (i.e., 60-day home health episodes) are more profitable than first stays, indicating the need for

further adjustment analogous to the early or late adjustment in the current home health PPS. Later institutional stays, on the other hand, are of roughly similar profitability as earlier stays.

Background on Estimating the Cost of PAC Stays

Our PAC PPS payment model is based on the universe of 2013 Medicare post-acute stays, which is made up of 8.9 million stays across the four settings. A stay is defined by a discharge from an inpatient rehabilitation facility (IRF) or a long-term care hospital (LTCH), an episode in a home health agency (HHA), and days on Medicare-covered claims within a stay in a skilled nursing facility (SNF). Claims covering each SNF stay were combined to create a stay.

Approximately 9 percent of home health episodes and 14 percent of institutional stays had missing data and were dropped (table 1). Stays were dropped because of

- zero payments;
- missing data on charges;
- missing provider data, such as cost-to-charge ratios;
- missing data on the area wage index; and
- missing other data needed for the analysis (for example, the data needed to calculate a level of severity of illness for a stay or an indicator of disability for the beneficiary).

We also dropped SNF stays of over 101 days, IRF and LTCH stays with exceptionally long lengths of stay, and LTCH stays with multiple nonzero claims.¹

TABLE 1
Number of 2013 Stays by Setting before and after Exclusions

	Number of 2013 stays	Number of stays in PAC PPS analysis	Percentage of stays dropped
Home health agencies	6,695,952	6,108,960	8.7
Skilled nursing facilities	2,630,489	2,266,204	13.8
Inpatient rehabilitation facilities	440,584	378,163	14.2
Long-term care hospitals	159,596	136,665	14.4
Total	9,926,621	8,889,992	10.4

Source: Urban Institute analysis of 2013 Medicare Standard Analytic Files.

Notes: PAC = post-acute care; PPS = prospective payment system.

Aside from the specified exclusions, we retained all stays of all reported health conditions in the analysis file, reflecting the assumption that the PAC PPS would be used to pay for all stays regardless of the principal reason for treatment, the patients' comorbidities, or whether the beneficiary had been admitted from the community. The analysis file includes stays from 9,188 HHAs (37 percent of PAC providers), 14,256 SNFs (57 percent of PAC providers), 1,093 IRFs (4 percent of PAC providers) and 416 LTCHs (2 percent of PAC providers). Hospital-based facilities account for 10 percent of HHA stays, 6 percent of SNF stays, 51 percent of IRF stays, and no LTCH stays.

Costs per stay include routine and ancillary costs, overhead costs, and the costs associated with teaching programs and treating low-income patients (in IRFs).² For institutional stays, we estimated therapy and NTA costs by converting charges on the PAC claims to costs using facility-specific and department-specific cost-to-charge ratios from each provider's Medicare cost report. To estimate therapy costs for HHAs, we calculated cost-to-charge ratios for each agency as the ratio of average charges per visit for the agency from the Datalink file and average costs per visit from the provider's Medicare cost report. We then converted the charges from the Datalink file to costs using this cost-to-charge ratio. All costs were standardized using the provider's wage index.

We did not have measures of routine relative resource use for the 2013 stays. Therefore, we imputed "actual" stay routine costs in three steps described in more detail below. First, we used the detailed assessment data from PAC-PRD demonstration data to develop a model to predict the routine resource use in a stay relative to the facility average routine resource use. Second, we applied this model to predict the relative routine resource use within facilities for the 2013 PAC stay. Third, we created routine costs for each stay as the average facility costs from the cost report adjusted by the predicted relative routine use within facilities.

For the routine cost prediction model, we used the clinical, demographic, and stay measures included in our administrative models of costs as well as a quadratic function of length of stay (or, for HHA episodes, the number of visits) from the administrative data. We also included an indicator for each provider in the PAC-PRD demonstration data so that the coefficients on the clinical, demographic, and stay information would describe how each patient's routine resource use deviates from that provider's average. The model is estimated using Poisson multivariate regression (generalized linear model with a log link). Coefficients are reported in table 3 of an earlier report by Wissoker (2017). This model provides the predictions of the routine resource use for each stay relative to the facility average routine resource use.

To calculate the routine cost for a stay, we calculated an average routine cost per stay for the provider of the stay by combining costs per day from the provider's 2013 Medicare cost report with lengths of stay from claims. We then used the model-predicted relative resource use for the stay relative to the average prediction of all stays for the provider to adjust the stay's routine cost up or down relative to the facility average routine cost.³ This ensures that each facility's imputed routine cost is centered on the actual routine cost for that facility.

Actual payments for each stay are used to set the average PAC PPS payments and are standardized by the provider's area wage index. Thus, actual payments and costs adjust for differences in input costs across geographic areas. Because PAC PPS payments are based on costs that were already standardized, they do not need to be adjusted further.

We adjusted all costs and payments to 2017 values based on the "through date" of each stay and MedPAC staff's expectations of the change in costs and payments from the stay through date through 2017. The cost and payment multipliers used to simulate the 2017 data are reported in table 2 of an earlier report by Wissoker (2017).

