



**U.S. Department of Health and Human Services
Assistant Secretary for Planning and Evaluation
Office of Disability, Aging and Long-Term Care Policy**

DOES HOME CARE PREVENT OR DEFER NURSING HOME USE?

February 2016

Office of the Assistant Secretary for Planning and Evaluation

The Office of the Assistant Secretary for Planning and Evaluation (ASPE) is the principal advisor to the Secretary of the Department of Health and Human Services (HHS) on policy development issues, and is responsible for major activities in the areas of legislative and budget development, strategic planning, policy research and evaluation, and economic analysis.

ASPE develops or reviews issues from the viewpoint of the Secretary, providing a perspective that is broader in scope than the specific focus of the various operating agencies. ASPE also works closely with the HHS operating agencies. It assists these agencies in developing policies, and planning policy research, evaluation and data collection within broad HHS and administration initiatives. ASPE often serves a coordinating role for crosscutting policy and administrative activities.

ASPE plans and conducts evaluations and research--both in-house and through support of projects by external researchers--of current and proposed programs and topics of particular interest to the Secretary, the Administration and the Congress.

Office of Disability, Aging and Long-Term Care Policy

The Office of Disability, Aging and Long-Term Care Policy (DALTCP), within ASPE, is responsible for the development, coordination, analysis, research and evaluation of HHS policies and programs which support the independence, health and long-term care of persons with disabilities--children, working aging adults, and older persons. DALTCP is also responsible for policy coordination and research to promote the economic and social well-being of the elderly.

In particular, DALTCP addresses policies concerning: nursing home and community-based services, informal caregiving, the integration of acute and long-term care, Medicare post-acute services and home care, managed care for people with disabilities, long-term rehabilitation services, children's disability, and linkages between employment and health policies. These activities are carried out through policy planning, policy and program analysis, regulatory reviews, formulation of legislative proposals, policy research, evaluation and data planning.

This report was prepared under contract #HHSP23320095654WC between HHS's ASPE/DALTCP and the Urban Institute. For additional information about this subject, you can visit the DALTCP home page at <http://aspe.hhs.gov> or contact the ASPE Project Officer, Pamela Doty, at HHS/ASPE/DALTCP, Room 424E, H.H. Humphrey Building, 200 Independence Avenue, S.W., Washington, D.C. 20201. Her e-mail address is: Pamela.Doty@hhs.gov.

DOES HOME CARE PREVENT OR DEFER NURSING HOME USE?

Brenda Spillman

Urban Institute

February 2016

Prepared for
Office of Disability, Aging and Long-Term Care Policy
Office of the Assistant Secretary for Planning and Evaluation
U.S. Department of Health and Human Services
Contract #HHSP23320095654WC

The opinions and views expressed in this report are those of the authors. They do not necessarily reflect the views of the Department of Health and Human Services, the contractor or any other funding organization.

TABLE OF CONTENTS

ACRONYMS	iii
INTRODUCTION	1
DATA AND METHODS	4
Methods	4
Key Analytic Measures	7
Other Measures	8
OVERVIEW OF DISABILITY, HEALTH, AND SERVICE USE BY CARE ARRANGEMENT	9
THE RELATIONSHIP BETWEEN FORMAL CARE HOURS AND NURSING HOME USE	12
Probability of Nursing Home Entry	13
Expected Days of Care over One Year and Two Years	14
SIMULATED EFFECTS OF INCREASING FORMAL CARE HOURS	17
DISCUSSION	20
REFERENCES	24
APPENDIX A. Additional Tables	26

LIST OF TABLES

TABLE 1.	Disability, Health, and Public Program Participation Among Community-Residing Medicare Beneficiaries Age 65 or Older Receiving Disability Assistance at Baseline, by Type of Care Received.....	9
TABLE 2.	Hours of Disability-Related Care in the Last Week, Community-Residing Medicare Beneficiaries Age 65 or Older Receiving Disability Assistance at Baseline.....	10
TABLE 3.	Patterns of Acute, Post-Acute, and Long-Term Care Use Over a 2-Year Follow-up Period, Community-Residing Medicare Beneficiaries Age 65 or Older Receiving Disability Assistance at Baseline	11
TABLE 4.	Comparison of High Risk Sample with Full Sample and Those with Fewer Than 3 ADL Limitations	12
TABLE 5.	Probit Estimation of the Probability of NonSNF Nursing Home Entry Over 1 and 2 Years, Community-Residing Medicare Beneficiaries Age 65 or Older Receiving Disability Assistance at Baseline	14
TABLE 6.	Tobit Estimation of Expected Days of NonSNF Nursing Home Use Over 1 and 2 Years, Community-Residing Medicare Beneficiaries Age 65 or Older Receiving Disability Assistance at Baseline	15
TABLE 7.	Simulated NonSNF Nursing Home Use Over 2 Years if Formal Care Increased by 8 Hours Per Week, Community Residents Age 65 or Older Receiving Disability Assistance at Baseline by Care Arrangement and Disability.....	17
TABLE A1.	Means and Proportions: Outcome Variables and Covariates by Analysis Sample	26
TABLE A2.	Simulated NonSNF Nursing Home Use Over 2 Years if Formal Care Increased by 8 Hours Per Week, Community Residents Age 65 or Older Enrolled in Medicaid and Receiving Disability Assistance at Baseline by Care Arrangement	27
TABLE A3.	Simulated NonSNF Nursing Home Use Over 2 Years if Formal Care Increased by 8 Hours Per Week, Persons Age 65 or Older Receiving Disability Assistance in Traditional Community Residences at Baseline by Care Arrangement and Disability	27

ACRONYMS

The following acronyms are mentioned in this report and/or appendix.

ACA	Affordable Care Act
ADL	Activity of Daily Living
CMS	Centers for Medicare and Medicaid Services
DME	Durable Medical Equipment
HCBS	Home and Community-Based Services
IADL	Instrumental Activity of Daily Living
IV	Instrumental Variable
MDS	Minimum Data Set
MFP	Money Follows the Person demonstration
NHATS	National Health and Aging Trend Study
NLTCS	National Long-Term Care Survey
SNF	Skilled Nursing Facility

INTRODUCTION

Population aging and recent stalling of disability declines (Freedman et al. 2013) heighten the need to understand patterns of Medicaid and Medicare service use in the older population with disabilities and particularly factors associated with costly nursing home use. Understanding utilization patterns is critical for projecting future demands on the health and long-term care delivery systems and costs of caring for an aging population. Despite the decline in use of institutional long-term care by the Medicare elderly in recent decades, nursing home use continues to be a concern for both individual well-being and private and public program costs.

Federal and state policy in recent years has focused on increasing Medicaid-financed home and community-based services (HCBS) and reducing nursing home care, and new incentives for doing so were included in the 2010 Affordable Care Act (ACA). Yet, to date, the shift to community-based care has been more successful for the younger population with developmental or intellectual disabilities than for the older population and other adults with disabilities (Eiken et al. 2011). Among the 21 states participating in the Balancing Incentives Program, an ACA initiative to increase the share of Medicaid long-term care spending devoted to HCBS, the average share for the aged and adults with physical disabilities was 31%, compared with 61% for those with intellectual or development disabilities (Wiener et al. 2015). All of these states and 22 others are participating in Money Follows the Person (MFP) Demonstration, which allows willing persons in institutional settings to return to community settings, supported by HCBS and other services to assist with transitions.

In addition, considerable effort is being made to project the effects of various proposed benefit configurations intended to increase pre-funding of long-term care costs among older Americans, who generally are not pre-financing care and have few affordable options for doing so. The high cost of nursing home care is a major factor in transition to Medicaid enrollment, particularly for older persons with lower income and resources (Spillman and Waidmann 2014).

The present study was undertaken to describe the patterns of acute, post-acute, and long-term care use among community-residing Medicare beneficiaries and specifically to examine the relationship between paid care in the community and long stay nursing home entry. Given the dual public interests in providing preferred community services to support the ability to age in place and saving public costs, several recent studies have examined whether the use of Medicaid-financed HCBS among the older population can reduce nursing home use and Medicaid costs. The theoretical and intuitive benefits are clear, both in terms of individual preferences and because of the potential for lower costs for both individuals and third-party payers, notably Medicaid, the largest third-party payer for long-term care. The empirical evidence, however, is less straightforward with respect to costs of care.

