

# Health Care Expenditures After Initiating Long-term Services and Supports in the Community Versus in a Nursing Facility

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**Background:** Individuals who receive long-term services and supports (LTSS) are among the most costly participants in the Medicare and Medicaid programs.

**Objectives:** To compare health care expenditures among users of Medicaid home and community-based services (HCBS) versus those using extended nursing facility care.

**Research Design:** Retrospective cohort analysis of California dually eligible adult Medicaid and Medicare beneficiaries who initiated Medicaid LTSS, identified as HCBS or extended nursing facility care, in 2006 or 2007.

**Subjects:** Propensity score matching for demographic, health, and functional characteristics resulted in a subsample of 34,660 users who initiated Medicaid HCBS versus extended nursing facility use. Those with developmental disabilities or in managed care plans were excluded.

**Measures:** Average monthly adjusted acute, postacute, long-term, and total Medicare and Medicaid expenditures for the 12 months following initiation of either HCBS or extended nursing facility care.

**Results:** Those initiating extended nursing facility care had, on average, \$2919 higher adjusted total health care expenditures per month compared with those who initiated HCBS. The difference was primarily attributable to spending on LTSS \$2855. On average, the monthly LTSS expenditures were higher for Medicare \$1501 and for Medicaid \$1344 when LTSS was provided in a nursing facility rather than in the community.

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**Conclusions:** The higher cost of delivering LTSS in a nursing facility rather than in the community was not offset by lower acute and postacute spending. Medicare and Medicaid contribute similar amounts to the LTSS cost difference and both could benefit financially by redirecting care from institutions to the community.

**Key Words:** long-term services and supports, nursing facilities, home and community-based services, health care expenditures

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Individuals who use long-term services and supports (LTSS), through either home and community-based services (HCBS) or extended (custodial) nursing facility stays, are among the most costly participants in the Medicare and Medicaid programs. A total of 10.7 million individuals were dually eligible for Medicare and Medicaid benefits during at least 1 month in 2013. The majority (59%) were ages 65 and older. Beneficiaries eligible for both Medicare and Medicaid (also known as MME's) comprised 14% of all Medicaid beneficiaries but accounted for 34% of Medicaid spending in 2013.<sup>1,2</sup> Similarly, MMEs were 18% of the Medicare fee-for-service population, and represented 33% of aggregate Medicare fee-for-service spending in 2011.<sup>3</sup> This disproportionate spending in both programs has been attributed to greater levels of disease burden and functional limitations among those using LTSS.

For MMEs, Medicare covers most acute, postacute, and rehabilitation care. Medicaid covers Medicare copayments and LTSS (eg, personal care services, home and community-based waiver services, extended nursing facility services). State Medicaid programs have looked to HCBS as an alternative that is better aligned with individual preferences and less costly than nursing facility care. Medicaid expenditures for those in nursing facilities are about double those for HCBS recipients.<sup>4,5</sup> It is not clear to what degree higher expenditures are primarily a function of the cost of delivering institutional services or the greater health and functional needs of those who select nursing facility care rather than HCBS.<sup>6,7</sup> The evidence as to whether the type of LTSS is associated with differences in the subsequent use of acute and postacute care services is mixed. Some investigators have reported that states with higher HCBS expenditures and less restrictive criteria for HCBS eligibility have lower rates of preventable hospitalizations.<sup>8</sup> However, others have found that nursing facility care may be offset by

lower spending in acute and postacute settings, especially among individuals with complex health needs.<sup>9,10</sup>

In the current study, we attempted to unravel the contribution of individual health factors from delivery system factors to determine the source of expenses for California MMEs who initiated either extended nursing facility care or HCBS. We applied propensity score methods to construct samples of MMEs with similar levels of need using each type of LTSS. We then compared subsequent health care expenditures after initiation of LTSS, and examined whether differences were attributable to differences in acute, postacute, or LTSS-related costs. We also assessed whether Medicare or Medicaid assumed a greater burden in the cost differences.