Construction of PAC PPS Payments Based on Predictive Models of Costs

We used two models to predict each stay's actual costs using patient and stay characteristics: one model for routine plus therapy costs (estimated using all cases) and another for nontherapy ancillary (NTA) costs (estimated using institutional stays). We used separate models because the costs and payments home health care stays do not include NTA services. We summed the cost predictions generated by the two models, setting NTA costs to zero for HHA stays. Under a PAC PPS, relative weights for each stay would be based on the sum of the predicted costs generated by the two models.

We used the following information to predict the cost of stays:

- patient age and disability status
- primary reason to treat (Medicare Severity Diagnosis Related Groups aggregated into broad "reason to treat" groups)
- patient comorbidities
- the number of body systems involved with the patient's comorbidities

- days spent in the intensive and coronary care units during the prior hospital stay
- the patient's severity of illness using the All Patient Refined Diagnosis Related Groups
- beneficiary's Hierarchical Condition Category risk score
- impairments and treatments, including bowel incontinence, severe wounds or pressure ulcers, use of certain high-cost service items, and difficulty swallowing
- frailty indicators as a proxy for functional status
- patient's cognitive status based on patient diagnoses

Primary reason to treat, comorbidities, number of body systems, severity of illness, and cognitive status are based on information from the hospital claim when the patient had a preceding hospital stay or are proxied from the PAC claims' diagnostic information if the patient did not have a preceding hospitalization.

The model uses claims-based proxies for questions that are available on assessments in some settings. Specifically, no assessment data are available across settings to indicate the patient was on a ventilator, had bowel incontinence, had severe wound care needs, or received complex care management. Therefore, we relied on codes from the International Classification of Diseases, Ninth Revision (ICD-9) in the PAC claims to indicate bowel incontinence and the presence of ventilator care (and did not include a complex care management variable).⁴ We used ICD-9 codes for coma, dementia, Alzheimer's disease, schizophrenia, and depressive disorders as proxies for cognitive function, and we used ICD-9 codes for dysphagia as a proxy for swallowing difficulties. More detailed definitions of the predictors for the models are reported by Wissoker (2017).

We generally avoided including in the model indicators of service use that are within providers' ability to control (such as the amount of rehabilitation therapy, the number of therapy disciplines, or the use of oxygen without a link to a respiratory diagnoses), but we did include indicators for ventilator care, tracheostomy care, and continuous positive airflow pressure because the cost of these services is significant and their use is much less likely to be influenced by payment policy.

To compensate for the lack of functional status information in the administrative data, we calculated the Frailty Index developed by JEN Associates, Inc. for each stay and included the components of that index as predictors. The JEN frailty index was developed to use claims diagnoses to identify frail older adults who may be at risk of institutionalization. It is based on 13 grouped categories of diseases or signs found to be significantly related to a current or future need for long-term care services.

We include in the model an indicator of the care being provided by HHAs. In early models that did not include this measure, the predicted average of routine plus therapy costs for home health cases was around 48 percent above the average costs. The predicted cost for home health cases reflects the costs for comparable patients treated in institutional settings. HHAs do not incur the same kinds or levels of costs of institutional providers, so we include an indicator in the model for home health. Without this indicator, PAC PPS payments would be well above the cost of care in HHAs and below the cost of care for stays treated in institutional settings. Including this indicator gives the result that costs for home health cases and for all institutional stays are predicted correctly on average. Including the home health indicator deviates from the overall goal of site-neutral payments, but we deemed it essential for producing reasonable alignment of payments and costs within an otherwise unified model (MedPAC 2016).

We predicted costs using Poisson regression models (i.e., a generalized linear model with a log link). Compared with an ordinary least squares regression, the Poisson regression gives less emphasis to infrequent but exceptionally high-cost stays. In addition, Poisson models can more easily handle dependent variables with zero values (such as institutional stays with no NTA costs).

The unified PAC PPS payments analyzed here include two illustrative outlier policies. First, we model a system in which 5 percent of payments are set aside for high-cost outlier payments. The system reimburses 80 percent of losses above the fixed loss amount, defined to be \$1,842 for HHA and \$11,216 for institutional settings. With this policy, roughly 11 percent of home health episodes and 11 percent of institutional stays would receive an outlier payment.

Second, we separately model a short-stay outlier payment. Institutional stays with lengths of stay within the shortest decile for their institutional settings are paid at 1.2 times the per diem cost for the first day and at cost for subsequent days. Home health low-utilization payment adjustment cases defined as having four or fewer visits are paid 1.2 times the per visit cost for the first visit and paid at cost for subsequent visits.

We estimated these cost models using cost data from 2013 that we adjusted to 2017 values. The cost-model coefficient estimates are reported in table 3 of a previous report by Wissoker (2017). The payments made to the 2013 caseload, including outlier payments and adjusted to 2017 values, are then used to define a budget-neutral average PAC PPS payment. PAC PPS payments were set to be proportional to the prediction from the cost models, imposing that the average PAC PPS payment equals the average of current payments adjusted to 2017.

