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Authors

Makam, Anil N
Nguyen, Oanh Kieu
Kirby, Benjamin
et al.

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Effect of Site-Neutral Payment Policy on Long-Term Acute Care Hospital Use

Anil N. Makam, MD, MAS[*,†], **Oanh Kieu Nguyen, MD, MAS**[*,†], **Benjamin Kirby, BA**[‡], **Michael E. Miller, MS**[†], **Lei Xuan, PhD**[†], and **Ethan A. Halm, MD, MPH**[*,†]

[*]Department of Internal Medicine, University of Texas Southwestern Medical Center, Dallas, Texas;

[†]Department of Clinical Sciences, University of Texas Southwestern Medical Center, Dallas, Texas;

[‡]University of Texas Southwestern Medical School, Dallas, Texas.

Abstract

OBJECTIVE: To assess the projected effect of the Centers for Medicare and Medicaid Services new site-neutral payment policy, which aims to decrease unnecessary long-term acute care hospital (LTACH) admissions by reducing reimbursements for less-ill individuals by 2020.

DESIGN: Observational.

SETTING: National 5% Medicare data (2011–12).

MEASUREMENTS: We examined the proportion of site-neutral LTACH admissions. Regional LTACH market supply was defined as LTACH beds per 100,000 residents, categorized according to tertile. We conducted a hospital-level analysis to compare the projected effect of site-neutral payment on "propensity score" matched high- and low-LTACH-use hospitals.

RESULTS: Forty-one percent of LTACH admissions would be subjected to site-neutral payment. The proportion of site-neutral admissions was large, varied considerably according to LTACH (median 40%, interquartile range 22–60%), and was only modestly greater with greater market supply (Pearson correlation coefficient=0.23, p<.001; coefficient of determination=0.10). The site-neutral payment policy would affect 47% of admissions from the highest-supply regions, versus 30% from the lowest-supply regions (p<.001); and 43% from high-use hospitals versus 36% from propensity score-matched low-use hospitals (p<.001).

CONCLUSION: A considerable proportion of LTACH admissions will be subjected to lower site-neutral payments. Although the policy will disproportionately affect high-use regions and hospitals, it will also affect nearly one-third of the current LTACH population from low-use hospitals and regions. As such, the site-neutral payment policy may limit LTACH access in

Corresponding Author: Anil N. Makam, MD, MAS, 5323 Harry Hines Blvd., Dallas, TX 75390. Anil.Makam@UTSouthwestern.edu.
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SUPPORTING INFORMATION
Additional Supporting Information may be found in the online version of this article.

existing LTAC-scarce markets, with potential adverse implications for recovery of hospitalized older adults. SITE-NEUTRAL POLICY EFFECT ON LTAC USE 00:1–8, 2018.

Keywords

postacute care; long-term acute care hospital; Medicare; older adults; health policy

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Long-term acute care hospitals (LTACHs) account for more than 140,000 admissions and $5.5 billion in spending annually, which is approximately one-fifth of the spending on skilled nursing facilities (SNFs)—the principal alternative post-acute care setting.[1] The most appropriate LTACH patient is someone who is chronically critically ill and requires prolonged mechanical ventilation but is otherwise stable enough to leave the acute care hospital,[2] but most LTACH patients are not chronically critically ill or mechanically ventilated.[2,3] Out of concern that LTACHs are caring for individuals who could be effectively treated in less-costly settings, such as SNFs, the Centers for Medicare and Medicaid Services (CMS) is implementing a new site-neutral payment policy that will reduce reimbursement for individuals who are transferred to an LTACH for a psychiatric or rehabilitation diagnosis or who did not have an intensive care unit (ICU) stay of 3 days or longer during the preceding hospitalization or did not need prolonged mechanical ventilation.[4] Furthermore, to qualify as an LTACH a facility must have no more than half of its admissions paid at the site-neutral payment rate. This policy is being phased in over 4 years, with full implementation by 2020,[5] but the extent to which it will reduce LTACH use is uncertain.

To understand how the policy may affect LTACH use for hospitalized older adults, it is important to examine the policy's effect on regions with different LTACH supply and hospitals with different LTACH use because there is considerable regional and hospital-level variation between LTACH and SNF use, regardless of differences between patients.[6,7] Because differences in illness severity or individual preferences only partially explain LTACH use,[6] there are concerns that high-supply regions and high-use hospitals are inducing LTACH use by expanding indications for transfer. If there is significant induced demand, then the reduced reimbursement for site-neutral admissions would be more likely to affect high-supply regions and high-use hospitals. This policy could also have a major effect in low-supply regions if a sizeable proportion of their LTACH admissions are subject to reduced reimbursement, because this could lead to consolidation or closure of needed LTACHs and unintentionally result in poorer recovery of older adults recovering from acute illness who would no longer benefit from this model of care.