## METHODS

### Study Design and Data Sources

We examined a cohort of California MMEs who initiated LTSS during 2006–2007. California's Medi-Cal program is the largest state Medicaid program in the country, and it was ranked seventh in the nation in its percent of total LTSS expenditures for HCBS (over 60%) in 2012.<sup>11</sup> During the study period, approximately 52% of Medi-Cal's total LTSS expenditures among MMEs were for HCBS, primarily for personal care services.<sup>12</sup> California uses a social model of care, such that the personnel responsible for assessing the need for HCBS and for authorizing benefit levels for personal care are not involved with their clients' medical needs.<sup>13</sup>

We measured Medicaid and Medicare expenditures for up to 12 months after the start of LTSS. To capture preinitiation and postinitiation information on the cohort, we linked multiple federal and state data sources for the period of January 1, 2005 to December 31, 2008. We obtained data on health care utilization and expenditures for LTSS, hospitalizations, physicians, and other health services from Medicaid and Medicare fee-for-service claims. We derived information on demographics, enrollment, and deaths from program eligibility files. For health care diagnoses, we supplemented claims data with information from the California Office of Statewide Health Planning and Development Patient Discharge Database, which covers all nonfederal hospitalizations in the state. We obtained information on functional limitations, cognitive impairment, and living arrangement from LTSS assessment files, including the Case Management, Information, and Payrolling System<sup>14</sup> for those receiving In-Home Supportive Services (California's Medicaid personal care program); and the Nursing Facility Minimum Data Set for those entering nursing facilities.<sup>15</sup> We used similar items available in both instruments to create a consistent method for categorizing functional status based on activities of daily living (ADL) and cognitive function.<sup>16</sup> We also utilized data from Case Management, Information, and Payrolling System and the California Departments of Public Health and Finance for county-level measures.

### Study Population

Our study sample was drawn from all California adult MMEs who used either Medicaid HCBS or had an extended nursing facility stay, identified from claims in 2006 or 2007, with no paid claims for that same service in the preceding 12 months. Individuals who initiated both HCBS and nursing facility in the same year were categorized on the basis of their initial LTSS use.

We identified HCBS from the following claims: the personal care assistance program known as In-Home Supportive Services, Community-based Adult Services (formerly known as Adult Day Health Care), Medicaid Home Health, Targeted Case Management, and adult HCBS waiver services.

We categorized nursing facility stays as either short (postacute) or extended (LTSS) based on their duration and payer. We classified a nursing facility stay as extended if it met any of the following criteria: stay  $\geq 21$  consecutive days; or length of stay  $\leq 20$  days, if Medicare did not pay during the stay, or the individual died during stay. Nursing facility stays  $\leq 20$  days reimbursed by Medicare were considered postacute services rather than LTSS.

We restricted our sample to those eligible for both Medicare and full-service Medicaid at the time of LTSS initiation, as reflected in paid claims for HCBS or LTSS nursing facility stays. We excluded individuals with developmental disabilities and those beneficiaries enrolled in Medicaid or Medicare-managed care plans at any time during the study period. We also excluded those whose Medicaid eligibility was solely for emergency or time-limited benefits, such as those with unverified citizen status.<sup>17</sup>

Our selection procedures resulted in a preliminary cohort of 90,990 LTSS users. We subsequently excluded individuals missing information on living arrangements at time of LTSS entry ( $n=6107$ ), for a resulting preliminary sample of 84,883 (35,054 in nursing facilities and 49,829 in HCBS).

### Propensity Score Matching

To account for potential selection differences, we used propensity score methods to construct a matched sample of individuals initiating either HCBS or an extended nursing facility stay. We used logistic regression models to create propensity scores<sup>18,19</sup> for using nursing facility services rather than HCBS. The following predictors were used: age, sex, race/ethnicity, comorbidities, presence of functional limitations, presence of cognitive limitations, and whether an individual lived alone at or after the time of LTSS entry. We measured comorbidity using the Chronic Illness and Disability Payment System score,<sup>20</sup> which was calculated based upon diagnoses derived from claims and patient discharge data for the 12 months before LTSS initiation. Higher scores reflect greater morbidity. We defined functional limitation as having  $\geq 3$  limitations in ADL requiring human assistance. Cognitive limitations were defined by the need for supervision due to impairment in memory, judgment, or orientation.