Construction Care Episodes of Sequences of PAC Stays

We define an episode of care as a sequence of post-acute stays for which each stay is separated from previous stays by no more than seven days. All patient stays that start within seven days of a previous stay or end within seven days of the next stay are linked to create a single care episode. This rule applies even if the patient has an intervening acute hospital stay.

For our analysis of care episodes, we excluded some additional cases (reducing the number of stays included in the analyses from those listed in table 1) that were problematic for the creation of care episodes. We dropped all beneficiaries that had an end date of an institutional stay that overlapped with the start day of another institutional stay or overlapped with the start dates for a home health episode, because they represent questionable data quality. We also dropped beneficiaries if start dates were the same for more than one stay because we could not confidently define the order of the stays. Altogether, we dropped an additional 12,479 stays leaving 8,877,513 post-acute stays for the sequences of care analyses that follow.

The start and end dates of individual stays reflect current billing rules.

- Sixty-day home health episodes were considered a single home health episode even if an intervening hospital or institutional stays occurred within the 60-day episode.
- Separate SNF stays were created if there was an intervening hospital or post-acute stay.
- Separate IRF stays were created if there is a hospitalization or PAC stay of greater than three days or the beneficiary returned to a different IRF facility.
- The rules for LTCHs treat an interruption as leading to separate stays if the patient was returned to the same LTCH following a stay in an acute hospital for at least 10 days; an IRF for at least 28 days; or an SNF for at least 46 days.

After linking the individual 8,877,513 stays, we obtained 5,334,337 care episodes. Table 2 reports the distribution of PAC episodes, with 1 to 13 stays per care episode. The majority of care episodes (64.4 percent) have only one stay. Nearly all the rest have six or fewer stays, with less than one percent consisting of more than six stays.

TABLE 2

Distribution of Episodes by Number of Stays

Number of stays in an episode	Number of episodes	Percentage of episodes	Cumulative percentage of episodes
1	3,435,192	64.4	64.4
2	1,121,885	21.0	85.4
3	367,059	6.9	92.3
4	158,394	3.0	95.3
5	85,860	1.6	96.9
6	134,973	2.5	99.4
7	25,248	0.5	99.9
8	4,378	0.1	100.0
9	1,077	<0.1	100.0
10	230	<0.1	100.0
11	66	<0.1	100.0
12	14	<0.1	100.0
13	1	<0.1	100.0

Source: Urban Institute analysis of 5,334,337 care episodes based on 2013 Medicare claims data.

To describe the sequence of settings for care episodes, we sequentially assigned letters indicating the setting for each stay in the episode, with H = home health, S = SNF, I = IRF, and L = LTCH. Single-stay care episodes have a single letter indicating the setting. Care episodes with multiple stays have one letter for each stay, with settings ordered by the start day of each stay. For example, a stay that begins in a SNF and is followed by two home health episodes is labelled “SHH.” The length of the sequence indicates the number of stays.

In table 3, we report the distribution of sequences with at least 2,500 care episodes. Home health and SNF single-stay episodes are most common, accounting for 61 percent of care episodes. IRF and LTCH single-stay episodes are considerably less common (consistent with their smaller share of the PAC market) with a total of 3 percent of all episodes.

TABLE 3

Sequences of Post-acute Care with More Than 2,500 Episodes

Sequence	Frequency	Percentage	Cumulative frequency
H	2,290,337	42.9	42.9
S	969,965	18.2	61.1
HH	400,527	7.5	68.6
SH	322,159	6.0	74.7
HHH	144,493	2.7	77.4
SS	125,440	2.4	79.7
I	123,523	2.3	82.0
HHHHHH	112,255	2.1	84.2
IH	97,679	1.8	86.0
HS	95,162	1.8	87.8
HHHH	72,678	1.4	89.1

L	51,367	1.0	90.1
HHHHH	46,424	0.9	91.0
SHH	36,372	0.7	91.6
SSH	27,253	0.5	92.2
IS	23,711	0.4	92.6
SSS	21,014	0.4	93.0
SHS	20,724	0.4	93.4
HSH	19,917	0.4	93.8
LS	18,733	0.4	94.1
HHS	16,322	0.3	94.4
HI	15,218	0.3	94.7
HSS	13,242	0.3	94.9
IHH	12,035	0.2	95.2
ISH	10,860	0.2	95.4
HHHHHHH	9,709	0.2	95.6
SHHH	9,328	0.2	95.7
LH	8,453	0.2	95.9
HL	6,386	0.1	96.0
HHHS	6,150	0.1	96.1
SHSH	4,618	0.1	96.2
HSHH	4,403	0.1	96.3
SSHH	4,352	0.1	96.4
SSSS	3,966	0.1	96.5
SHHHH	3,814	0.1	96.5
ISS	3,775	0.1	96.6
IHS	3,742	0.1	96.7
LSS	3,431	0.1	96.7
HHHHS	3,336	0.1	96.8
HIH	3,154	0.1	96.8
SSSH	3,147	0.1	96.9
HSHH	3,139	0.1	97.0
HHI	3,135	0.1	97.0
IHHH	3,011	0.1	97.1
HSSH	2,875	0.1	97.1
II	2,799	0.1	97.2
LSH	2,725	0.1	97.2
SHSS	2,562	0.1	97.3
All other	14,2393	2.7	100

Source: Analysis of 8.9 million PAC stays in 2013 conducted by the Urban Institute for MedPAC.