Another concern is that the policy may be a blunt tool that indiscriminately reduces LTACH use. As a corollary of demand elasticity, low-supply regions and low-use hospitals may be more apt to transfer the most complicated patients to LTACHs, akin to transferring the sickest individuals to the ICU when ICU bed supply is limited.[8–11] Thus, LTACH patients from low-supply regions and low-use hospitals who do not meet the minimum ICU stay or mechanical ventilation requirements that the new policy stipulates may still be sicker in other ways. These individuals may have more-complex diagnoses or greater comorbidity burden or require other care needs (e.g., complex wound therapy) beyond the scope of care provided in SNFs but may nonetheless have less access to LTACHs under the site-neutral payment policy.

To better understand the expected effect of this policy, we used national Medicare data to examine the projected consequences of site-neutral payment overall and on regions with different LTACH supply and hospitals with different LTACH use patterns. Of the subgroup of site-neutral LTACH admissions, we also examined whether LTACH patients from low-supply regions and low-use hospitals had greater illness severity than those from high-supply regions and high-use hospitals.

METHODS

Data Source and Study Cohort

We conducted an observational study using a national 5% Medicare limited dataset. Participant characteristics were obtained from Medicare denominator, inpatient, outpatient, carrier, and durable medical equipment (DME) files. Regional LTACH supply was defined at the hospital referral region (HRR) level using data from the Dartmouth Atlas.[12] Hospital characteristics were obtained from the CMS Provider of Services file.

We included Medicare fee-for-service beneficiaries aged 65 and older who were transferred from an acute care hospital (hereafter abbreviated as hospital) to an LTACH on the day of discharge or the next day in fiscal year 2012 using a validated temporally adjacent claims algorithm.[13] LTACHs were identified according to CMS provider numbers (last 4 digits between 2000–2299), which are based on Medicare certification. We confirmed the identification of LTACHs by reviewing the facility name and then conducting an Internet search if the facility type was uncertain. We excluded individuals without Medicare Parts A and B or those with Part C at any time in the past 12 months (Table 1).

Regional LTACH Market Supply

Regional LTACH market supply was defined as the number of LTACH beds in 2012 per 100,000 residents in the HRR using 2010 U.S. Census data. For regional analyses, we categorized the 304 HRRs according to tertile (Supplementary Figure S1): low (<5 beds per 100,000 residents); intermediate (5–11 beds), and high (>11 beds).

Hospital LTACH Use

For each hospital, we calculated the historical transfer rate to an LTACH for Medicare fee-for-service beneficiaries in 2011; the numerator was the number of hospitalized individuals transferred to an LTACH on the day of discharge or the next day, and the denominator was total number of hospitalizations. For the single hospital without claims data in 2011, we used 2012 data. Low-use hospitals were defined as having a LTACH transfer rate less than the median transfer rate of 1.32% and high-use hospitals as having a rage of the median or greater.

Patient Characteristics

We used proxies for advanced functional impairment using DME claims for wheelchairs, home hospital beds, and oxygen and a validated claims-based frailty index (C-statistic0.75 to identify the Fried frailty phenotype).[15] We used diagnosis-related groups (DRGs) and major diagnostic categories (MDCs) to characterize the reason for hospitalization. CMS assigns hospital DRG weights multipliers to reflect average resources used to treat individuals in that DRG. ICU length of stay was ascertained from revenue center codes.

Statistical Analyses

We examined the proportion of admissions susceptible to site-neutral payment according to individual LTACHs and examined the correlation between the proportion of site-neutral admissions and regional LTACH market supply. To enable a more-robust estimate, we restricted analysis to LTAC facilities with 5 or more claims.

For region-level analyses, we used Cochran-Armitage correlation coefficients to test for trends for categorical variables and Spearman correlation coefficients to test for trends for continuous variables across tertiles of HRR LTACH market supply.

For hospital-level analyses, we first matched hospitals with a low LTACH transfer rate to hospitals with a high LTACH transfer rate using a propensity score analysis to account for other hospital or regional differences that might account for differences in the proportion of site-neutral admissions. After matching hospitals, we used descriptive statistics to compare the proportion of site-neutral admissions and other measures of illness severity between individuals transferred to an LTACH from matched low- and matched high-transfer hospitals. To develop the propensity score model that we used to match hospitals, we excluded hospitals with fewer than 20 claims (n=14, 1% of hospitals) to enable a stabler estimate of the transfer rate. The outcome for the model was whether a hospital was a low- or a high-LTACH-transfer hospital. Predictors in the model were ownership, medical school affiliation, teaching intensity, urban location, bed size, distance to the nearest LTACH and whether the hospital was in a state with a Certificate of Need law restricting the opening or expansion of hospitals, accounting for clustering of hospitals according to state. The Hosmer-Lemeshow goodness-of-fit test (p=.11) and receiver operating characteristic curve (c-statistic=0.75) confirmed good model fit. We matched low- and high-transfer hospitals within each state using 1:1 nearest-neighbor matching without replacement using 5% calipers.