Most studies examining whether use of HCBS reduces nursing home use have focused on Medicaid spending for these specific services, using claims data for Medicaid beneficiaries. In a study of aggregate Medicaid program spending, Kaye and colleagues (2009) found that, although initial spending was higher, over time state investments in increased HCBS were associated with lower overall long-term care spending for the older population. Evaluation results from MFP indicate that older persons returning to the community had spending in the first year after transition that was about \$12,000 below that for the prior year, and savings from reduced institutional spending more than offset higher HCBS spending (Irvin et al. 2015).

Other studies focusing on the Medicaid program have had more mixed results. A study of the Indiana Medicaid program found that a higher volume of home care services among HCBS waiver participants was associated with reduced likelihood of nursing facility entry among those surviving a 24-month analysis period (Sands et al. 2012). A 5-hour increment in attendant services per month reduced the likelihood of nursing home entry by 5%, and a similar increment in homemaker services reduced nursing home entry by 13%. More recent research using an instrumental variable (IV) approach to adjust for joint determination of home care and nursing home use, also found that increased Medicaid spending on home care was associated with reduced nursing home utilization and spending, but that the reduction fell far short of offsetting the cost of the home care services (Guo et al. 2015). Finally, findings from a more general study using survey data from the Health and Retirement Study indicate that effects may vary depending on informal care resources available (Muramatsu et al. 2007). Analysis in that study found that higher state investment in Medicaid home care had no effect on nursing home entry overall, but was significantly associated with a lower risk of nursing home admission for older adults with no living children.

This study takes a broader perspective, describing patterns of Medicare and Medicaid service use in a nationally representative cohort of community-residing older persons receiving assistance with basic activities and then examining whether the number of hours of formal, paid services, regardless of payer, is associated with reduced nursing home use over fixed time periods of 1 year and 2 years. Data are from the 2004 National Long-Term Care Survey (NLTCS) linked with multiple years of Medicare and Medicaid administrative data. Analyses address the following questions for persons receiving disability assistance at the time of interview:

- What are the patterns of service use and do they vary by the type of care arrangement, specifically formal care only, both formal care and informal care from family or others, and informal care only?
- Is the amount of formal care received at baseline associated with reduced nursing home entry over periods of 1 year and 2 years?

- What effect, if any, does formal care have on expected days of nursing home care for the cohort?
- What are the net cost implications of any reductions in nursing home care, taking into account the cost of increasing formal care hours?

DATA AND METHODS

The NLTCs was the dominant nationally representative longitudinal survey focused on disability and long-term care in the Medicare population age 65 or older for two decades prior to its discontinuation after the 2004 survey year used in this analysis. Throughout the survey's history, Medicare beneficiary and claims data were linked to respondents, providing continuous longitudinal information on Medicare service use and spending. Beginning in the 1999 survey year, the Office of the Assistant Secretary for Planning and Evaluation supported linkage of Outcome and Assessment Information Set and Minimum Data Set (MDS) assessments, the latter with the particular intent of being able to observe nursing home admissions occurring in the intervals between interviews. For the 2004 survey year, all administrative files were updated through 2009, and Medicaid Analytic Extract files for 2004-2007, the most recent years then available, were added.

The base analysis sample drawn from the 2004 survey wave for this study includes 1,856 Medicare fee-for-service beneficiaries with chronic disabilities receiving assistance in community settings--either traditional housing or non-institutional supportive settings, such as assisted living, at interview. Nursing home analyses also examine a subsample 1,125 persons who may be at higher risk of needing a nursing home level of care by virtue of having limitation in three or more daily personal care activities at baseline. Requiring assistance with three or more daily activities is sometimes used to approximate a level of need consistent with eligibility for Medicaid HCBS waiver services or nursing home care.

Methods

In order to understand which recipients might benefit most from increased hours of formal care, an organizing principle for analyses is the type of care arrangement. Descriptive analyses examine level of disability, health, and public program participation, and hours of formal and informal care received at baseline, and Medicare and Medicaid service use over a 2-year follow-up period by care arrangement at baseline: formal care only, both formal and informal care, and informal care only.

Models examining the association of HCBS with nursing entry and days of care use baseline hours of formal care, hours of informal care, and care arrangement to predict nursing home use within 1 year and 2 years of survey interview. Outcome measures are admission to an episode of nursing home care other than skilled nursing facility (SNF) care, and expected days of non-SNF nursing home care, taking into account both the probability of use and days of use among users. Model development was informed by previous work using the NLTCs to examine the role of informal

caregiver stress in long stay nursing home use (Spillman and Long 2009; Spillman 2014).

The conceptual framework for the model, based on the literature and economic theory incorporates the following assumptions:

- Nursing home care is a less preferred option for both care recipients and family and other informal caregivers as long as informal and formal community-based care is able to meet care needs.
- Formal and informal hours of care are negatively associated with nursing home use, after controlling for physical and cognitive health and functioning deficits that generate the need for care.
- The sustainability of community care arrangements depends on the level of care required, the availability of informal care, and the resources available to pay for formal care.
- Frailty and care needs tend to increase over time.
- The demand for nursing home care, formal care, and informal care are jointly determined by recipient and family decisions.
- The recipient's baseline situation is the outcome of past decisions, and the factors that influenced past decisions, some of which are unobservable, also affect future decisions.

The last two assumptions present a challenge for modeling. The key explanatory variables, formal and informal care hours, and the outcome variables are jointly determined, or endogenous, which can bias estimates of the association of home care hours with nursing home use. Technically, the two endogenous explanatory variables are correlated with the error term in the nursing home use model because factors that affect nursing home use also affect the use and level of formal and informal care. Further bias can occur because of other unobserved factors that affect decisions about use of formal, informal, and nursing home care.

In the previous studies of caregiver stress and nursing home use, models included a third endogenous factor, stress resulting from caregiving, which affects and is affected by the levels of formal and informal care hours. The analysis sample in the more recent study (Spillman 2014) was a pooled sample of informal care recipients and their primary caregivers in NLTCs survey years 1999 and 2004, for whom detailed information about the experience of caregiving, including high-stress, was collected in a supplemental survey of caregivers. The analysis used a two-stage IV approach. The first stage predicts values for the endogenous regressors using all model explanatory variables plus additional explanatory variables associated with the endogenous regressors but not with the main outcome. These predicted values replace the endogenous regressors

in a second stage estimation of the main nursing home use equations. IV estimates may still be biased, but tests in the previous study indicated that the instruments chosen were valid and that the bias in the IV estimates was less than 5% of the bias in estimates ignoring endogeneity.

In that study estimates ignoring endogeneity of formal and informal care hours and caregiver stress indicated a negative but insignificant relationship between informal care hours and both nursing home admission and expected days of care, consistent in sign with expectations. High-stress was positively and significantly related with both outcomes, consistent with expectations in sign and significance. Contrary to expectations, however, the coefficient for formal care hours also was positive and significant. IV estimation moved coefficients in the direction of hypothesized effects: the formal care hours coefficient became smaller and insignificant (although still positive), the negative for informal care hours coefficient became larger and significant, and the positive high-stress coefficient was both larger and highly significant. The results suggested that the weaker result for informal care hours and the counterintuitive result for formal care hours in the original estimation reflected bias created by the inter-relationship between care hours and caregiver stress.

The current study focuses on a broader sample including both persons relying solely on formal care and informal care recipients who did not identify a primary caregiver or whose primary caregiver did not respond to the caregiving supplement. As a result, it is impossible to observe for the full sample either primary caregiver stress or factors predicting it, such as physical or financial strain from caregiving or recipient behavior problems. Various specifications for IV models addressing endogeneity of only formal and informal care hours were tested. In all cases, both formal and informal care became statistically insignificant. In addition, the coefficient for informal care switched from negative to positive, contrary to expectation and results in the earlier study. Although statistical tests indicated a reduction in bias relative to estimates ignoring endogeneity, based on the earlier evidence of additional bias in hours estimates associated with caregiver stress, the decision was made to present results from estimations ignoring endogeneity. Besides yielding more plausible negative signs for both informal and formal care, the models ignoring endogeneity also allowed inclusion of an interaction term distinguishing effects for recipients receiving only formal care, which was intractable in IV models. Despite the likely bias from ignoring the joint determination of formal and informal care hours, qualitative conclusions with respect to the effect of increasing formal care hours and the cost implications are similar to those from the IV model.

All descriptive estimates and model results were produced using the survey (svy) commands in Stata 13.1 (StataCorp 2013). Svy:probit was used to estimate the probability of nursing home entry, and svy:Tobit was used to estimate expected days of use. Simulated changes in outcome variables associated with a change in formal care hours and significance of the changes were computed using Stata's margins commands.