Using an adaptation of the Greedy algorithm,<sup>21</sup> we created a sample ( $n=34,660$ ) of one-to-one matches between

HCBS and nursing facility users with propensity scores identical to at least 4 decimal places. Figure 1 arrays the propensity scores into strata and shows the distribution of the original 84,883 cases into each strata, and how these cases distribute between HCBS and nursing facility entry cohorts. HCBS recipients predominate accounting for two thirds or more of the individuals in each of the first 4 strata. Nursing facility entrants account for two thirds or more of those in the highest 4 strata. Figure 2 shows the distribution of propensity scores among HCBS and nursing facility entrants among the matched sample ( $n=34,660$ ) of HCBS and nursing facility cases. (Table 1 in the Supplemental Digital Content 1, <http://links.lww.com/MLR/B100> shows the propensity score logistic regression and the odds ratios for each measure.)

## Health Care Expenditures

We measured Medicaid and Medicare health care expenditures for up to 12 months (or death if this was sooner) following initiation of LTSS. We then calculated the average monthly acute, postacute, LTSS, and total Medicare and Medicaid expenditures. Medicaid expenditures include the state and federal contributions to all services. Our assessment does not include expenditures, which were out-of-pocket, from private insurance, or from other forms of public insurance; nor do we include lost income for family caregiving.

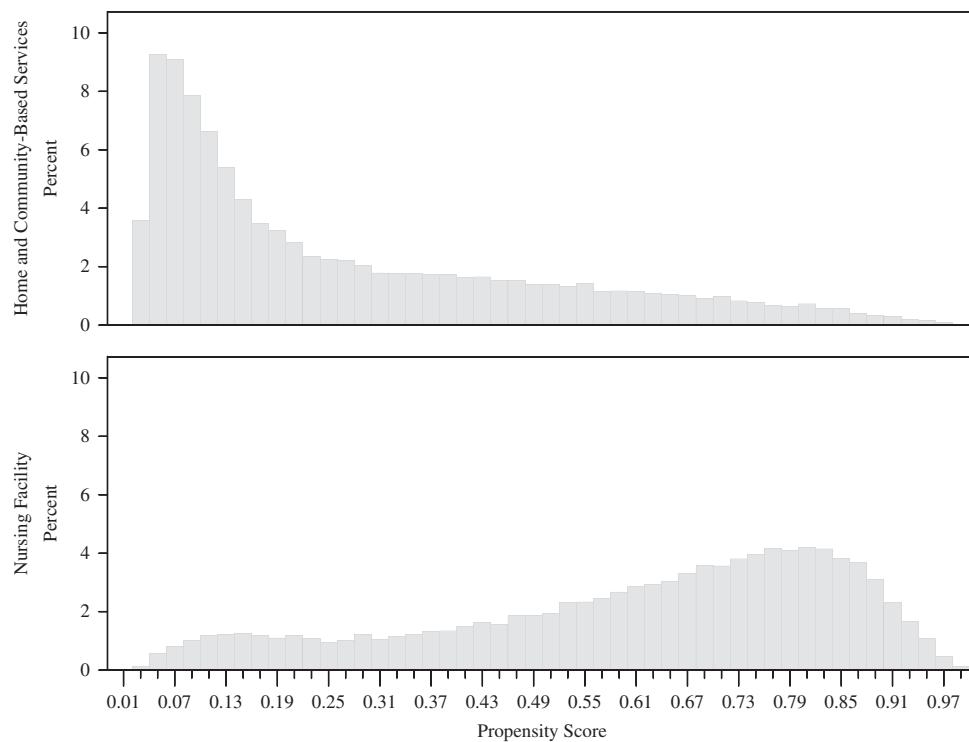
Acute medical care included acute inpatient hospital stays, emergency department visits, ambulatory care visits, procedures, diagnostics, therapies, and equipment. Postacute care included Medicare-reimbursed home health, long-term care hospitals and inpatient rehabilitation facilities, and

therapies (eg, physical, occupational, and speech) that were reimbursed separately from home health or a skilled nursing facility. Postacute care also included short-term Medicare-skilled nursing facility stays. LTSS expenditures included HCBS, Medicaid home health, and extended nursing facility care. From a cost accounting standpoint, we classified Medicare nursing facility expenditures as LTSS, even though they are programmatically considered postacute care, if these Medicare postacute care services were used during an individual's extended nursing facility stay.