We repeated our region- and hospital-level descriptive analyses for the subgroup of individuals with a site-neutral LTACH admission. Analyses were conducted using Stata version 15.0 (StataCorp, College Station, TX) and SAS version 9.4 (SAS Institute, Inc., Cary, NC). Our institutional review board exempted this study from approval.

RESULTS

We included 3,898 of 4,730 LTACH admissions of older Medicare beneficiaries (Table 1). Overall, 1,615 (41.4%) LTACH admissions would receive reduced site-neutral reimbursement. The median proportion of site-neutral payment admissions according to

LTACH was 40% (interquartile range (IQR) 22–60%), which correlated modestly with regional LTACH market supply (Pearson correlation coefficient=0.23, p<.001; coefficient of determination=0.10), such that LTACHs in low-supply regions had a slightly lower percentage of site-neutral admissions than those in high-supply regions (Figure 1); 31.7% of LTACHs have more than half of their admissions that would receive reduced site-neutral payment.

Differences in Subject Characteristics According to Regional LTACH Market Supply

Of the 3,898 individuals included for the region-level analysis, 48% were transferred to LTACHs from high-supply LTACH regions. Individuals in areas with greater regional LTACH supply were more likely to be older and less likely to have a history of respiratory failure, sepsis, and pneumonia. They otherwise had similar health before the hospitalization, including similar healthcare use, comorbidities, functional impairment, and frailty (Table 2).

Individuals in areas with greater LTACH supply had less-severe illness during the index hospitalization (Table 3). Individuals from the highest-supply regions had shorter lengths of stay (5 fewer hospital days, 7 fewer days for total episode of care) and diagnoses of lower resource intensity (DRG weight 1.91 vs 3.06) and received fewer intensive therapies, including prolonged mechanical ventilation (11% vs 25%), tracheostomy (11% vs 27%), feeding tubes (10% vs 20%), and central venous lines (29% vs 35%) (p<.001 for all comparisons) than those from the lowest-supply regions.

Forty-seven percent of admissions in high-supply regions and 30% in low-supply regions would be reimbursed at the lower site-neutral payment rate (p<.001).

Matching Low- and High-LTACH-Use Hospitals

Of 1,286 hospitals, we matched 292 low- to 292 high-LTACH-use hospitals. These 584 hospitals were geographically representative, representing 39 states and the District of Columbia. Matched low-use hospitals had a median LTACH transfer rate of 0.6% (IQR 0–0.9%) and matched high-use hospitals a median rate of 2.2% (IQR 1.7–3.5%). Covariate testing showed good balance, particularly for distance to the nearest LTACH one of the strongest predictors of LTACH use (Supplementary Table S1).[6] Unmatched hospitals were more likely than matched hospitals to be for profit and nonteaching but otherwise were similar (Supplementary Table S2).

Differences in Subject Characteristics According to LTACH Use

Of 3,876 older Medicare beneficiaries eligible for the hospital-level analysis, 1,673 were hospitalized in 1 of the 584 matched hospitals (Table 1); 64% of these individuals were transferred to an LTACH from a high-LTACH-use hospital.

Subjects were similar between low- and high-LTACH-use hospitals with respect to demographic characteristics, prior use, comorbidities (aside from prior respiratory failure), functional impairment, and frailty (Table 2).

With respect to the index hospitalization, individuals transferred from high-use hospitals had lower severity and complexity of illness than those from low-use hospitals (Table 3).

Although these findings were similar to those observed in our region-level analyses, the magnitude of difference between subject characteristics was smaller but still clinically meaningful. Compared to individual from low-use hospitals, those transferred to an LTACH from a high-use hospital had shorter lengths of stay (2 fewer hospital days) and diagnoses of lower resource intensity (DRG weight of1.99 vs 2.69) and received fewer intensive therapies, including prolonged mechanical ventilation (14% vs 20%) and tracheostomy (14% vs 22%) (p<.001 for all comparisons).

Thirty-six percent of LTACH admissions from low-use hospitals and 43% of admissions from high-use hospitals would be reimbursed at the lower site-neutral payment rate (p=.01).

Site Neutral Admissions According to Region and Hospitals with Different LTAC Use

Individuals with site-neutral LTACH admissions from high-supply regions and high-use hospitals had a length of stay that was 1 day shorter and diagnoses of lower resource intensity than those who met site-neutral payment criteria from low-supply regions and low-use hospitals. Although not statistically significant, individuals transferred to an LTACH from low-supply regions received slightly more intensive hospital treatments (feeding tubes, central venous lines, hemodialysis). Lastly, far more LTACH patient in low-supply regions had a chronic skin ulcer or open wound (Table 4).