Notes: The 8.9 million PAC stays in 2013 were provided in 5,334,376 sequences of post-acute care. Home health stay (H), skilled nursing facility stay (S), inpatient rehabilitation facility stay (I), and long-term care hospital stay (L). The sequence shows the order and count of the stays. For example, a HH refers to a two-stay sequence and both stays were home health care.

Multiple-stay care episodes account for 35.6 percent of all care episodes. Of these, 41.6 percent (or 14.8 percent of all care episodes) are only home health episodes, and 10.8 percent (3.9 percent of all) are only institutional PAC (I-PAC) stays (i.e., SNF, IRF, or LTCH). Sequences that involve both home health and institutional arrangements tend to move from a higher to lower level of care. Of the multistay episodes, 28.2 percent (10.1 percent of all episodes) move from an institutional setting to home health, and 8.6 percent (3.1 percent of all episodes) involve movement from home health to an institutional setting. The others cycle between home health and institutional settings or are in

categories with fewer than 2,500 episodes (which in the latter case make up less than 3 percent of episodes).

For each stay in an episode, we observe the setting, cost, diagnoses and other characteristics as well as sequence of settings in the care episode and where the stay falls in the sequence. We also compute what the payment would be under the prototype PAC PPS for the stay. In the remainder of this report, we describe the profitability of stays (and other stay characteristics) by stay setting and its position in the sequence of stays in the care episode.

Payment-to-Cost Ratios of Stays by Setting and Position in Sequences of Stays

First, we examine the average payment-to-cost ratios of stays, by setting and position in the sequence of stays. Payments are the simulated post-acute prospective payment system payments including outliers for 2017 as described above. Costs include both the estimated routine plus ancillary costs for 2017. Payment-to-cost ratios are the ratios of the average payments to average costs for the stays being analyzed, and these ratios indicate the profitability of the group of stays.

The analyses are performed separately for stays that are in home health and institutional settings (combining SNF, IRF, and LTCH). All home health stays are grouped together regardless of what type of sequence they are in. Likewise, all institutional stays are grouped together. Care episodes that contain both home health and I-PAC stays contribute stays in both the home health and I-PAC groupings.

Tables 4 and 5 report average PAC PPS payments, average costs, and payment-to-cost ratios for home health stays and I-PAC stays, further grouped by the length of the sequence the stay belongs to and the stay's position within the sequence. The first row of data in table 4 reports information for home health stays in episodes that consist only of that stay (indicated as an H sequence in table 3). The second row reports data for home health stays that are the first stay of episodes made of two stays (including sequences HH, HS, HI, and HL in table 3). The third row reports data for home health stays that are the second stay of episodes with a length of two stays (HH, SH, IH, and LH). Subsequent rows show for stays of length three by sequence position, and so on. Table 5 reports analogously for institutional stays. The first row reports data for solo institutional stays (S, I, or L), the second row reports data for the first stay of two-stay sequences (an S, I, or L stay followed by any other type of stay), and so on. In this manner, we can reveal potential patterns in the profitability of stays depending on where they fall in an episode of post-acute care.

TABLE 4

Estimated Payments under the Post-acute Care Prospective Payment System, Costs, and Ratio of Payments to Costs by Timing of the Stay, Home Health Episodes

Sequence length (in stays)	Stay number in the sequence	Average PAC PPS payment	Average cost	Average payment / average cost	Stay counts
1	Solo	\$2,530	\$2,190	1.16	2,290,337
2	First	2,735	2,699	1.01	517,293
	Second	2,643	2,278	1.16	828,818
3	First	2,739	2,611	1.05	207,970
	Second	2,783	2,565	1.08	245,854
	Third	2,584	2,087	1.24	264,894
4	First	2,754	2,592	1.06	105,309
	Second	2,756	2,430	1.13	116,255
	Third	2,724	2,343	1.16	118,887
	Fourth	2,567	1,982	1.29	120,314
5	First	2,762	2,574	1.07	64,902
	Second	2,735	2,356	1.16	69,767
	Third	2,697	2,226	1.21	70,040
	Fourth	2,686	2,204	1.22	71,257
	Fifth	2,545	1,896	1.34	68,633
6	First	2,649	2,174	1.22	125,214
	Second	2,619	2,056	1.27	127,694
	Third	2,601	1,986	1.31	128,045
	Fourth	2,603	1,982	1.31	128,066
	Fifth	2,599	1,979	1.31	128,182
	Sixth	2,529	1,790	1.41	125,718

Source: Analysis of 2013 PAC stays conducted for the Commission by the Urban Institute.

Note: Post-acute care (PAC), prospective payment system (PPS). Within the type of stay (in this case, home health stays) and sequence length, the count of stays by stay number varies because not all stays were treated in that setting. For example, in a home health sequence with four stays, there were 116,255 second stays and 118,887 third stays because some second stays were furnished in I-PAC settings. Other combinations of visits with seven or more stays in the sequence are not shown.