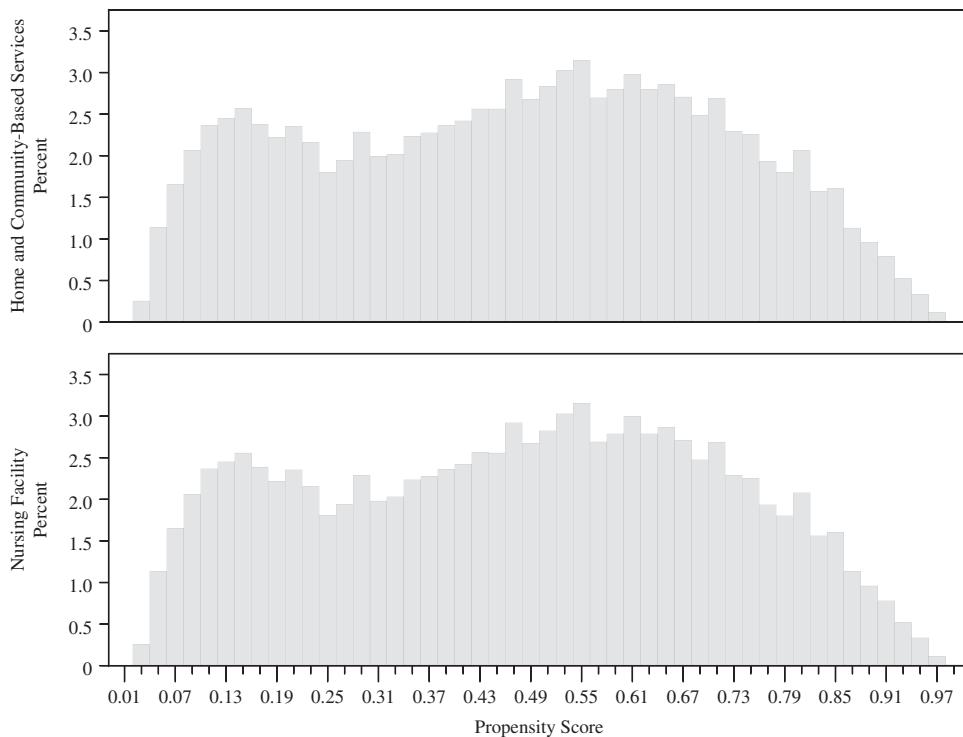
The Medicare and Medicaid administrative data included a monthly indicator of eligibility. All cases were retained in the study for the months they remained eligible for Medicare or Medicaid. Fewer than 1% of the sample lost eligibility for Medicare and 5.3% of the sample lost eligibility to Medicaid during the study period. We were unable to determine why a living individual lost eligibility to either payer. Most individuals who lost Medicare eligibility were under age 65, suggesting a change in their disability status over time. The majority of those who lost Medicaid eligibility were previously discharged from a nursing facility, suggesting that they no longer had medical expenses relative to income that would qualify for Medicaid.

## Analysis

We performed multivariate least squares regression models to predict average monthly expenditures. Separate models were estimated for total, the combination of acute and postacute, and LTSS expenditures. We used an intent-to-treat approach, retaining each individual in the first type of LTSS initiated, whether or not the individual exited LTSS or



**FIGURE 1.** Propensity score when initiating long-term services and supports, original sample ( $n=84,883$ ).



**FIGURE 2.** Propensity score when initiating long-term services and supports, matched sample ( $n = 34,660$ ). Matching of cases is based on propensity scores common to at least 4 decimal places.

subsequently used a different type of LTSS in the year. We adjusted analyses by the variables used to create the propensity scores. Additional predictors used were the number of months the user survived in the observation period, and the year LTSS was initiated (2006 or 2007). This latter measure adjusted for differences in costs over time. We also incorporated 3 county characteristics into our models. We used nursing home beds per 1000 persons as a proxy for the local nursing facility supply, the median hourly pay rate for Medicaid personal care assistants as a proxy for the availability of HCBS providers, and the percent of the population aged 65 or older as a proxy for the community demand for LTSS.

To reduce the effects of distribution outliers and improve goodness of fit of the regression models, we truncated the expenditure distribution such that the lowest and highest 1% were given values equal to those at 1% and 99% of the distribution, respectively.