DISCUSSION

In this national study of Medicare beneficiaries, we identified 4 critical findings about the potential effect of the CMS site-neutral payment policy. First, 41% of LTACH admissions would be subject to reduced reimbursement under the site-neutral payment policy. Second, the proportion of site-neutral admissions by individual LTACH was highly variable and only minimally correlated with regional market supply. Although the policy will not affect some LTACHs much, many others, including those in LTACH-scarce markets, will be substantially affected. Without more selective admission criteria, by 2020, one-third of LTACHs would be ineligible to qualify for LTACH Medicare payment. Third, although the policy is more likely to affect LTACH admissions from high-use regions and hospitals, nearly one-third of admissions from low-use regions and hospitals would also be subject to reduced site-neutral payments. Lastly, individuals who may have less access to LTACHs as a result of the reduced reimbursement were slightly sicker from lowuse regions and hospitals than high-use regions and hospitals. Taken together, the reduced site-neutral payment for less-sick individuals will broadly affect the entire LTACH sector, including regions and hospitals with already scarce LTACH use, which was not the intent of the policy.

Our study has several policy implications for post-acute care in the site-neutral payment era. Because so many admissions will be reimbursed at the lower site-neutral payment rate (which is equivalent to the lower of the estimated cost of care or the comparable per diem inpatient prospective payment system rate), it is likely that more individuals who would have been transferred to an LTACH for post-acute care will be cared for in alternate settings, such as SNFs. Ideally, the individuals diverted from LTACHs can be effectively cared for in these lower-intensity, lower-cost settings. Alternatively, many hospitalized older adults who currently would be transferred to an LTACH may remain in the hospital if they are too ill to be cared for in a SNF or, worse, may be transferred to a SNF inappropriately and experience worse outcomes and recovery.

It is also anticipated that the reduced site-neutral payment for LTACHs will lead to consolidation of the LTACH market and potential closure of several LTACHs.[16] Reduced LTACH bed capacity is more likely to occur in high-supply regions and could decrease overuse of LTACH in areas with the greatest market penetration, such as Texas, Louisiana, and Oklahoma, where individuals with lower-acuity illness are more likely to be safely shifted to less costly post-acute care settings,[6] although regions with scarce supply are not immune to the financial reimbursement shift given that one-third of the LTACH population in these areas would also be subject to lower payments. Thus, it is uncertain whether many LTACHs in low-supply regions can withstand the lower contribution margin and remain financially solvent. If closures occur in existing LTACHs-scarce regions, even individuals with the greatest severity of illness, such as those who are chronically critically ill who require mechanical ventilation, may no longer have adequate access to the higher-intensity multidisciplinary care offered in LTACHs, which has been associated with better outcomes and lower costs.[17,18] Careful attention is warranted to monitor the effect of the site-neutral payment policy on LTACH access, particularly in areas that already have a scarce supply, and how this relates to outcomes, recovery, and healthcare costs.

Our findings from our subgroup analysis of site-neutral LTACH admissions suggest that the decision to send people to LTACHs from low-use regions and hospitals is more selective and skewed to sicker, more medically complex individuals, although the magnitude in the differences in clinical severity were modest. One notable difference was that individuals transferred to LTACHs from low-supply regions had a substantially greater burden of skin ulcers. This suggests that 1 niche that LTACHs fill on the post-acute care spectrum is management of complex wounds, consistent with perspectives of LTACH stakeholders,[2] although evidence of the benefit of LTACH for complex wounds is limited. In the absence of a critical illness or multiorgan failure, individuals transferred to an LTACH, including many with wounds and ulcers, had mortality similar to that of those receiving care in alternative settings—at greater cost.[18] Additional research is needed on whether LTACHs specifically improves wound healing more than alternative post-acute care settings.

Lastly, another finding of our study is that demand elasticity of supply influences LTACH use,[11] such that greater LTACH market supply is strongly associated with greater use by individuals who may benefit less from this level of care.[17,18] This is evident in the large differences between high- and low-supply regions in illness severity of individuals transferred to LTACHs. The new pricing system under the site-neutral payment policy may realign the supply-demand relationship by reducing financial incentives to transfer individuals who may not benefit from LTACH-level care.

The main limitation of our study is the use of administrative data to ascertain severity of illness, which may not discern nuanced but clinically relevant differences between people who may otherwise appear comparable using Medicare data. Second, although Medicare beneficiaries account for two-thirds of the LTACH population,[1] our findings may not be generalizable to those with private insurance or Medicare Advantage.