Key Analytic Measures

Nursing home use was constructed from MDS data for the calendar years 2004-2009. The focus is on nursing home use excluding SNF stays, which is more likely to reflect permanent placement, rather than a short-term post-acute admission. Outcome variables are indicators of a non-SNF episode beginning within follow-up periods of 1 year and 2 years, and the number of days of care in non-SNF stays occurring within each time period, valued 0 for those with no admission in the period. Although longer time periods are possible with the administrative data available, because key explanatory variables can be measured only at baseline, effects may be attenuated as the length of the follow-up period increases.

Formal and informal care measures were constructed from care recipient reports on the amount of care provided in the last week by each person providing care. NLTCS respondents who report receiving help with at least one activity of daily living (ADL) or instrumental activity of daily living (IADL) in the week prior to interview were asked to identify all persons assisting them. Included ADLs are eating, transferring, getting around inside, dressing, bathing, and toileting. Included IADLs are housework, laundry, meal preparation, shopping, getting around outside, managing money, taking medications, and telephoning. For each caregiver, respondents report the number of hours of care provided, and, if the caregiver is not a relative, whether the caregiver is paid. NLTCS respondents were asked to report both actual hours in the week prior to interview and hours in a typical week for each caregiver. Conceptually hours in a typical week might be considered a preferred measure. However, hours in the last week were more fully reported, and the two values were the same for the large majority of caregivers (about two-thirds of informal caregivers and three-quarters of formal caregivers). When aggregated to the respondent level, substituting typical hours for actual hours in the last week for caregivers whose hours differed made inconsequential difference in the distributions of formal and informal care hours received in the prior week. The measure used in the analysis is hours in the last week, corresponding to the reporting period for disability assistance.

Service use and program participation at interview and over a 2-year follow-up period is constructed using Medicare and Medicaid beneficiary and claims data. Program participation variables are Medicaid enrollment at baseline and a hierarchical measure indicating any Medicaid HCBS claims spanning the interview date, and if not, any Medicare home health claims. Inpatient spending in the 6 months prior to interview and use of home health at baseline also are constructed from Medicare claims for use in models. Inpatient spending is included as a control for recent serious health events. Use of home health at baseline is included to control for home care received at baseline that is related to acute illness rather than long-term care, which could distort the relationship between formal care hours and nursing home use. Medicare and Medicaid claims also are used to construct indicators of service use and mean spending per service user over a 2-year follow-up period for Medicare inpatient, home health, SNF, and hospice, and for Medicaid HCBS and nursing home use. MDS assessments are

used to construct an all-payer indicator of any nursing home use and non-SNF nursing home use SNF use over the 2-year follow-up and mean days of care per user.

Other Measures

Recipient characteristics constructed from survey data include disability and self-reported health, age, race and Hispanic origin, economic status, and geographic region. Disability is categorized hierarchically as chronic assistance with three or more ADLs, 1-2 ADLs, or no ADLs (assistance with IADLs only). In addition, the NLTCs allows identification of total ADL limitations, including limitations managed entirely with assistive devices. This latter measure is used both to select the sample likely to be at higher risk for nursing home use and to control for disability level in models. Cognitive impairment is defined as either a proxy respondent report of Alzheimer's disease, intellectual disability, or dementia, or a score on the Short Portable Mental Status Questionnaire indicating mild to severe dementia (Pfeiffer 1975). Health is measured by self-reported health, in addition to the measure of inpatient hospital spending in the prior 6 months. Age is categorized in 10-year categories through age 85 or older.

Economic measures are income and home value. Income is measured by categorical variables indicating income less than \$20,000 annually, \$20,000 to less than \$40,000, and \$40,000 or more. Home value is categorized as \$0 for those who do not own a home, less than \$75,000, \$75,000 to less than \$150,000, and \$150,000 or more. Home ownership in particular has been found to have an independent association with a lower likelihood of nursing home use after controlling for income.

Area and Medicaid program characteristics are constructed from county-level data from the Area Resource File and external data compiled from various sources. They are nursing home beds per 1,000 persons age 65 or older in the county of residence and the Medicare SNF per diem in the state of residence relative to the median across states, constructed from Centers for Medicare and Medicaid Services (CMS) data (CMS 2006, 2007). Included program characteristics are whether the share of Medicaid long-term care spending for HCBS in the state of residence exceeds the median across states, constructed from data in Burwell et al. (2004), whether the state applies a special income standard for nursing home users, and whether the state has a medically needy program.

OVERVIEW OF DISABILITY, HEALTH, AND SERVICE USE BY CARE ARRANGEMENT

Tables 1-3 provide context with respect to how disability, health, program participation, and service use within a 2-year follow-up period differ by care arrangement among community-residing Medicare beneficiaries receiving help at baseline.

TABLE 1. Disability, Health, and Public Program Participation Among Community-Residing Medicare Beneficiaries Age 65 and Older Receiving Disability Assistance at Baseline, by Type of Care Received					
	All	Care Arrangement ^a			
		Formal Only (n=305)	Formal and Informal (n=425)	Informal Only (n=1,126)	
Number of persons (000s)	3,473	520	723		2,231
Percent	100.0	15.0	20.8		64.2
Percent Distribution					
Disability and health					
Receipt of help					
No ADLs	34.6	44.6	18.4	**	37.5 ** ##
2+ ADLs	28.1	23.6	29.0		28.9 *
3+ ADLs	37.3	31.8	52.6	**	33.6 ##
Total ADL limitations ^b					
Fewer than 3	41.8	45.9	17.7	**	48.6 ##
3 or more	58.2	54.1	82.3	**	51.4 ##
Cognitive impairment	29.9	27.1	39.7	**	27.4 ##
Fair or poor health	55.4	47.4	63.4	**	54.6 ** ##
Mortality					
Died within 1 years	14.2	13.7	17.6		13.2 ##
Died within 2 years	29.5	30.2	35.4		27.5 ##
Public program participation					
Medicaid eligible	27.4	35.8	38.6		21.7 ** ##
Publicly paid home care ^c					
None	85.3	76.9	66.7	**	93.3 ** ##
Medicaid HCBS	5.8	11.6	9.9		3.1 ** ##
Medicare home health	8.9	11.5	23.4	**	3.5 ** ##
SOURCE: Tabulations of the 2004 NLTCs and linked administrative data. The unweighted sample is 1,856 persons receiving assistance in community settings.					
**(*)=Difference from value for formal care only is statistically significant at the 5%(10%) level in a two-tailed test. ##(#)=Difference from value for formal and informal care is statistically significant at the 5%(10%) level in a two-tailed test.					
a. NLTCs respondent-reported types and hours of care received in the week prior to interview.					
b. Includes ADL limitations managed without help at baseline.					
c. Payment sources are constructed hierarchically from Medicaid and Medicare claims with Medicaid HCBS taking precedence. Claims may differ from respondent-reports because service use began after the prior week for which respondents report care (i.e., on the interview date) or because of respondent error. Thirty-four persons reporting only informal care in the prior week had claims for Medicaid HCBS at interview. For half, services began on or within 2 days prior to interview, and 2 also had a Medicare home health claim on or spanning the interview date.					

About one in six care recipients receive only formal care, about one in five receive both formal and informal help, and nearly two in three receive only informal help (Table 1). Recipients of both formal and informal help clearly have a greater level of disability and poorer health than the other two groups. Nearly half receive help with at least three ADL disabilities, compared with roughly one-third of those receiving formal or informal care only, and 82% have limitation in at least three ADLs, compared with about half of the other groups. They also are more likely to have cognitive impairment--40% versus just over one-quarter of the other two groups. Those receiving both types of care also are most likely to report fair or poor health, and those receiving only formal care are significantly less likely to report fair or poor health than either group receiving informal care. Differences in mortality over 1 year and 2 years are relatively modest, but those receiving both formal and informal care are more likely to die than those with only informal care.

Patterns of disability-related care and service use over a 2-year follow-up period are consistent with the greater disability and poorer health of those using both formal and informal help. Their average total care hours are about twice the total hours received by those with either formal help only or informal help only, and their formal and informal care hours were similar to those received by the two groups, respectively (Table 2).

TABLE 2. Hours of Disability-Related Care in the Last Week, Community-Residing Medicare Beneficiaries Age 65 or Older Receiving Disability Assistance at Baseline				
	All	Care Arrangement ^a		
		Formal Only	Formal and Informal	Informal Only
Formal care				
Percent using	35.8	100.0	100.0	0.0
Hours of care	25	26	23	---
Informal care				
Percent using	85.0	0.0	100.0	100.0
Hours of care	31	—	32	31
Total hours of care	35	26	56 **	31 * ##
SOURCE: Tabulations of the 2004 NLTCs and linked administrative data.				
**(*)=Difference from value for formal care only is statistically significant at the 5%(10%) level in a two-tailed test. ##(#)=Difference from value for formal and informal care is statistically significant at the 5%(10%) level in a two-tailed test. a. NLTCs respondent-reported care arrangement and hours of care received in the week prior to interview.				