### Sensitivity Analyses

We performed several sensitivity analyses to test the robustness of our findings. First, we repeated our analyses on a subsample of individuals who received LTSS, in either a nursing facility or HCBS, for at least 100 consecutive days. This allowed us to assess potential bias from misclassifying postacute rehabilitation in nursing facilities stays, if they exceeded 21 days, as LTSS. Second, we excluded the expenditures for the first month after initiating LTSS. This allowed us to examine whether the inclusion of Medicare postacute expenditures at the beginning of an extended

nursing facility inflated estimates of LTSS spending in that setting. Third, we repeated our original analyses with an indicator variable for whether or not a user remained in the same type of LTSS throughout the entire study period. (Table 2 in the Supplemental Digital Content 2, <http://links.lww.com/MLR/B101> shows the outcomes of staying in the same type of LTSS, a different type of LTSS, returning to the community without any LTSS, or death over the 12 mo period.) Finally, we repeated our analyses to account for whether an individual had been hospitalized before initiating LTSS, because admission to a nursing facility is more closely associated with a hospital stay than initiating HCBS. We conducted this sensitivity analysis by modifying the propensity score calculation to include an indicator for hospitalization in the month during which LTSS was initiated.

Procedures for the privacy protection of recipient identity and service use were approved by the University of California Committee on Human Research (No. 10-02998) and the California Committee for the Protection of Human Subjects (No. 12-06-0416). All analyses were conducted using SAS version 9.4 (SAS Institute Inc., Cary, NC).

### RESULTS

Table 1 shows the characteristics of all MME LTSS users, and the propensity score-matched subset. In the pre-matched study population, nursing facility users were more likely to be older; white; and have functional and cognitive limitations, and higher Chronic Illness and Disability Payment System scores. In the propensity score-matched

**TABLE 1.** Medicare and Medicaid Enrollees Who Initiated Long-term Services and Supports in California in 2006–2007

Variables	Full Population					Propensity Score Matched Sample*					
	HCBS			NF		P†	HCBS			NF	
	N or Mean	% or 95% CI	N or Mean	% or 95% CI	N or Mean		N or Mean	% or 95% CI	N or Mean	% or 95% CI	P
Total	49,829	100.0	35,054	100.0			17,330	100.0	17,330	100.0	
Age											
<65	10,567	21.2	4968	14.2	<0.001	3358	19.4	3208	18.5	0.13	
65–74	16,578	33.3	8098	23.1	<0.001	4642	26.8	4742	27.4	0.13	
75–84	16,627	33.4	12,232	34.9	<0.001	5862	33.8	5963	34.4	0.13	
≥ 85	6057	12.2	9756	27.8	<0.001	3468	20	3417	19.7	0.13	
Female	31,085	62.4	22,090	63	0.06	10,676	61.6	10,763	62.1	0.34	
Race/ethnicity											
White	14,895	29.9	16,430	46.9	<0.001	6768	39.1	6749	38.9	0.41	
Hispanic	13,779	27.7	7916	22.6	<0.001	4621	26.7	4565	26.3	0.41	
Black	5334	10.7	3741	10.7	<0.001	1852	10.7	1842	10.6	0.41	
Asian	12,586	25.3	4660	13.3	<0.001	2857	16.5	2985	17.2	0.41	
Other	3235	6.5	2307	6.6	<0.001	1232	7.1	1189	6.9	0.41	
ADL limitations‡	16,924	34	28,876	82.4	<0.001	11,619	67	11,623	67.1	0.96	
Cognitive limitations§	18,299	36.7	20,120	57.4	<0.001	8559	49.4	8514	49.1	0.63	
Living alone	13,752	27.6	9395	26.8	0.01	4373	25.2	4427	25.5	0.51	
CDPS Score¶	2.12	2.10–2.13	3.32	3.30–3.34	<0.001	2.81	2.78–2.84	2.82	2.79–2.84	0.77	

\*The measures in this table were used in deriving the propensity score.

†P-value from t test for continuous variables and  $\chi^2$  test for categorical variables, comparison is NF versus HCBS.

‡ADL items available in CMIPS and the MDS are common in terms of activities of daily living (ie, bathing, dressing, toileting, transferring, and eating). Our ADL limitations measure indicates that the individual requires at least the need of assistance (if not more assistance) from another in ≥ 3 ADL tasks. Reference is &lt;3 ADL limitations.