The site-neutral payment policy that is currently being phased in, with full implementation planned by 2020, will broadly affect the LTACH market. We anticipate that this policy will lead to consolidation of the LTACH market, with a reduction in the number of LTACH beds in high-supply regions, and consequently reduce overuse of LTACH by less-ill individuals who may not benefit from this type of care, but hospitals and regions with scarce LTACH use will also be affected, given that one-third of their patients will also be reimbursed at the lower site-neutral payment rate, which was not the intent of the policy. If closures occur in LTACH-scarce regions, older adults who would most likely benefit from LTACH-level care, such as those who are chronically critically ill and require mechanical ventilation, may no longer have access to LTACHs. Further research should examine LTACH access in the site-neutral payment era and how this will affect health outcomes, cognitive and functional recovery, and costs of care.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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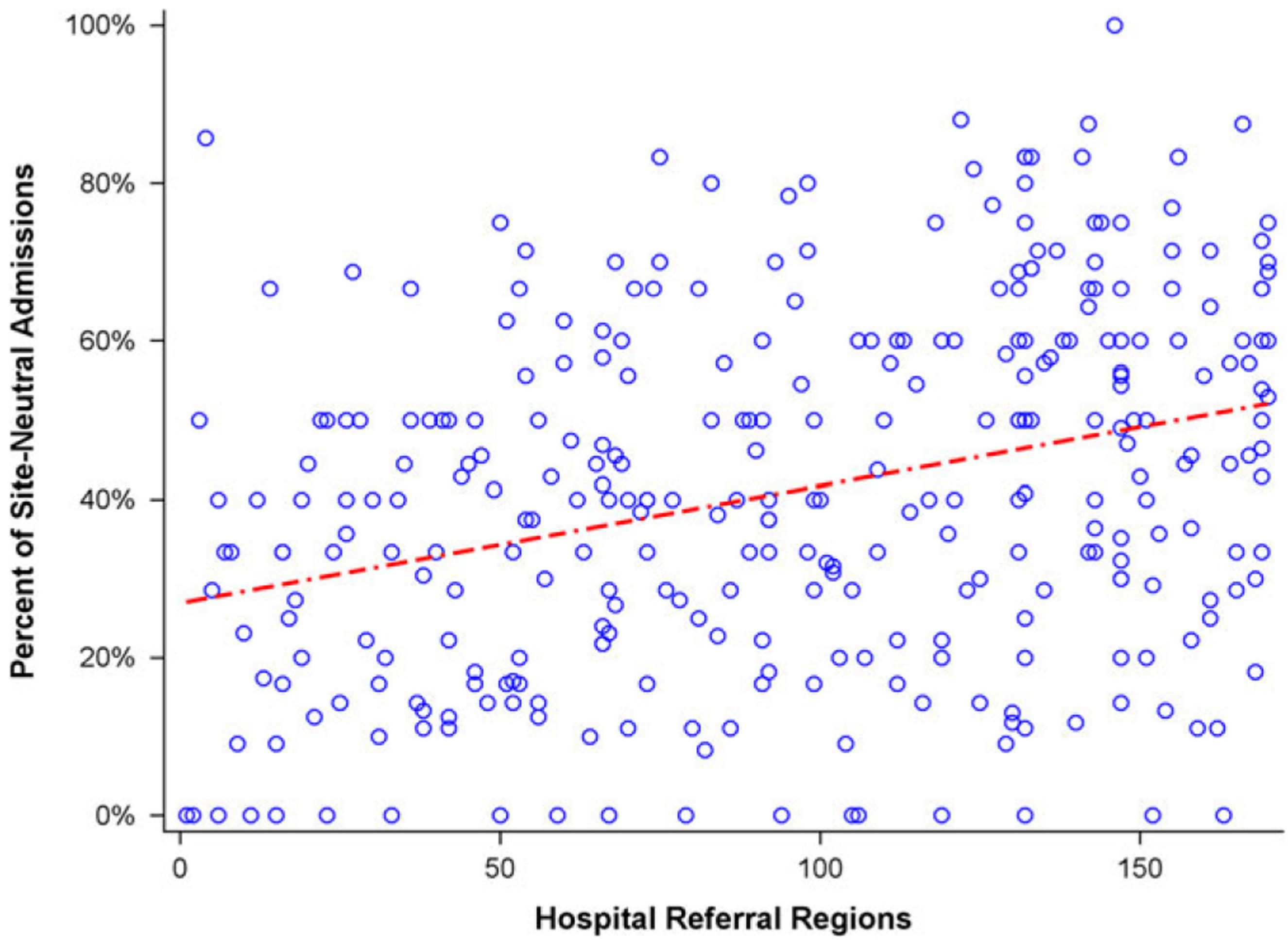

Figure 1.