Recipients of both formal and informal care also have generally higher utilization and spending per user for acute and post-acute care over a 2-year follow-up period relative to those in the other two groups, whose utilization and spending is generally similar (Table 3). Notably, there is no difference across the groups in the percent using SNFs, but SNF spending per user for those receiving both types of help is about \$4,000 higher than that for the other two groups.

TABLE 3. Patterns of Acute, Post-Acute, and Long-Term Care Use Over a 2-Year Follow-up Period, Community-Residing Medicare Beneficiaries Age 65 or Older Receiving Disability Assistance at Baseline				
Use and Spending^b	All	Care Arrangement^a		
		Formal Only	Formal and Informal	Informal Only
Acute care				
Part B spending ^c	\$ 9,089	\$ 8,607	\$11,382 *	\$ 8,455 ##
Inpatient hospital				
Percent using	58.1	56.9	64.1	56.4 ##
Spending among users	\$18,181	\$15,987	\$19,852 *	\$18,081
Post-acute care				
SNF				
Percent using	25.4	24.7	28.8	24.4
Spending among users	\$12,777	\$11,211	\$15,888 **	\$11,954 ##
Home health				
Percent using	38.1	34.8	49.7 **	35.2 ##
Spending among users	\$ 6,937	\$ 7,906	\$ 8,418	\$ 6,034 ##
Long-term care				
Medicaid HCBS				
Percent using	10.3	16.5	16.4	6.9 ** ##
Spending among users	\$16,993	\$25,461	\$17,843 *	\$12,290 ** ##
Medicaid nursing facility				
Percent using	8.6	11.5	15.7	5.6 ** ##
Spending among users	\$21,788	\$21,851	\$29,125	\$16,204 ##
Nursing home use all payers				
Percent using	26.8	26.0	31.0	25.6 #
Days of use among users	149	156	225 **	117 ##
Non-SNF nursing home use all payers				
Percent using	20.9	19.1	25.0	20.0 #
Days of use among users	98	105	155	73 ##
SOURCE: Tabulations of the 2004 NLTCs and linked administrative data.				
<p>**(*)=Difference from value for formal care only is statistically significant at the 5%(10%) level in a two-tailed test. ##(#)=Difference from value for formal and informal care is statistically significant at the 5%(10%) level in a two-tailed test.</p> <p>a. NLTCs respondent-reported care arrangement and hours of care received in the week prior to interview.</p> <p>b. Spending is Medicare or Medicaid program payment amounts from claims.</p> <p>c. Includes carrier, outpatient, and DME claims. Virtually all respondents used Part B Services.</p>				

Patterns are different for Medicaid-financed long-term care. For Medicaid HCBS, utilization and spending per user for recipients of both formal and informal care is significantly higher than that for persons receiving informal care only, and, although their use rate (16.4%) is similar to that for persons receiving only formal care, their spending per HCBS user is significantly lower--about \$18,000 versus about \$25,000 for those using only formal care. Similarly, those using both formal and informal care are more than twice as likely to use Medicaid-financed nursing home care than those receiving informal care only--15.7% versus 5.6%--and their spending per user is about \$13,000 higher. Considering all-payers, those with both formal and informal help are more likely to use nursing facility care and non-SNF care than recipients of informal help only, and users spend roughly twice as many days in either type of nursing home care over a 2-year follow-up period as those receiving only informal care at baseline.

THE RELATIONSHIP BETWEEN FORMAL CARE HOURS AND NURSING HOME USE

Analyses reported in this section examine the association of formal care hours with admission to any non-SNF nursing home episode and expected days of care over follow-up periods of 1 year and 2 years. As noted, the intent is to focus on nursing facility use that is likely to represent permanent placement, rather than post-acute care. Models examine the full sample of community-residing persons receiving assistance at baseline and the subset who have at least three ADL limitations to focus on a population likely to be at higher than average risk for nursing home use than those with less severe disability.

Table 4 provides unadjusted outcomes and selected baseline characteristics of the higher risk group relative to the full sample and lower risk persons. (Means and proportions of all model covariates are provided in Table A1.)

TABLE 4. Comparison of High-Risk Sample with Full Sample and Those with Fewer Than 3 ADL Limitations						
	All Persons (n=1,856)	Fewer Than 3 ADL Limitations (n=731)		3+ ADL Limitations (n=1,125)		
Non-SNF nursing home use						
Percent with an admission within 1 year	0.11	0.10		0.12		
Percent with an admission within 2 years	0.21	0.21		0.21		
Expected days of use within 1 year	5.56	3.56		6.99		##
Expected days of use within 2 years	20.46	14.05	*	25.06		##
Baseline characteristics						
Formal care hours	8.80	3.45	**	12.63	**	##
Informal care hours	26.68	16.51	**	33.98	**	##
Informal care only	0.64	0.75	**	0.57	**	##
Formal care only	0.15	0.16		0.14		
Formal and informal care	0.21	0.09	**	0.29	**	##
Fair or poor health	0.55	0.49	**	0.60	**	##
Inpatient spending prior 6 months	2643	1967	*	3128		##
Cognitively impaired	0.30	0.23	**	0.35	**	##
SOURCE: Analysis of the 2004 NLTCS linked with administrative data and state and county-level Medicaid program, price, and supply characteristics.						
**(*)=Difference from value for full sample receiving help is statistically significant at the 5%(10%) level in a two-tailed test. ##(##)=Difference from value for persons with fewer than 3 ADLs is statistically significant at the 5%(10%) level in a two-tailed test.						

Although there are no significant differences in the percent using non-SNF nursing facility care over 1 year or 2 years for the higher risk group relative to either the mean over the full sample or for those with less severe disabilities, those with three or more ADL limitations had substantially higher expected days of care relative to the lower risk group. They also were receiving significantly more formal and informal care hours at baseline. There is no significant difference in the proportion of higher and lower risk

persons receiving formal care only, but the higher risk group was far more likely to be receiving both types of care. They also were more likely to report fair or poor health, had higher recent inpatient spending, and were more likely to have cognitive impairment.

Probability of Nursing Home Entry

Results for models estimating the probability of nursing home entry are shown in Table 5. Baseline formal care hours have a small, but significant negative effect on nursing home entry, bolstered by a negative coefficient for the interaction term for those receiving formal care only. This is true for both follow-up periods and for the full sample and the higher risk sample. Informal care hours also have the expected negative coefficient in all models, albeit smaller and not significant in any equation. Neither disability level nor care arrangement has a significant association with nursing home entry. The coefficient for cognitive impairment indicates a positive association with nursing home entry, as expected, but the association is significant only in the nearer term for those in the higher risk group. Fair or poor health at baseline has a significant positive association with nursing home entry for the full sample in both periods. Although the coefficients have the expected positive sign for the higher risk group, they are half as large and not significant. A likely reason is lesser variation in health status in the higher risk group.

Notably being enrolled in Medicaid at baseline, which may indicate greater access to HCBS over time, has a negative coefficient in all equations, although it is significant only over the 2-year follow-up period in the full sample. Conversely, being in the highest income group, although not a significant predictor, was negatively associated with nursing home entry, with the largest effect size in the first year after interview for both samples. Being a homeowner with home value less than \$75,000 has a positive association throughout, but is largest and highly significant only over 1 year for the full sample. On the other hand, home value greater than \$150,000 has a negative association that is largest and significant only over a 2-year period for the full sample. Living in a state that devotes a larger share of Medicaid long-term care spending to HCBS also has a negative association with nursing home entry in all equations, but the coefficients are substantially larger and significant only for the higher risk group, consistent with their greater likelihood of meeting functional standards for waiver services.