§Cognitive status is based on memory, orientation, and judgment items in the CMIPS and MDS instruments. Having 1 item requiring at least verbal assistance/supervision/cueing identifies an individual as having a cognitive limitation in our common measure. Reference, Supervision not required.

||Reference, lives with others.

¶Chronic Illness and Disability Payment System score.<sup>20</sup>

ADL indicates activities of daily living; CDPS, Chronic Illness and Disability Payment System; CI, confidence interval; HCBS, home and community-based services; NF, extended nursing facility stay entrant.

sample, there were no significant differences in these baseline characteristics between HCBS and nursing facility users. Small but significant differences remained between HCBS and nursing facility users in the community and recipient characteristics of survival months and year of LTSS entry. These latter measures were not included in calculating the propensity score, but they were included as controls in the expenditure regression models. (Table 3, Supplemental Digital Content 3, <http://links.lww.com/MLR/B102> displays the descriptive statistics on these measures.)

In the matched sample, the unadjusted mean total monthly expenditures after initiating LTSS were \$3833 higher for those admitted to a nursing facility for an extended stay versus those using HCBS (Table 2). LTSS expenditures accounted for most of this difference (\$3072/mo higher for nursing facility users). Medicare contributed almost as much as Medicaid (\$1902 vs. \$2196) to the LTSS cost of new users of extended nursing facility stays. Medicaid, however, contributed more than Medicare for HCBS entrants, a monthly average of \$834 versus \$164, respectively. (Medicare does not cover HCBS services, but individuals who entered our study sample by initiating HCBS could have moved into a nursing facility for an extended stay during the 12-m follow-up. If a portion of the expenditures for this extended stay was paid for by Medicare, then this would generate Medicare expenditures for those identified as initiating HCBS.)

In multivariate analyses, combining both Medicare and Medicaid expenditures, those initiating LTSS in a nursing facility had \$2919 higher total health care expenditures per

month on average, compared with those who entered HCBS (Table 3). The cost difference was almost entirely attributable to LTSS (\$2855). There were no statistical differences in the combined acute and postacute care costs between those entering a nursing facility and those using HCBS. Younger age, minority race/ethnicity, ≥ 3 limitations in ADLs, higher comorbidity, and shorter survival time were associated with higher total health care expenditures. Older age, cognitive limitations, and living alone at LTSS entry were associated with lower acute and postacute expenditures, but higher LTSS expenditures. When we examined the sample across the range of propensity scores, we found the expenditure difference between HCBS and nursing facility use to be consistent within each propensity score decile (Table 4, Supplemental Digital Content 4, <http://links.lww.com/MLR/B103>).

On average, the monthly total health care expenditures was higher for Medicare \$1474 [95% confidence interval (CI), \$1324–\$1623] and for Medicaid \$1455 (95% CI, \$1421–\$1488) when LTSS was provided in a nursing facility as compared with HCBS. The cost difference for the LTSS component of total health care expenditures between nursing facility care and HCBS was higher for Medicare than Medicaid (\$1501; 95% CI, \$1469–\$1533 vs. \$1344; 95% CI, \$1318–\$1370), respectively.

We observed consistent results in our sensitivity analyses. When we reclassified nursing facility stays as short (postacute) when they were up to 100 days, the adjusted total monthly cost difference between LTSS nursing facility care

**TABLE 2.** Average Unadjusted Monthly Health Care Expenditures After Initiating Long-term Services and Supports by Payer and Level of Service

	HCBS (n = 17,330)		NF (n = 17,330)		Difference	
	\$	95% CI	\$	95% CI	NF-HCBS	95% CI
Combined Medicare and Medicaid mean monthly expenditures						
Acute	4940	4804–5077	5587	5443–5730	646	448–845
Postacute	313	297–329	428	403–453	115	85–145
LTSS	988	970–1007	4060	4013–4108	3072	3021–3123
Total	6242	6098–6385	10,075	9913–10,237	3833	3617–4050
Medicare mean monthly expenditures						
Acute	4638	4508–4768	5112	4981–5243	474	289–659
Postacute	311	296–327	406	387–426	95	70–120
LTSS	164	154–174	1902	1863–1940	1738	1698–1778
Total	5113	4977–5249	7420	7271–7569	2307	2105–2508
Medicaid mean monthly expenditures						
Acute	306	292–321	480	455–506	174	145–203
Postacute	2	1–2	22	6–37	20	5–36
LTSS	834	822–847	2196	2169–2224	1362	1332–1392
Total	1142	1123–1162	2699	2658–2739	1556	1511–1601

The Medicare and Medicaid subgroup average monthly expenditures, when separately combined may differ from the Total Medicare and Medicaid values because of differences in an individual's eligibility months in each payer program. This affects the denominators used in the mean expenditures calculations. Row and column totals may differ due to rounding.