For home health stays, we find that the profitability of the episode depends on where it falls in a sequence of stays (table 4). Care episodes consisting of a single home health episode have an average payment-to-cost ratio of 1.16. Such episodes are typically more profitable than first home health stays in episodes with multiple stays (except for the longest episodes shown, with six stays). Overall, the average payment-to-cost ratio of first home health stays of multistay episodes is 1.05 (not shown in table). Within multistay care episodes of each length, average profitability is lowest for the episode starting the sequence and then increases, with the last stay being the most profitable.

For institutional PAC stays, we find a much weaker relationship between payment-to-cost ratios and position in the stay (table 5). Single-stay care episodes have a payment-to-cost ratio of 1.14. This is slightly lower than the profitability of the first I-PAC stays of two-stay episodes (1.17) and higher than those of the first stays of longer care episodes. It is also only slightly higher than the payment-to-cost

ratio for stays at the end of a care multistay episode; that ratio ranges from 1.12 to 1.14 for care episodes of fewer than six stays.

TABLE 5

Estimated Payments under the Post-acute Care Prospective Payment system, Costs, and Ratio of Payments to Costs by Timing of the Stay, Institutional Post-acute Care Stays

Sequence length (in stays)	Stay number in the sequence	Average PAC PPS payment (\$)	Average cost (\$)	Average payment / average cost	Stay counts
1	Solo	16,289	14,245	1.14	1,144,855
2	First	16,277	13,948	1.17	604,592
	Second	16,135	14,318	1.13	293,067
3	First	17,060	15,191	1.12	159,089
	Second	16,321	14,334	1.14	121,205
	Third	16,056	14,100	1.14	102,165
4	First	17,655	16,097	1.10	53,085
	Second	16,599	14,785	1.12	42,139
	Third	16,504	14,821	1.11	39,507
	Fourth	16,329	14,287	1.14	38,080
5	First	18,097	16,740	1.08	20,958
	Second	16,929	15,162	1.12	16,093
	Third	16,682	15,205	1.10	15,820
	Fourth	16,739	15,052	1.11	14,603
	Fifth	16,586	14,677	1.13	17,227
6	First	18,381	17,506	1.05	9,759
	Second	17,362	16,147	1.08	7,279
	Third	17,116	15,966	1.07	6,928
	Fourth	17,041	15,784	1.08	6,907
	Fifth	17,242	16,016	1.08	6,791
	Sixth	17,267	16,246	1.06	9,255

Source: Analysis of 2013 PAC stays conducted for the Commission by the Urban Institute.

Note: Post-acute care (PAC), prospective payment system (PPS). “Institutional post-acute care” refers to stays in skilled nursing facilities (SNFs), inpatient rehabilitation facilities (IRFs), and long-term care hospitals (LTCHs). Within the type of stay (institutional PAC) and sequence length, the count of stays by stay number varies because not all stays were treated in that setting. For example, in the institutional PAC sequence with four stays, there were 42,139 second stays and 39,507 third stays because some second stays were furnished in I-PAC settings. Other combinations of visits with seven or more stays in the sequence are not shown.

For simplicity, we report the data in a more aggregated form in table 6, with rows grouping all stays by their position in a care episode combined over care episodes of varying lengths. Third home health stays, for example, include stays from episodes with three or more stays but not episodes with only one or two stays. By collapsing the data in this way, we focus on changes in profitability by a stay’s position in the sequence while recognizing that position and spell length are closely related.

TABLE 6

Payment-to-Cost Ratio, by Stay Number in Care Episode

	Home Health Episodes		Institutional PAC Stays	
	Payment/cost	N	Payment/cost	N
Solo	1.16	2,290,337	1.14	1,144,855
For care episodes with between two and six stays				
First-of-multiple	1.05	1,020,688	1.15	847,483
Second	1.15	1,388,388	1.13	479,783
Third	1.23	581,866	1.13	164,420
Fourth	1.28	319,637	1.13	59,590
Fifth	1.32	196,815	1.11	24,018
Sixth	1.41	125,718	1.06	9,255

Source: Analysis of 2013 PAC stays conducted for the Commission by the Urban Institute.

Note: Post-acute care (PAC), prospective payment system (PPS). “Institutional post-acute care” refers to stays in skilled nursing facilities (SNFs), inpatient rehabilitation facilities (IRFs), and long-term care hospitals (LTCHs). “First-of-multiple” PAC stays are stays discharged to subsequent PAC settings—either home health or institutional PAC. Second, third, fourth, and fifth could be preceded and/or followed (and sixth stays could be preceded) by PAC stays of any type, home health or institutional. For example, a third home health stay was third in a sequence of PAC stays, and the sequence could include home health and institutional PAC stays before and after the third stay.

In this simpler framework, we find similar patterns in profitability as found in tables 4 and 5. For home health episodes, solo episodes have a payment-to-cost ratio of 1.16, first episodes among those with more than one stay have an average payment-to-cost ratio of 1.05, and later episodes have payment-to-cost ratios above 1.25. For institutional PAC stays, the payment-to-cost ratio of solo, early, and later stays cluster around 1.13, with slight a decrease by stay number.