TABLE 5. Probit Estimation of the Probability of Non-SNF Nursing Home Entry Over 1-2 Years, Community-Residing Medicare Beneficiaries Age 65 or Older Receiving Disability Assistance at Baseline (coefficient)				
Baseline Characteristics	All Persons (n=1,856)		3+ ADL (n=1,125)	
	With 1 Year	Within 2 Years	With 1 Year	Within 2 Years
Formal care hours	-0.006 *	-0.004 *	-0.006 *	-0.004 *
Interaction: formal care only by formal care hours	-0.001	0.000	-0.004	-0.005
Informal care hours	-0.001	-0.001	-0.001	-0.001
Formal care only	0.165	0.030	0.170	-0.055
Formal and informal care	0.069	0.121	0.086	0.094
Age 75-84	0.197	0.310 **	0.218	0.292 **
Age 85 or older	0.373 **	0.427 **	0.284 *	0.372 **
Female	-0.072	-0.035	-0.028	0.034
Black race	-0.321	-0.316 **	-0.328	-0.334 *
Hispanic	-0.276	-0.601 **	-0.023	-0.270
Fair or poor health	0.254 **	0.150 **	0.138	0.078
Inpatient spending prior 6 months	0.011	0.013 *	0.013	0.014 *
1-2 ADLs	-0.093	0.131	---	---
3+ ADLs	-0.018	0.078	---	---
Cognitively impaired	0.163	0.132	0.282 *	0.203
Receiving Medicare home health at interview	0.433 **	0.350 **	0.293	0.307 *
Medicaid enrolled at interview	-0.142	-0.201 **	-0.133	-0.137
Income between \$20,000 and \$40,000	0.020	0.044	-0.001	-0.024
Income \$40,000 or more	-0.244	-0.031	-0.379	-0.125
Home value less than \$75,000	0.278 **	0.088	0.130	0.016
Home value between \$75,000 and \$150,000	0.050	-0.014	-0.007	0.036
Home value \$150,000 or more	-0.094	-0.280 **	-0.096	-0.186
Nursing home beds per 1,000 persons 65+	-0.006	-0.004 *	-0.006	-0.009
Medicare SNF per diem relative to median	-0.420	-0.434	-1.523	-1.457
North Central region	0.029	-0.092	0.092	0.020
Southern region	-0.220	-0.183	-0.148	-0.113
Western region	-0.299	-0.265 *	-0.021	0.056
Metropolitan area	-0.080	0.110	0.022	0.182 *
Community share of Medicaid LTC spending > median	-0.039	-0.124	-0.225 *	-0.302 **
Special income standard for nursing home users	-0.120	-0.135	-0.171	-0.120
Medically needy program	0.175	0.134	0.195	0.200 *
Respondent is a proxy	0.069	0.101	0.038	0.087
Months of follow-up period survived	-0.030	0.076	0.027	0.129 *
Constant	-0.905	-0.878	0.087	-0.012

SOURCE: Analysis of the 2004 NLTCs linked with administrative data and state and county-level Medicaid program, price, and supply characteristics.
Omitted categories: Informal care only, age 65-74, White non-Hispanic, excellent or good health, IADL disability only, income < \$20,000, not a homeowner, North East region.

**(*) Significantly different from zero at the 5%(10%) confidence level.

Expected Days of Care Over 1 Year and Two Years

Formal care hours also are negatively associated with expected days of non-SNF nursing facility care--mean days over the full cohort, including those who do not have an admission in a given follow-up period (Table 6)--but coefficients are small and are significant only over the 1-year follow-up for both the full and high-risk samples. As in the nursing home entry model the formal care effect for those receiving only formal care is augmented by the negative coefficient on the interaction term in each model, with the exception of the 2-year follow-up period for the full sample. In that case, a positive interaction term results in a smaller overall effect for those receiving formal care only.

Coefficients for informal care hours also have the expected negative sign but are not significant. Having formal care only or both types of care is associated with higher days of care, relative to the omitted group with informal care only, but coefficients are significant only for having both types of care over the 2-year follow-up.

TABLE 6. Tobit Estimation of the Probability of Non-SNF Nursing Home Entry Over 1-2 Years, Community-Residing Medicare Beneficiaries Age 65 or Older Receiving Disability Assistance at Baseline (coefficient)				
Baseline Characteristics	All Persons (n=1,856)		3+ ADL (n=1,125)	
	With 1 Year	Within 2 Years	With 1 Year	Within 2 Years
Formal care hours	-0.089 *	-0.220	-0.109 *	-0.231
Interaction: formal care only by formal care hours	-0.007	0.070	-0.030	-0.144
Informal care hours	-0.016	-0.043	-0.013	-0.028
Formal care only	3.459	9.737	4.622	15.401
Formal and informal care	4.735	24.013 **	6.811	25.672 **
Age 75-84	2.312	5.051	1.219	6.631
Age 85 or older	1.680	5.873	0.338	2.957
Female	1.339	1.828	3.036	0.726
Black race	-3.818 *	-6.053	-7.648 **	-18.677 **
Hispanic	-0.905	-7.395	0.669	-3.859
Fair or poor health	1.334	1.429	-0.482	-3.738
Inpatient spending prior 6 months	0.282	0.696	0.161	0.562
1-2 ADLs	2.806	8.887	---	---
3+ ADLs	4.700 **	13.768 **	---	---
Cognitively impaired	6.329 **	23.536 **	11.324 **	34.162 **
Receiving Medicare home health at interview	0.392	-1.755	0.269	1.364
Medicaid enrolled at interview	-1.863	-8.225	-1.078	-4.366
Income between \$20,000 and \$40,000	-0.367	-1.134	1.223	-0.490
Income \$40,000 or more	-1.919	-2.440	-2.035	-5.148
Home value less than \$75,000	2.667	12.629 *	5.316	18.582 *
Home value between \$75,000 and \$150,000	0.973	3.289	2.246	8.460
Home value \$150,000 or more	-0.589	-8.988 *	-0.181	-9.514
Nursing home beds per 1,000 persons 65+	0.003	0.054	0.049	0.132
Medicare SNF per diem relative to median	10.598	25.768	13.474	21.816
North Central region	-2.335	-1.987	-3.750	-8.147
Southern region	-5.378	-5.066	-8.737	-14.075
Western region	-7.681 *	-16.636 *	-9.344	-23.934 *
Metropolitan area	-3.290	-1.985	-4.170	-0.693
Community share of Medicaid LTC spending > median	-1.878	-5.396	-5.230 *	-12.208 *
Special income standard for nursing home users	-1.510	-8.017	-0.345	-5.797
Medically needy program	-2.074	-3.994	-0.632	-1.365
Respondent is a proxy	1.638	3.186	1.396	3.426
Months of follow-up period survived	4.441 **	15.228 **	5.563 **	19.730 **
Constant	-14.572	-57.606	-15.564	-50.031

Source: Analysis of the 2004 NLTCS linked with administrative data and state and county-level Medicaid program, price, and supply characteristics.
Omitted categories: Informal care only, age 65-74, White non-Hispanic, excellent or good health, IADL disability only, income < \$20,000, not a homeowner, North East region.
**(*) Significantly different from zero at the 5%(10%) confidence level.

For expected days of care, unlike the probability of entry, the coefficients for having three or more ADL limitations are positive, large, and highly significant for the full sample in both periods. Coefficients for cognitive impairment are even larger and highly significant for both samples in both time periods. Being in fair or poor health has a positive association, although insignificant, with expected days of care in the full sample, but a negative association for the higher risk group.

As was the case for the probability of entering a non-SNF facility, being Medicaid enrolled at baseline has a negative but insignificant association with expected days, increasing in the longer time period, but is about twice the magnitude in the full sample as in the high-risk sample. Being in the highest income group also is negatively but not significantly associated with expected days of care in both samples, with larger effect sizes over 2 years. As with the probability of non-SNF nursing facility entry, living in a state with a greater commitment to Medicaid HCBS has a negative association with expected days of care that is both larger and significant for the higher risk group.

SIMULATED EFFECTS OF INCREASING FORMAL CARE HOURS

Simulations to illustrate the implications of estimates for non-SNF nursing home use and cost are presented in Table 7 for the full sample and for the higher risk group with at least three ADL limitations. Base predictions are predicted outcomes within each time period and within each type of care arrangement, with baseline formal care hours in the last week valued at the mean for the group. The alternate predictions are for an increase of 8 hours in mean formal care hours in the last week. For the informal care only group, the increase is from 0 to 8 formal care hours. These changes are static and assume that informal care hours are unchanged. An implicit assumption, as in other studies, is that formal care hours in the last week represent a typical week, which, as discussed in the methods section, appears to be a reasonable assumption.