Long-term acute care hospital's (LTACHs) proportion of site-neutral payment admissions according to regional market supply. The proportion of admissions that would be subjected to reduced site-neutral reimbursement was calculated for LTACHs with ≥5 claims during fiscal year 2012 (n=319). Individual LTACHs are shown as open black circles within 170 hospital referral regions (HRRs). HRRs were sorted in ascending order according to their LTACH market supply, defined as the number of LTACH beds per 100,000 residents residing in the HRR. The dashed line represents a modest correlation between LTACHs' proportion of site-neutral eligible admissions and regional LTACH market supply (Pearson correlation coefficient (r)=0.23, p<.01, coefficient of determination (R^2)=0.10). In a sensitivity analysis, we restricted the analysis to 136 LTACHs with ≥ 10 claims in 89 HRRs and similarly found modest correlation (r=0.27, p<.01; R^2=0.13).

Table 1.

Study Flow

Exclusion Criterion	Overall and Region-Level Analyses		Hospital-Level Analyses	
	Excluded	Included	Excluded	Included
	n (%)			
Not transferred to long-term acute care hospital	434,663 (98.9)	4,730	434,663 (98.9)	4,730
Missing data in denominator file	4 (0.0)	4,726	4 (0.0)	4,726
No continuous Part A or B in prior year	251 (5.3)	4,475	251 (5.3)	4,475
Had Part C ≥ 1 months in prior year	152 (3.4)	4,323	152 (3.4)	4,323
Index hospitalization in Alaska or Hawaii	1 (0.0)	4,322	1 (0.0)	4,322
Index hospital missing provider number	1 (0.0)	4,321	1 (0.0)	4,321
Index hospital claim missing diagnosis-related group	30 (0.7)	4,291	30 (0.7)	4,291
Not first eligible claim per individual	393 (9.2)	3,898	393 (9.2)	3,898
Index hospital has <20 total claims	-	-	20 (0.5)	3,876
Index hospital excluded from propensity-score matching	-	-	2,203 (56.8)	1,673

Study cohort initially included 439,393 unique general acute care hospital claims by adults aged ≥65 during federal fiscal year 2012.

Table 2.

Baseline Characteristics Before Index Hospitalization

Characteristic	Regional LTACH Hospital Supply[1]				Hospital LTACH Transfer Rate[2]		
	Low, n=685	Moderate, n=1,355	High, n=1,858	P-Value[3]	Matched Low, n=598	Matched High, n=1,075	P-Value[4]
Age, n (%)							.93
65–69	138 (20.1)	240 (17.7)	298 (16.0)	.01	121 (20.2)	206 (19.2)	
70–74	161 (23.5)	288 (21.3)	404 (21.7)	.48	132 (22.1)	232 (21.6)	
75–79	131 (19.1)	272 (20.1)	378 (20.3)	.52	116 (19.4)	223 (20.7)	
80–84	150 (21.9)	263 (19.4)	348 (18.7)	.09	114 (19.1)	198 (18.4)	
≥85	105 (15.3)	292 (21.5)	430 (23.1)	<.001	115 (19.2)	216 (20.1)	
Female, n (%)	352 (51.4)	718 (53.0)	1004 (54.0)	.23	303 (50.7)	584 (54.3)	.15
Race, n (%)							.14
White	516 (75.3)	973 (71.8)	1458 (78.5)	.006	466 (77.9)	803 (74.7)	
Black	131 (19.1)	220 (16.2)	302 (16.3)	.14	98 (16.4)	184 (17.1)	
Other	38 (5.5)	162 (12.0)	98 (5.3)	.02	34 (5.7)	88 (8.2)	
Hospitalizations	1 (0–3)	1 (0–3)	1 (0–2)	.11	1 (0–3)	1 (0–3)	.23
Comorbidities, n (%)							
Charlson Index, median (IQR)	4 (2–6)	4 (2–5)	4 (2–5)	.22	4 (2–6)	4 (2–6)	.45
Respiratory failure, n (%)	443 (64.7)	750 (55.4)	855 (46.0)	<.001	354 (59.2)	538 (50.1)	<.001
Sepsis, n (%)	314 (45.8)	536 (39.6)	587 (31.6)	<.001	220 (36.8)	390 (36.3)	.84
Pneumonia, n (%)	381 (55.6)	689 (50.8)	825 (44.4)	<.001	300 (50.2)	516 (48.0)	.40
Functional impairment							
Wheelchair, n (%)	97 (14.2)	254 (18.7)	300 (16.1)	.68	95 (15.9)	188 (17.5)	.40
Home hospital bed, n (%)	75 (10.9)	162 (12.0)	194 (10.4)	.47	66 (11.0)	125 (11.6)	.72
Home oxygen use, n (%)[5]	52 (7.6)	100 (7.4)	131 (7.1)	.61	42 (7.0)	86 (8.0)	.47
Frailty Index, median (IQR)[6]	0.23 (0.13–0.40)	0.26 (0.14–0.44)	0.25 (0.14–0.41)	.74	0.24 (0.13–0.40)	0.26 (0.14–0.43)	.09

All nondemographic characteristics shown are for the 12 months before the index hospitalization

[1]Number of long-term acute care hospital (LTACH) beds per 100,000 residents at hospital referral region level, according to tertile. Low=0–5, moderate=5–11, high= ≥ 11.