Characteristics of Component Stays by Stay Number of Home Health and Institutional PAC Stays

As a step toward understanding which patient characteristics and diagnoses are associated with the overpayment in later home health episodes, we examine how patient condition varies with position in the sequence for episodes with six or fewer stays (tables 7 and 8). Characteristics and diagnoses are also reported for all PAC stays, all home health episodes, and all institutional stays. These patterns reflect the timing within care episodes and differences in the types of care episodes that tend to have few or many stays.

TABLE 7

Beneficiary Characteristics by Timing of the Stay

Type of stay	Stay count (n)	Very old	Dual-eligible	ESRD	Disabled	Cognitively impaired	Community admitted	Least frail	Most frail	Chronically critically ill	Multiple body systems	Severely ill	Medically complex	Unusually high cost
All PAC stays	8,877,513	30%	32%	4%	26%	20%	50%	7%	11%	5%	N/A	N/A	N/A	11%
Home health episodes														
All	6,099,989	29	33	4	27	16	68	10	6	2	N/A	N/A	N/A	11
First-and-only	2,290,337	28	29	3	24	16	55	11	7	3	N/A	N/A	N/A	8
<i>For care episodes with six or fewer stays</i>														
First-of-multiple	1,020,688	30	38	4	29	17	73	9	6	2	N/A	N/A	N/A	16
Second	1,388,388	29	32	4	26	17	66	8	7	3	N/A	N/A	N/A	11
Third	581,866	30	36	4	30	17	86	9	4	0.8	N/A	N/A	N/A	11
Fourth	319,637	30	39	4	32	17	90	8	4	0.6	N/A	N/A	N/A	10
Fifth	196,815	30	41	4	33	18	92	8	4	0.4	N/A	N/A	N/A	9
Sixth	125,718	31	43	4	34	18	94	8	3	0.4	N/A	N/A	N/A	8
Institutional PAC stays														
All	2,777,524	31	30	5	23	27	10	2	21	11	17%	14%	0.1%	10
First-and-only	1,144,855	32	33	5	24	31	11	2	21	11	18	15	0.1	11
<i>For care episodes with six or fewer stays</i>														
First-of-multiple	847,483	30	24	5	21	21	7	2	21	12	15	14	0.1	9
Second	479,783	33	31	6	24	28	12	2	22	8	18	13	0.1	11
Third	164,420	32	32	7	25	28	15	2	22	6	19	11	0.1	11
Fourth	59,590	32	33	8	26	28	15	2	22	6	21	11	0.2	11
Fifth	24,018	32	34	8	27	28	15	2	23	6	23	12	0.2	12
Sixth	9,255	34	35	8	27	29	15	2	23	7	23	13	0.2	15

Source: Analysis of 8.9 million PAC stays in 2013 conducted by the Urban Institute for MedPAC.

Note: PAC (post-acute care), N/A (not applicable). "Institutional post-acute care" refers to stays in skilled nursing facilities (SNFs), inpatient rehabilitation facilities (IRFs), and long-term care hospitals (LTCHs). The table shows the share of stays with the respective characteristic(s). Because each row and column is independent, the rows and columns will not sum to 100 percent. "First-of-multiple" PAC stays are stays discharged to subsequent PAC settings—either home health or institutional PAC. Second, third, fourth, and fifth could be preceded and/or followed (and sixth stays could be preceded) by PAC stays of any type, home health or institutional. For example, a third home health stay was third in a sequence of PAC stays, and the sequence could include home health and institutional PAC stays before and after the third stay. Dual-eligible beneficiaries are eligible for Medicare and Medicaid. "Most frail" refers to stays assessed as having most frail patients using the JEN Frailty Index. (The JEN Frailty Index is an algorithm that identifies frail older adults who may be at risk for institutionalization.) "Chronically critically ill" refers to stays for beneficiaries who spent eight or more days in an intensive care or coronary care unit. "Severely ill" refers to stays for patients who were treated in institutional PAC and categorized as severity of illness level 4 during the immediately preceding hospital stay. "Multiple body systems" refers to stays for patients with diagnoses that involved five or more body systems and were treated in institutional PAC settings (thus, "not applicable" in the home health portion of the table). "Unusually high cost" refers to stays that would be included in an outlier pool set at 5 percent for home health stays and 5 percent for institutional PAC stays. About 12,000 stays were excluded from the analysis because the dates on the claims overlapped. Other combinations of visits with seven or more stays in the sequence are not shown.