CI indicates confidence interval; HCBS: home and community-based services; LTSS, long-term services and supports; NF, extended nursing facility stay entrant.

and HCBS was \$4222 for those with extended stays. Excluding the expenditures that occurred in the month after initiating LTSS resulted in an adjusted total monthly difference

of \$2983. Accounting for individuals who remained in their initial type of LTSS throughout the entire period slightly widened the difference in expenditures between nursing

**TABLE 3.** Factors associated With Average Monthly Health Care Expenditures Following Initiation of Long-term Supports and Services

Models	Total All Services		Acute and Postacute		LTSS	
	\$	P	\$	P	\$	P
Nursing facility entrant (reference = HCBS)	2919	<0.001	62	0.43	2855	<0.001
Age (reference < 65 y)						
65–74	701	<0.001	815	<0.001	130	<0.001
75–84	1196	<0.001	1484	<0.001	303	<0.001
≥ 85	1372	<0.001	1906	<0.001	552	<0.001
Female	357	<0.001	261	<0.001	90	<0.001
Race/ethnicity (reference = white)						
Hispanic	929	<0.001	1272	<0.001	345	<0.001
Black	1804	<0.001	1776	<0.001	31	0.42
Asian	442	<0.001	904	<0.001	469	<0.001
Other	700	<0.001	712	<0.001	2	0.97
≥ 3 ADL limitations*	897	<0.001	37	0.67	844	<0.001
Cognitive limitations†	23	0.78	587	<0.001	611	<0.001
CDPS score‡	2135	<0.001	2014	<0.001	115	<0.001
Living alone	173	0.08	355	<0.001	182	<0.001
Months alive (up to 12)§	1029	<0.001	810	<0.001	197	<0.001
Year 2007 (reference = 2006)¶	422	<0.001	392	<0.001	30	0.18
County characteristics						
NF beds/1000 population	301	<0.001	237	<0.001	64	<0.001
PCA hourly rate#	330	<0.001	166	<0.001	157	<0.001
Residents aged ≥ 65 (%)**	57	0.02	84	<0.001	26	<0.001

\*ADL items available in CMIPS and the MDS are common in terms of activities of daily living (ie, bathing, dressing, toileting, transferring, eating). Our ADL limitations measure indicates that the individual requires at least the need of assistance (if not more assistance) from another in ≥ 3 ADL tasks. Reference is <3 ADL limitations.

†Cognitive status is based on Memory, Orientation, and Judgment items in the CMIPS and MDS instruments. Having 1 item requiring at least verbal assistance/supervision/cueing identifies an individual as having a cognitive limitation in our common measure. Reference, supervision not required.

‡Chronic Illness and Disability Payment System score.<sup>20</sup>

§Mean number of months alive in the 12 months following start of LTSS.

¶Indicates that recipient entered LTSS in 2007 rather than 2006.

||Mean number of nursing facility beds per 1000 residents in the county.

#Median hourly payment rate for Medicaid home and community-based services PCAs in the recipient's county of residence.

\*\*Mean percentage of county residents aged 65 or over in the year of the recipient's LTSS entry.

ADL indicates activities of daily living; CDPS, Chronic Illness and Disability Payment System; HCBS, home and community-based services; LTSS, long-term services and supports; PCA, personal care assistant.

facility and HCBS to \$3671. Recalculating the propensity score to include whether the individual had a hospitalization in the same month as initiating LTSS reduced the adjusted difference in monthly total costs to \$1989. LTSS expenditures were \$2702 higher per month for those in nursing facilities than HCBS, a result which is very similar (\$153 per month lower) to that obtained from the model which did not include prior hospitalization in the propensity score calculation.