TABLE 7. Simulated Non-SNF Nursing Home Use Over 2 Years if Formal Care Increased by 8 Hours Per Week, Community Residents Age 65 or Over Receiving Disability Assistance at Baseline by Care Arrangement and Disability									
	All Persons Receiving Help				Person with 3+ ADLs				
	Base Prediction ^a	+8 Formal Care Hours Per Week	Change	Percent Change	Base Prediction ^a	+8 Formal Care Hours Per Week	Change	Percent Change	Percent Change
Percent Admitted									
Within 1 year									
Informal only	10.4	9.6	-0.8 *	-8.0	11.2	10.3	-0.9 *	-7.7	
Formal only	10.4	9.5	-0.9 **	-9.0	9.0	7.8	-1.1 **	-12.8	
Formal and informal	12.8	11.8	-1.0 *	-7.4	12.7	11.7	-0.9 *	-7.4	
Within 2 years									
Informal only	19.9	19.1	-0.9 *	-4.3	20.5	19.7	-0.8 *	-4.1	
Formal only	18.9	18.1	-0.9 *	-4.5	13.7	12.3	-1.4 **	-10.4	
Formal and informal	25.1	24.1	-1.0 *	-3.8	24.7	23.8	-0.9 *	-3.7	
Expected Days of Use									
Within 1 year									
Informal only	4.2	3.5	-0.7 *	-16.9	5.2	4.3	-0.9 *	-16.8	
Formal only	5.6	4.9	-0.8 **	-13.6	5.5	4.4	-1.1 **	-20.1	
Formal and informal	9.7	9.0	-0.7 *	-7.4	11.1	10.3	-0.9 *	-7.8	
Within 2 years									
Informal only	14.6	12.9	-1.8	-12.0	17.7	15.8	-1.9	-10.5	
Formal only	20.1	18.9	-1.2	-6.0	19.9	16.9	-3.0 **	-15.1	
Formal and informal	38.7	37.0	-1.8	-4.5	41.7	39.8	-1.9	-4.4	
(***) Significantly different from zero at the 5%(10%) confidence level. a. Predicted values for an 8-hour increase in formal care at the mean of formal care hours and all other covariates from probit and Tobit models of nursing home entry and expected days of use, respectively.									

Differences in the percent entering nursing homes for both periods and all care arrangements are roughly a 1 percentage point reduction. Slightly larger reductions are seen for those in the higher risk group receiving formal care only. Nearly all the reduction in the percent entering a nursing home occurs over the first year after interview, for both the full sample and the higher risk group. Although the nominal changes are small, from a percentage standpoint, reductions are smaller but reasonably similar to those reported in Sands et al. (2012), for a cohort of Indiana Medicaid beneficiaries. In that study, the increase in HCBS was much smaller than in the present

study, however. An increase of 5 hours per month was associated with a 5% (for personal care hours) to 13% (for household activities hours) lower incidence of nursing home entry over 24 months. In this study, among the higher risk group, an increase of 8 hours per week in undifferentiated care is associated with a roughly 4% reduction in nursing home entry over 2 years for informal care users, and a 10% reduction for those receiving formal care only.

To further assess the similarity of findings in this study with those in Sands et al., models were rerun for Medicaid beneficiaries only. Findings were that Medicaid beneficiaries receiving informal care had lower rates of use and smaller, insignificant percentage point changes from increasing hours of formal care. Changes were significant for those receiving formal care only, whose probability was 2 percentage points lower over 2 years, 14% lower than the base predicted probability of entry of 14.4% and somewhat larger than the corresponding full sample estimates. Over 2 years, additional hours of paid care were associated with a slight and insignificant *increase* in the likelihood of entry for those receiving only informal care or both types of care, although expected days of care over 2 years were lower, potentially indicating delayed entry. (Simulations for Medicaid enrollees are provided in Table A2).

Reductions in expected days of care over the 1-year follow-up are less than a day for the full sample, and about a day for the higher risk group, again slightly larger for those receiving formal care only. For the 2-year follow-up period, reductions for both groups receiving informal care are a little under 2 days in both the full sample and the higher risk sample. For those receiving formal care only, the full sample reduction over 2 years is less than that for informal care users--a little over a day, consistent with the positive coefficient for the interaction term in full-sample model--but for the higher risk sample the reduction is 3 days, nearly a day more than that for informal care users.

Clearly, the estimated changes do not support a conclusion that savings would be realized at an individual level from increasing formal care use. To provide context for cost implications, the 2015 median private pay hourly rate nationally for a home health aide was \$20 (Genworth 2014), and the median private pay daily rate for a semi-private nursing facility room was \$220. At these rates, an 8-hour increase in home care would cost \$160 per week over the course of a year, compared with savings of \$220 for a day of nursing home use avoided. Even 2 weeks of home care would exceed the cost of a day of nursing home care, so that effect sizes would need to implausibly larger than those estimated here--on the order of 40 days--to reach a break-even point.

These findings are qualitatively but not quantitatively similar to findings in Guo et al. (2015) that in a given year a \$1,000 increase in Medicaid HCBS direct care spending (i.e., excluding HCBS other than human assistance) was associated with a 2.75-day decline in annual nursing home use and was only partially offset by a \$351 reduction Medicaid nursing facility payments (\$558 if valued at private market rates). Estimates from an alternate specification relating the effect of HCBS spending in the year prior to first nursing home entry to nursing home use, a 100% increase in prior year HCBS spending was associated with a 14% reduction in nursing home admissions, which the

authors translated to a 1.78-day delay in entry. Although the magnitude of the estimated effects is similar to the change in days of use in this analysis, it is not possible to translate the “interventions” of a \$1,000 increase in spending or a 100% increase in prior year HCBS spending to an equivalent of a weekly increase in hours.

DISCUSSION

This analysis has used nationally representative survey data linked with administrative data to explore two areas of high policy interest. The first is patterns of Medicare and Medicaid service use among older persons with disabilities receiving help in community settings. The second is whether increased formal care in community settings is associated with reduced nursing home use at a population level and if so, the net cost implications. Estimates are organized by the type of care arrangement in place at baseline for persons receiving assistance with daily activities--informal care only, formal care only, formal and informal care--and show that relative to those using either formal or informal care only, those using both types of care have greater levels of disability, are in poorer health, and are more likely to be cognitively impaired.

Consistent with their greater disability, those using both formal and informal care received hours of formal and informal care on a par with those receiving only one or the other, respectively, and received roughly twice the total number of hours weekly on average. Not surprisingly, they also were more likely to use Medicare acute and post-acute services and had higher spending per user than the other two groups. For Medicaid HCBS, those receiving only formal care were about equally likely to use and had higher per user spending, relative to those using both formal and informal care, but those receiving both types of care were most likely to use and had higher spending for Medicaid nursing home care. They also were more likely to use nursing home care and had higher days per user, regardless of payer.

Whereas most previous studies examining the role of formal care in preventing or deferring nursing home care have focused entirely on Medicaid beneficiaries, the intent of this analysis was to take a broader population level approach considering the association of formal care services with reduced nursing home use, regardless of payer. Key findings were that although increasing hours of formal care by 8 hours per week was associated with reduced nursing home entry the magnitude of the reductions were small--generally about 1 percentage point for the probability of entry and about a day per year for expected days of care.

Limiting the sample to those with three or more ADLs as a crude proxy for a nursing home level of need increased magnitudes of changes only modestly. Interestingly, the largest effects were for persons receiving only formal care at baseline. For example, predicted expected nursing home days over 2 years among those with three or more ADLs were 3 days lower for those receiving only formal care at baseline compared with about 2 days lower for those receiving informal care. Although those receiving both types of care in most cases had nominal predicted reductions in use similar to those for person using either type of care alone, they uniformly had the highest rate and level of use and therefore the smallest percentage changes.

The bottom line for all groups, however, is that when home care and nursing home care is valued at average private market rates of about \$20 for home care and \$220 for nursing home care, the 8-hours increase in weekly hours of home care would cost \$160 per week and save only \$220-\$330 per year in reduced nursing home use. That level of savings would cover the incremental hours of care for only about 2 weeks.

There are a number of important limitations to the analysis. As noted, there is reason to believe that the effects of formal and informal care hours are biased because they are jointly determined with the decision to enter a nursing home and because of related unobserved factors. As discussed earlier, one such unobserved factor is caregiving-related burden among primary informal caregivers, which is correlated with formal and informal hours but is not observable for all sample members. Caregiver stress has been demonstrated in previous analyses to play a large role in nursing home entry decisions and expected days of care. In earlier work focusing on informal care recipients and their primary caregivers, IV estimates treating caregiver stress as an additional endogenous factor affecting both care hours and nursing home use moved coefficients for formal and informal care hours in the expected negative direction, but the differences were not of a magnitude to substantially narrow the gap between the cost of additional formal home care and the potential savings from reducing nursing home use estimated here (Spillman 2014). In addition, even tests indicating that bias has been reduced by IV methods do not indicate the initial magnitude of bias nor the remaining bias after IV estimation. Recent research has proposed methods to bound the potential magnitude of bias that may be helpful in future analyses (Oster 2015).