TABLE 8

Beneficiary Primary Reason for Treatment by Timing of the Stay

Type of stay	Stay count (n)	Ventilator care	Severe wound care	Stroke	Other neurology medical	Other neurology surgical	Orthopedic medical	Orthopedic surgical	Respiratory medical	Respiratory surgical	Cardiovascular medical	Cardiovascular surgical
All PAC stays	8,877,513	0.4%	5%	2%	8%	0.6%	10%	10%	9%	0.5%	15%	3%
Home health stays												
All	6,099,989	0.0	5	1	9	0.3	12	6	8	0.4	17	2
First-and-only	2,290,337	0.0	3	1	8	0.4	12	10	8	0.5	13	4
<i>For care episodes with six or fewer stays:</i>												
First-of-multiple	1,020,688	0.0	5	1	10	0.2	12	2	9	0.2	19	2
Second	1,388,388	0.0	5	2	8	0.5	12	9	8	0.2	17	2
Third	581,866	0.1	6	0	10	0.1	12	1	7	0.1	21	1
Fourth	319,637	0.1	7	0	11	0.1	11	1	7	0.0	22	1
Fifth	196,815	0.1	6	0	11	0.1	11	0	7	0.0	22	0
Sixth	125,718	0.1	6	0	11	0.0	10	0	6	0.0	22	0
Institutional PAC stays												
All	2,777,524	1.2	4	4	5	1.2	5	17	11		9	4
First-and-only	1,144,855	1.4	3	4	5	1.1	5	17	11	0.5	9	4
<i>For care episodes with six or fewer stays:</i>												
First-of-multiple	847,483	1.1	4	5	4	1.5	6	25	8	0.6	7	5
Second	479,783	0.8	5	4	5	1.2	5	10	11	0.4	11	4
Third	164,420	0.9	6	3	6	0.9	5	8	11	0.4	12	3
Fourth	59,590	1.0	7	3	6	0.8	5	8	11	0.3	12	3
Fifth	24,018	1.0	8	3	5	0.7	5	8	11	0.3	12	3
Sixth	9,255	1.3	8	3	5	0.4	5	8	11	0.3	12	3

TABLE 8

Beneficiary Primary Reason for Treatment by Timing of the Stay (continued)

Type of stay	Kidney/urine medical	Kidney/urine surgical	Infectious disease medical	Infectious disease surgical	Hematology medical	Hematology surgical	Rehabilitation medical	Skin medical	Skin surgical	Other medical	Other surgical
All PAC stays	6%	0.4%	3%	0.5%	2%	0.1%	5%	4%	0.2%	15%	3%
Home health stays											
All	6	0.3	2	0.2	2	0.1	6	5	0.2	17	2
First-and-only	4	0.5	2	0.3	1	0.1	10	5	0.3	16	3
<i>For care episodes with six or fewer stays:</i>											
First-of-multiple	6	0.3	1	0.2	2	0.1	4	6	0.2	10	2
Second	5	0.2	2	0.3	2	0.0	4	5	0.1	16	2
Third	7	0.1	0.8	0.1	3	0.0	3	5	0.1	19	0.6
Fourth	9	0.1	0.6	0.1	4	0.0	2	5	0.1	20	0.4
Fifth	11	0.1	0.5	0.0	5	0.0	1	5	0.0	20	0.3
Sixth	12	0.0	0.4	0.0	6	0.0	1	5	0.0	20	0.2
Institutional PAC stays											
All	7	0.5	6	1.0	1	0.1	4	2	0.3	12	4
First-and-only	7	0.5	7	1.0	1	0.1	4	2	0.3	13	4
<i>For care episodes with six or fewer stays:</i>											
First-of-multiple	5	0.6	5	1.1	1	0.1	3	1	0.3	9	5
Second	8	0.5	6	0.9	2	0.1	4	2	0.4	14	4
Third	9	0.5	6	0.9	2	0.1	5	2	0.4	15	3
Fourth	9	0.5	6	0.8	2	0.1	5	2	0.5	14	3
Fifth	10	0.4	7	0.6	2	0.1	5	2	0.6	13	3
Sixth	10	0.4	7	0.7	2	0.1	5	3	0.4	12	3

Source: Analysis of 8.9 million PAC stays in 2013 conducted by the Urban Institute for MedPAC.

Notes: PAC (post-acute care), "Institutional post-acute care" refers to stays in skilled nursing facilities (SNFs), inpatient rehabilitation facilities (IRFs), and long-term care hospitals (LTCHs). The table shows the share of stays with the respective characteristic(s). Because each row and column is independent, the rows and columns will not sum to 100 percent. "First-of-multiple" PAC stays are stays discharged to subsequent PAC settings—either home health or institutional PAC. Second, third, fourth, and fifth could be preceded and/or followed (and sixth stays could be preceded) by PAC stays of any type, home health or institutional. For example, a third home health stay was third in a sequence of PAC stays, and the sequence could include home health and institutional PAC stays before and after the third stay. About 12,000 stays were excluded from the analysis because the dates on the claims overlapped. Other combinations of visits with seven or more stays in the sequence are not shown.