## CONCLUSIONS

We found that among a group of MMEs matched with similar levels of health and functional needs, those entering LTSS in nursing facilities had average total monthly expenditures of nearly \$3000 greater than those entering LTSS in the community. Nearly all of the difference was attributable to the cost of LTSS spending. Those receiving LTSS through a nursing facility were more costly to both Medicare and Medicaid, Medicare's spending was similar to Medicaid's for MMEs with an extended stay in a nursing facility. Our approach assigned all Medicare payments for these extended nursing facility stays to LTSS even though Medicare does not technically have an LTSS benefit. This highlights the hidden role that Medicare plays in LTSS delivered in nursing facilities.

Unlike the findings of Wysocki et al<sup>9</sup> and Kane et al,<sup>10</sup> we did not find that the higher cost for LTSS provided in nursing facilities was fully offset by lower acute and post-acute spending when compared with those receiving LTSS in the community. However, we did observe in our multivariate analysis that older age and cognitive limitations were associated with higher LTSS spending and lower acute and postacute expenditures.

We believe that by limiting our analysis to those initiating LTSS, and by matching on propensity to use nursing facility care, we were able to make a more accurate determination of the cost differences by type of LTSS. We were conservative in our estimates, analyzing the cost outcomes based on a recipient's initial type of LTSS and prospectively from date of service initiation. Our findings were robust through a series of sensitivity analyses. These revealed that the difference in the total costs for those using nursing facility care versus HCBS was even greater when analysis was limited to those who remain in their initial type of LTSS throughout the entire observation period. Furthermore, when we reconstructed our sample by reclassifying postacute nursing facility stays to <100 days, rather than <21 days, the differences in overall health care costs between those receiving LTSS in a nursing facility versus those in HCBS actually increased. This suggests that if we mistakenly included some individuals with postacute stays between 21 and 100 days in our original estimates, then this would result in a bias to underestimate the overall health care cost differences between those receiving LTSS in a nursing facility versus in the community.

Our study has some important limitations. First, the assignment of individuals to different types of LTSS was not randomized, but rather based on actual practice. Although we applied propensity scores to adjust for differences between

individuals using nursing facilities versus HCBS, it is possible that unobserved characteristics explain some of the differences in costs. For example, we had limited information on social support; with more detail beyond household size, we would have a more precise method for estimating the cost of receiving LTSS in a nursing facility versus through HCBS. In our sensitivity analyses accounting for whether the individual was hospitalized before initiating LTSS, our estimate of the cost differences was reduced but still significantly higher for those receiving nursing facility care.

Second, we may have inflated the difference in costs by intentionally including Medicare nursing facility expenditures, which are programmatically considered post-acute, within our cost accounting of LTSS when these expenses were a part of an extended nursing facility stay. However, we found that 43% of the nursing facility stays began as Medicare-financed postacute care but eventually shifted to Medicaid financing. When we excluded costs for the month after enrollment in LTSS, a time period most likely corresponding to Medicare-reimbursed postacute care, we found that average monthly total cost differences between HCBS and nursing facility groups were virtually unchanged.

Third, our analysis was unable to account for expenditures outside of those made by Medicare and Medicaid, or capture lost wages of family members who contributed caregiving services.

Finally our results may not be generalizable to all Medicaid beneficiaries receiving LTSS today. They are retrospective, from a single state, and do not include individuals in managed care or who enrolled in Medicaid only after initiating LTSS. However, California is a significant state because it has the nation's largest Medicaid program and the largest Medicaid HCBS program. The findings from California are relevant to the growing number of states that, as result of the Affordable Care Act and their own policies, are rebalancing LTSS away from the nursing facility and toward greater use of HCBS.<sup>22</sup>

Our findings are also relevant for states attempting to improve the coordination of care and payments across Medicare and Medicaid.<sup>23</sup> That Medicare and Medicaid are almost equal partners in the funding of extended nursing facility stays provides an incentive for these 2 payers to jointly pursue a care transformation plan that returns greater value by increasing quality and or lowering costs. The Affordable Care Act is providing federal support through the Centers for Medicare and Medicaid's Coordinated Care Office for demonstrations of innovative approaches. California and several other states are transitioning payments for LTSS into managed care, with the hope that financial integration across payers and levels of care will support a more integrated delivery model. The findings from this study can help to serve as a baseline for evaluating the effectiveness of this approach.

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