A fundamental limitation is that the data do not allow observation of changes over the follow-up periods in key factors affecting nursing home use. These include changes in functional status and cognition, events such as falls or stroke that may lead to precipitous decline in health and functioning, changes in residence or living arrangement, and disruption of care arrangements, for example, death or illness of the primary caregiver.

A further limitation both of the present study and the two Medicaid studies cited is that formal care is limited to direct services for personal care and household activities. While formal direct services make up the largest part of Medicaid HCBS, other supports and services can be included in HCBS waiver service packages and may make significant contributions to the ability to age in place and also to the effectiveness of direct services. These include accommodative environmental features that reduce the physical demands on recipients, and assistive devices that can offset reduced physical capacity. Medicare often covers certain assistive devices on a non-means-tested basis under the durable medical equipment (DME) benefit. Environmental modifications and assistive devices also may be components of effective arrangements for aging in place made by or for older persons not relying on public benefits.

Further analyses using longitudinal data, such as the National Health and Aging Trends Study (NHATS), that allow observation of changes over time and provide a richer picture of the human and physical support environment, can allow exploration and

better understanding of factors associated with nursing home entry decisions and therefore point to where and when policy has the potential to intervene effectively. The NHATS conducts annual in-person interviews that allow observation of changes in health and functioning, the available care network and care arrangements, unmet need for help, physical environment, and economic and other factors relevant to nursing home decisions. Like the NLTCS, NHATS is linked to Medicare beneficiary and claims data as well as MDS and other assessment data.

Despite the limitations of the current analysis, estimates do provide information to aid in thinking about potential policy interventions at the population level both for those who are enrolled in Medicaid and for those who are not.

For policy to be effective and affordable, it is likely that targeting of services and other interventions beyond that possible in the current analysis would be necessary. As noted, estimates for those with three or more ADLs showed larger predicted effects. Further exploratory models limiting the sample to community residents in traditional community housing, excluding those in any type of non-institutional residential care, found further reductions in the probability and expected days of nursing home use for all persons and for the high-risk group. (Simulations are provided in Table A3.)

Other recent research has found that older persons living in traditional housing and receiving paid help have the highest rate of unmet need for care among community residents, suggesting the need for improvements in the quantity or quality of services (Freedman and Spillman 2014). In the present study the largest and strongest associations of increased hours of paid care with reduced nursing home use were for those receiving only formal care, and those receiving both formal and informal care are a particularly vulnerable group, with significantly worse health and functioning and greater care needs prior to nursing home entry and uniformly the highest rate of entry and expected days of care. More careful exploration how services and other aspects of care arrangements change over time, using longitudinal data with frequent follow-up, could better identify how and when services and other supports might be most cost effectively targeted to either of these groups.

Targeting aimed at both care recipients and informal caregivers might be even more effective, but, again requires a longitudinal perspective. The high level of nursing home use among those receiving both formal and informal care and their higher level of disability and especially cognitive impairment support current policy focus on finding effective ways to support informal caregivers. In the community sample used in this analysis, recipients of both types of care who have three or more ADL limitations receive an average 80 hours of help per week, 47 hours from informal caregivers, and those who also have cognitive impairment receive 90 hours of care weekly on average, 46 hours from informal caregivers. In the earlier study relating caregiver stress to nursing home entry, recipients with highly stressed primary caregivers were far more likely to enter nursing homes. Yet, caregivers who reported high-stress were more likely to have used respite and other formal care, made home modifications, or obtained

assistive devices for the care recipient, but also were less likely than other caregivers to report that these measures fully met their needs (Spillman 2014).

More generally, findings with respect to the association of higher state investment in HCBS and economic resources with nursing home use point to other places where policy may effectively intervene to support reduced use of nursing homes and improved ability to age in place in preferred community settings. Higher state investment in HCBS was uniformly negatively associated with both the likelihood of non-SNF use and expected days of use, coefficients were larger over 2 years, and coefficients were both larger and statistically significant in both periods within the higher risk group with three or more ADLs. This may suggest that state investments aimed at the Medicaid population have beneficial spillover effects for the general population. States participating in Balancing Incentives Program, all of which qualified for the program on the basis of their low share of Medicaid long-term care spending devoted to HCBS, cited lack of adequate services and other infrastructure as a significant challenge to meeting program goals (Wiener et al. 2015).

The second more general finding is the negative association of higher income and higher home value and, conversely, the positive association of lower income and no or low housing value with nursing home entry and expected days. These findings point to the importance of efforts to devise policies that could increase access to affordable long-term care financing options, particularly for those of modest means. As noted, recent research found that use of costly nursing home care played a central role in transitions to Medicaid eligibility (Spillman and Waidmann 2014). A combination of policies to increase options for pre-funding long-term care needs combined with continued building of the required HCBS infrastructure might be able both to prevent or delay nursing home entry and Medicaid enrollment and to significantly improve the tools available to support aging in place.

REFERENCES

- Eiken, S, K Sredl, B Burwell, and L Gold. 2011. Medicaid Expenditures for Long-Term Services and Supports: 2011 Update. Thomson Reuters.
- Freedman, VA, and BC Spillman. 2014. "Disability and Care Needs of Older Americans." *Milbank Quarterly*, 92(3): 509-41. doi: 10.1111/1468-0009.12076.
- Freedman, VA, BC Spillman, PM Andreski, JC Cornman, EM Crimmins, E Kramarow, J Lubitz, LG Martin, SS Merkin, RF Schoeni, TE Seeman, and TA Waidmann. 2013. "Trends in Late-Life Activity Limitations: An Update from 5 National Surveys." *Demography*, 50(2): 661-671.
- Genworth Financial, Inc. 2014. Genworth 2014 Cost of Care Survey. https://www.genworth.com/dam/Americas/US/PDFs/Consumer/corporate/130568_032514_CostofCare_FINAL_nonsecure.pdf.
- Guo, J, RT Konetzka, and WG Manning. 2015. "The Causal Effects of Home Care Use on Institutional Long-Term Care Utilization and Expenditures." *Health Econ*, 24 Suppl 1: 4-17, doi: 10.1002/hec.3155.
- Irvin, CV, N Denny-Brown, A Bohl, et al. 2015. Money Follows the Person 2014. Annual Evaluation Report. Report to the U.S. Department of Health and Human Services, Centers for Medicare and Medicaid Services, Contract #HHSM-500-2010-000261/HHSM-500-T0010.
- Kaye, HS, MP LaPlante, and C Harrington Kaye. 2009. "Do Noninstitutional Long-Term Care Services Reduce Medicaid Spending?" *Health Affairs*, 28(1): 262-272.
- Muramatsu, NH Yin, RT Campbell, et al. 2007. "Risk of Nursing Home Admission Among Older Americans: Does States' Spending on Home- and Community-Based Services Matter?" *J Gerontol B Psychol Sci Soc Sci*, 62(3): S169-S178.
- Oster, E. 2015. Unobservable Selection and Coefficient Stability: Theory and Evidence. Brown University and NBER. http://www.brown.edu/research/projects/oster/sites/brown.edu.research.projects.oster/files/uploads/Unobservable_Selection_and_Coefficient_Stability.pdf.
- Pfeiffer, E. 1975. "A Short Portable Mental Status Questionnaire for the Assessment of Organic Brain Deficit in Elderly Patients." *J Am Geriatr Soc*, 23(10): 433-441.
- Sands, LP, H Xu, J Thomas, et al. 2012. Volume of Home- and Community-Based Services and Time to Nursing-Home Placement. *Medicare and Medicaid Research Review*, 2(3).
- Spillman, BC. 2014. Why Do Elders Receiving Informal Home Care Transition to Long Stay Nursing Home Residency?" Report to the U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation. <https://aspe.hhs.gov/basic-report/why-do-elders-receiving-informal-home-care-transition-long-stay-nursing-home-residency>.

Spillman, BC, and SK Long. 2009. "Does High Caregiver Stress Predict Nursing Home Entry?" *Inquiry*, 46(2): 140-161.

Wiener, J, SL Karon, M McGinn-Shapiro, et al. 2015. Descriptive Overview and Summary of Balancing Incentive Program Participating States at Baseline. Report to the U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation. <https://aspe.hhs.gov/execsum/descriptive-overview-and-summary-balancing-incentive-program-participating-states-baseline>.