TABLE 9

Facility Profit Status and Location by Timing of the Stay

	Nonprofit	For profit	Hospital based	Freestanding	Stay counts
All	27%	70%	11%	89%	8,877,513
Home health stays					
All	27	70	10	90	6,099,989
First-and-only	36	61	14	86	2,290,337
<i>For care episodes with 6 or fewer stays:</i>					
First of multiple	21	76	8	92	1,020,688
Second	25	72	9	90	1,388,388
Third	19	79	7	93	581,866
Fourth	17	81	6	94	319,637
Fifth	16	82	6	94	196,815
Sixth	15	82	5	95	125,718
Institutional post-acute care stays					
All	28	67	12	88	2,777,524
First-and-only	28	67	11	89	1,144,855
<i>For care episodes with 6 or fewer stays:</i>					
First of multiple	32	63	19	81	847,483
Second	24	71	8	92	479,783
Third	23	73	8	92	164,420
Fourth	22	74	8	92	59,590
Fifth	21	76	8	92	24,018
Sixth	19	76	8	92	9,255

Source: Analysis of 2013 PAC stays conducted by the Urban Institute for MedPAC.

Note: Institutional post-acute care (I-PAC) includes stays in skilled nursing facilities, inpatient rehabilitation facilities, and long-term care hospitals. First of multiple PAC stays includes stays discharged to subsequent PAC care (either HH or I-PAC).

Among home health episodes, we see some clear differences associated with position of the stay. Solo home health episodes are less likely to be dual eligible, less likely to be disabled, and more likely to be admitted from hospitals than are later stays (table 7). The reasons for treatment also vary considerably, with solo episodes being more likely to require rehabilitation and those in longer sequences more likely to require kidney or urine care and medical hematology or involve severe wounds (table 8). First home health episodes of care episodes with multiple stays are more likely to receive outlier payments, but they otherwise have characteristics generally somewhere in between solo episodes and the later stays.

Among the I-PAC stays, we see sharp differences in diagnoses by timing of the stay within the care episode (tables 7 and 8). Among the first of multiple I-PAC stays, 25 percent are orthopedic surgery patients compared with 8 percent among those in their fifth or sixth stays in I-PACs. In contrast, 15 percent of first-stay patients from multistay care episodes have multiple body system diagnoses compared with 23 percent among those in their fifth or sixth stays. Other primary reasons for treatment, such as cardiovascular medical and respiratory medical, appear to have higher prevalence in

the fifth and sixth stays. Consistent with these patterns, the first-of-many I-PAC stays tend to be younger on average than those in their fifth or sixth stays and less likely to be cognitively impaired or community admitted.

Facility Characteristics by Position of Stay in Sequence

A portion of the variation in profitability with the position of the stay may be caused by the relative costs of the facility where the care takes place. To examine this, we examine the shares of stays treated in nonprofit, for-profit, hospital-based, and free-standing facilities and how they vary with the stay's position in care episodes.

Among home health episodes, solo episodes are substantially more likely to be treated by nonprofit and hospital-based agencies than other multistay episodes regardless of position in the sequence (table 9). This presumably is related to the high likelihood that solo stays originated at an acute hospital. Among multistay episodes, later episodes are more likely than early episodes to be treated by free-standing and for-profit agencies.

Among institutional stays, first-of-multiple stays are more likely to take place in non-profit and hospital-based institutional facilities than either solo stays or stays occurring later in care episodes (table 9). This high use of nonprofit and hospital-based facilities in the first stay of multiple-stay episodes is presumably related to the high rates of treatment of orthopedic surgical conditions, which disproportionately takes place in hospital-based IRFs. Among stays of multistay episodes, later stays are more likely than earlier episodes (beyond the first) to be treated by free-standing and for-profit facilities.

Conclusion

In this report, we have provided additional methodological detail and data analyses that are used in Chapter 4 of MedPAC's June 2018 report to Congress on paying for sequential stays in a unified payment system for post-acute care (MedPAC 2018). This work was generated by a concern that the post-acute payment model may not adequately account for a stay's position within a care episode in assigning payments.

We find that for home health, profitability and case mix depend on a home health episode's position in a sequence of stays (and whether the stay is part of a multistay care episode). This suggests that the

prototype design of the PAC PPS payment model does not adequately account for the change in costs and patient needs over the course of the care episode. One might adjust for this by adding indicators of stay position for home health into the payment. This would parallel the approach used in the current home health PPS. Such an adjustment would reduce the payments for late stays, disproportionately affecting free-standing and for-profit agencies and facilities

In contrast, institutional care profitability varies little with position in the sequence of stays despite variation in patient characteristics by the stay position. This suggests that the model adequately controls for variation in the costs of institutional stays regardless of where they occur in a sequence.

Further discussion of the implications of these findings for the design of the unified payment system, as well as likely impacts of moving from the current setting specific prospective payment system to a unified payment system, are discussed in the MedPAC report chapter.

Notes

- ¹ Within each setting, IRF and LTCH stays were dropped if their length of stay was greater than three standard deviations above the mean of the logged distribution.
- ² Because the overhead share of the total cost of a stay were similar across settings (though the levels differed), we did not model fixed and variable costs separately.
- ³ An alternative approach could have estimated the average routine cost per day (readily available from the cost report) and then multiplied this by each stay's length of stay.
- ⁴ Severe wound care includes treatment for a nonhealing surgical wound; an infected wound; a wound for a patient who is morbidly obese; a fistula; osteomyelitis; or a stage III, stage IV, or unstageable pressure wound.

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