[2] Hospitals were defined as low LTACH transferring hospitals if the proportion of LTACH transfers was less than the median value of 1.32% and high if the proportion was the median value or greater. We conducted a hospital-level propensity score analysis to match low LTACH transfer and high LTACH transfer hospitals (see Methods). After matching, we included 598 individuals who were hospitalized in one of the 292 matched low-transfer hospitals and 1,075 who were hospitalized in one of the 292 matched high-transfer hospitals.

[3] Calculated using Spearman test of trends for continuous variables and Cochran-Armitage test of trends categorical variables.

[4] Calculated using Wilcoxon-Mann-Whitney tests for continuous variables and chi-square tests for categorical variables.

[5] For 12 consecutive months before index hospitalization

[6] Validated claims-based algorithm (c-statistic 0.75) for which the dichotomous cutoff of 0.12 was considered frail (sensitivity 66%, specificity of 73%)[15]. IQR=interquartile range.

Table 3.

Participant Characteristics During Index Hospital and Long-Term Acute Care Hospital (LTACH) Stay

Characteristic	Regional LTACH Supply[1]				Hospital LTACH Transfer Rate[2]		
	Low, n=685	Moderate, n=1,355	High, n=1,858	P-Value[3]	Matched Low, n=598	Matched High, n=1,075	P-Value[4]
Meets site-neutral payment criteria, n (%)[5]	206 (30.1)	528 (39.0)	881 (47.4)	<.001	218 (36.5)	460 (42.8)	.01
Length of stay, days, median (IQR)							
Hospital	14 (8–22)	11 (6–17)	9 (6–15)	<.001	12 (7–19)	10 (6–16)	<.001
LTACH	25 (18–35)	23 (18–32)	23 (18–31)	.02	23 (17–33)	24 (18–33)	.31
Total	40 (29–54)	35 (27–48)	33 (26–44)	<.01	37 (28–50)	35 (26–48)	.04
Hospital diagnosis							
Medical (vs surgical), n (%)	315 (46.0)	723 (53.4)	1110 (59.7)	<.001	279 (46.7)	607 (56.5)	<.01
DRG weight, median (IQR)	3.1 (1.8–10.9)	2.1 (1.5–5.3)	1.9 (1.5–4.7)	<.001	2.7 (1.6–5.8)	2.0 (1.5–5.3)	<.001
LTACH diagnosis (major diagnostic category), n (%)							
Respiratory	307 (44.8)	494 (36.5)	665 (35.8)	<.001	250 (41.8)	397 (36.9)	.05
Infectious	80 (11.7)	216 (15.9)	247 (13.3)	.82	66 (11.0)	147 (13.7)	.12
Musculoskeletal	39 (5.7)	87 (6.4)	159 (8.6)	.005	44 (7.4)	84 (7.8)	.74
Selected hospital treatments, n (%)							
Mechanical ventilation							<.001
None	405 (59.1)	939 (69.3)	1,435 (77.2)	<.001	394 (65.9)	778 (72.4)	
Transient (<96 hours)	45 (6.6)	86 (6.4)	113 (6.1)	.63	30 (5.0)	71 (6.6)	
Prolonged in hospital (≥96 hours)	64 (9.3)	97 (7.2)	108 (5.2)	.002	54 (9.0)	74 (6.9)	
Prolonged in hospital and LTACH	171 (25.0)	233 (17.2)	202 (10.9)	<.001	120 (20.1)	152 (14.1)	
Tracheostomy	183 (26.7)	215 (15.9)	201 (10.8)	<.001	133 (22.2)	148 (13.8)	<.001
Feeding tube	140 (20.4)	195 (14.4)	178 (9.6)	<.001	97 (16.2)	136 (12.7)	.04
Central venous line	239 (34.9)	460 (33.9)	529 (28.5)	<.001	206 (34.5)	333 (31.0)	.15
Hemodialysis	96 (14.0)	228 (16.8)	247 (13.3)	.21	97 (16.2)	171 (15.9)	.87

[1]Number of long-term acute care hospital (LTACH) beds per 100,000 residents at hospital referral region level, according to tertile. Low=0–5, moderate=5–11, high= ≥ 11.

[2]Hospitals were defined as low LTACH transferring hospitals if the proportion of LTACH transfers was less than the median value of 1.32% and high if the proportion was the median value or greater. We conducted a hospital-level propensity score analysis to match low LTACH transfer and high LTACH transfer hospitals (see Methods). After matching, we included 598 individuals who were hospitalized in one of the 292 matched low-transfer hospitals and 1,075 who were hospitalized in one of the 292 matched high-transfer hospitals.