APPENDIX A. ADDITIONAL TABLES

TABLE A1. Means and Proportions: Outcome Variables and Covariates by Analysis Sample

	All Persons (n=1,856)	Fewer Than 3 ADLs (n=731)		3+ ADLs (n=1,125)	
Outcomes					
Non-SNF nursing home use					
Any admission within 1 year	0.11	0.10		0.12	
Any admission within 2 years	0.21	0.21		0.21	
Expected days of use within 1 year	5.56	3.56		6.99	##
Expected days of use within 2 years	20.46	14.05	*	25.06	##
Baseline characteristics					
Formal care hours	8.80	3.45	**	12.63	** ##
Informal care hours	26.68	16.51	**	33.98	** ##
Informal care only	0.64	0.75	**	0.57	** ##
Formal care only	0.15	0.16		0.14	
Formal and informal care	0.21	0.09	**	0.29	** ##
Age 65-74	0.26	0.28		0.25	
Age 75-84	0.41	0.41		0.40	
Age 85 or older	0.33	0.31		0.35	
Female	0.67	0.66		0.68	
Black race	0.08	0.07		0.08	
Hispanic	0.06	0.05		0.06	
Fair or poor health	0.55	0.49	**	0.60	** ##
Inpatient spending prior 6 months	2,643.15	1967	*	3128	##
No ADLs	0.10	0.25	**	---	
1-2 ADLs	0.32	0.75	**	---	
3+ ADLs	0.58	---		---	
Cognitively impaired	0.30	0.23	**	0.35	** ##
Receiving Medicare home health at interview	0.09	0.07	**	0.11	##
Medicaid enrolled at interview	0.27	0.26		0.29	
Income less than \$20,000	0.59	0.58		0.59	
Income between \$20,000 and \$40,000	0.30	0.31		0.29	
Income \$40,000 or more	0.11	0.11		0.12	
Not a homeowner	0.51	0.47		0.54	##
Home value less than \$75,000	0.16	0.18		0.15	
Home value between \$75,000 and \$150,000	0.17	0.18		0.16	
Home value \$150,000 or more	0.16	0.17		0.15	
Nursing home beds per 1,000 persons 65+	3.37	3.82		3.05	
Medicare SNF per diem relative to median	1.00	0.99		1.00	
North Eastern region	0.20	0.20		0.19	
North Central region	0.25	0.26		0.24	
Southern region	0.38	0.37		0.39	
Western region	0.17	0.17		0.18	
Metropolitan area	0.70	0.71		0.70	
Community share of Medicaid long-term care spending > median	0.48	0.49		0.48	
Special income standard for nursing home users	0.67	0.68		0.67	
Medically needy program	0.67	0.68		0.67	
Respondent is a proxy	0.50	0.40	**	0.57	** ##
Months of 1-year follow-up period survived	11.15	11.41	**	10.96	* ##
Months of 2-year follow-up period survived	20.45	21.32	**	19.83	** ##

SOURCE: Analysis of the 2004 NLTCs linked with administrative data and state and county-level Medicaid program, price, and supply characteristics.

**(*)=Difference from value for full sample receiving help is statistically significant at the 5%(10%) level in a two-tailed test.

##(#)=Difference from value for persons with fewer than 3 ADLs is statistically significant at the 5%(10%) level in a two-tailed test.

TABLE A2. Simulated Non-SNF Nursing Home Use Over 2 Years if Formal Care Increased by 8 Hours Per Week, Community Residents Age 65 or Older Enrolled in Medicaid and Receiving Disability Assistance at Baseline by Care Arrangement				
	Medicaid Enrollees Receiving Help			
	Base Prediction^a	+ 8 Formal Care Hours Per Week	Change	Percent Change
Percent Admitted				
Within 1 year				
Informal only	6.7	6.5	-0.2	-3.2
Formal only	9.3	8.2	-1.1 *	-11.9
Formal and informal	10.1	9.8	-0.3	-2.9
Within 2 years				
Informal only	12.3	12.9	0.6	4.8
Formal only	14.4	12.4	-2.0 **	-13.8
Formal and informal	20.9	21.7	0.8	3.9
Expected Days of Use				
Within 1 year				
Informal only	3.4	2.2	-1.2	-36.2
Formal only	3.1	2.3	-0.9 *	-27.6
Formal and informal	6.8	5.6	-1.2	-18.3
Within 2 years				
Informal only	13.1	11.5	-1.6	-12.2
Formal only	10.6	7.5	-3.0 **	-28.7
Formal and informal	26.4	24.8	-1.6	-6.1
(**) Significantly different from zero at the 5%(10%) confidence level. a. Predicted values for an 8-hour increase in formal care at the mean of formal care hours and all other covariates from probit and tobit models of nursing home entry and expected days of use, respectively.				

TABLE A3. Simulated Non-SNF Nursing Home Use Over 2 Years if Formal Care Increased by 8 Hours Per Week, Persons Age 65 or Older Receiving Disability Assistance in Traditional Community Residences at Baseline by Care Arrangement and Disability									
	All Persons Receiving Help					Person with 3+ ADLs			
	Base Prediction^a	+ 8 Formal Care Hours Per Week	Change	Percent Change	Percent Change	Base Prediction^a	+ 8 Formal Care Hours Per Week	Change	Percent Change
Percent Admitted									
Within 1 year									
Informal only	10.6	9.3	-1.4 **	-12.8	-12.8	11.4	10.0	-1.4 **	-12.4
Formal only	11.9	10.8	-1.2 **	-9.7	-9.7	10.6	8.9	-1.6 **	-15.5
Formal and informal	12.0	10.5	-1.4 **	-12.1	-12.1	11.8	10.3	-1.4 **	-12.2
Within 2 years									
Informal only	20.1	19.1	-1.0	-5.0	-5.0	20.9	20.0	-0.9	-4.5
Formal only	19.3	17.4	-1.8 **	-9.5	-9.5	14.1	12.1	-2.0 **	-14.3
Formal and informal	24.0	22.9	-1.1	-4.6	-4.6	24.4	23.3	-1.0	-4.1
Expected Days of Use									
Within 1 year									
Informal only	4.3	3.5	-0.8	-18.4	-18.4	5.3	4.5	-0.8	-15.7
Formal only	6.6	5.6	-1.0 **	-14.8	-14.8	7.3	6.0	-1.3 **	-17.3
Formal and informal	8.8	8.0	-0.8	-9.0	-9.0	10.0	9.1	-0.8	-8.4
Within 2 years									
Informal only	15.0	13.5	-1.5	-10.0	-10.0	18.2	17.0	-1.3	-6.9
Formal only	20.5	17.8	-2.7 **	-13.2	-13.2	24.7	21.2	-3.5 **	-14.0
Formal and informal	38.3	36.8	-1.5	-3.9	-3.9	41.9	40.7	-1.3	-3.0
(**) Significantly different from zero at the 5%(10%) confidence level. a. Predicted values for an 8-hour increase in formal care at the mean of formal care hours and all other covariates from probit and tobit models of nursing home entry and expected days of use, respectively.									

ESTIMATING THE IMPACT OF MEDICAID SERVICES USE AND SPEND-DOWN ON LONG-TERM CARE FINANCING

Reports Available

Does Home Care Prevent or Defer Nursing Home Use?

HTML <https://aspe.hhs.gov/basic-report/does-home-care-prevent-or-defer-nursing-home-use>

PDF <https://aspe.hhs.gov/pdf-report/does-home-care-prevent-or-defer-nursing-home-use>

Rates and Timing of Medicaid Enrollment among Older Americans

HTML <https://aspe.hhs.gov/basic-report/rates-and-timing-medicaid-enrollment-among-older-americans>

PDF <https://aspe.hhs.gov/pdf-report/rates-and-timing-medicaid-enrollment-among-older-americans>

Why Do Elders Receiving Informal Home Care Transition to Long Stay Nursing Home Residency?

HTML <http://aspe.hhs.gov/basic-report/why-do-elders-receiving-informal-home-care-transition-long-stay-nursing-home-residency>

PDF <http://aspe.hhs.gov/pdf-report/why-do-elders-receiving-informal-home-care-transition-long-stay-nursing-home-residency>

To obtain a printed copy of this report, send the full report title and your mailing information to:

U.S. Department of Health and Human Services
Office of Disability, Aging and Long-Term Care Policy
Room 424E, H.H. Humphrey Building
200 Independence Avenue, S.W.
Washington, D.C. 20201
FAX: 202-401-7733
Email: webmaster.DALTCP@hhs.gov

NOTE: All requests must be in writing.

RETURN TO:

Office of Disability, Aging and Long-Term Care Policy (DALTCP) Home
<http://aspe.hhs.gov/office-disability-aging-and-long-term-care-policy-daltcp>

Assistant Secretary for Planning and Evaluation (ASPE) Home
<http://aspe.hhs.gov>

U.S. Department of Health and Human Services (HHS) Home
<http://www.hhs.gov>