[3]Calculated using Spearman test of trends for continuous variables and Cochran-Armitage test of trends for categorical variables.

[4]Calculated using Wilcoxon-Mann-Whitney tests for continuous variables and chi-square tests for categorical variables.

[5]Site-neutral payment eligibility included not having an intensive care unit stay of ≥3 days or prolonged mechanical ventilation (≥96 hours) during the hospitalization preceding LTACH transfer or being transferred to an LTACH for 1 of 15 principal psychiatric or rehabilitation diagnosis-related groups (DRGs).

IQR=interquartile range.

Table 4.

Characteristics of Participants with Site-Neutral Long-Term Acute Care Hospital (LTACH) Admission

Characteristic	Regional LTACH Supply[1]				Hospital LTACH Transfer Rate[2]		
	Low, n=206	Moderate, n=528	High, n=881	P-Value[3]	Matched Low, n=218	Matched High, n=460	P-Value[4]
Length of stay, days, median (IQR)							
Hospital	8 (5–13)	7 (4–10)	7 (4–10)	.001	8 (5–12)	7 (4–10)	.01
LTACH	24 (17–31)	23 (18.5–29)	23 (18–29)	.30	22 (17–30)	23 (17–31.5)	.42
Total	33 (25–43)	31 (25–39)	30 (24–38)	.01	30 (24–42)	31 (24–39)	.71
Primary hospital diagnosis							
Medical (vs surgical), n (%)	144 (69.9)	352 (66.7)	623 (70.7)	.39	141 (64.7)	319 (69.4)	.22
Diagnosis-related group weight, median (IQR)	1.8 (1.2–2.4)	1.8 (1.2–2.5)	1.5 (1.1–2.1)	.002	1.9 (1.3–2.6)	1.6 (1.1–2.1)	.03
Respiratory MDC, n (%)	32 (15.5)	74 (14.0)	173 (19.6)	.02	36 (16.5)	84 (18.3.6)	.58
Infectious MDC, n (%)	33 (16.0)	88 (16.7)	135 (15.3)	.63	36 (16.5)	67 (14.8)	.51
Musculoskeletal MDC, n (%)	25 (12.1)	72 (13.6)	101 (11.5)	.47	33 (15.1)	64 (13.9)	.67
Secondary hospital diagnosis, n (%)							
Sepsis	47 (22.8)	124 (23.5)	189 (21.5)	.47	49 (22.5)	93 (20.2)	.50
Diabetes mellitus with complications	33 (16.0)	92 (17.4)	128 (14.5)	.30	39 (17.9)	69 (15.0)	.34
Delirium or dementia	39 (18.9)	165 (31.3)	227 (25.8)	.53	38 (17.4)	108 (23.5)	.07
Chronic skin ulcer or wound	74 (35.9)	172 (32.6)	212 (24.1)	<.001	76 (34.9)	129 (28.0)	.07
LTACH diagnosis (MDC), n (%)							
Respiratory	43 (20.9)	99 (18.8)	209 (23.7)	.10	51 (23.4)	104 (22.6)	.82
Infectious	26 (12.6)	82 (15.5)	107 (12.2)	.36	18 (8.3)	64 (13.9)	.03
Musculoskeletal	27 (13.1)	73 (13.8)	112 (12.7)	.71	34 (15.6)	66 (14.4)	.67
Selected hospital treatments, n (%)							
Feeding tube	10 (4.9)	17 (3.2)	33 (3.8)	.70	9 (4.1)	14 (3.0)	.47
Central venous line	51 (24.8)	126 (23.9)	182 (20.7)	.11	50 (22.9)	104 (22.6)	.92
Hemodialysis	22 (10.7)	59 (11.2)	78 (8.9)	.22	25 (11.5)	48 (10.4)	.69

[1] Number of long-term acute care hospital (LTACH) beds per 100,000 residents at hospital referral region level, according to tertile. Low=0–5, moderate=5–11, high= ≥ 11.

[2] Hospitals were defined as low LTACH transferring hospitals if the proportion of LTACH transfers was less than the median (1.32%) and high if the proportion was the median value or greater. We conducted a hospital-level propensity score analysis to match low LTACH transfer and high LTACH transfer hospitals (see Methods). After matching, we included 218 individuals who were hospitalized in one of the 292 matched low-transfer hospitals and 460 who were hospitalized in one of the 292 matched high-transfer hospitals who had a site-neutral LTACH admission.

[3]Calculated using Spearman test of trends for continuous variables and Cochran-Armitage test of trends for categorical variables.

[4]Calculated using Wilcoxon-Mann-Whitney tests for continuous variables and chi-square tests for categorical variables.

IQR=interquartile range; MDC = major diagnostic category.