

The Impact of the Vermont Support and Services at Home Program on Healthcare Expenditures

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Abstract

- *Objective: The Support and Services at Home (SASH) program in Vermont aims to coordinate care and assist participants in accessing the health care and support services they need to maintain their health and age comfortably and safely in their homes. Most program participants are residents of U.S. Department of Housing and Urban Development (HUD)-assisted properties or Low-Income Housing Tax Credit (LIHTC) properties. Our objective is to estimate the impact of the first 5 1/2 years of the SASH program on the Medicare expenditures of these participants.*
- *Methods: We use a difference-in-differences model, comparing the change in the expenditures among the SASH participants with the change in the expenditures for a comparison group of Medicare beneficiaries in HUD-assisted or LIHTC properties that did not host the SASH program.*

Abstract (continued)

- *Results: Our findings indicate that participants—particularly dual-eligible participants—in SASH panels that are overseen by the Cathedral Square Corporation, and in the subset of those panels that are in an urban county, experience slower growth in total Medicare expenditures and expenditures for hospital care, emergency department visits, and specialist physician visits relative to the comparison group.*
- *Conclusions: Although we do not find that the SASH program has a significant impact on Medicare expenditures for all participants in our sample, the favorable results among a subset of panels, containing nearly one-half of the SASH participants in HUD-assisted or LIHTC properties, provides evidence that a housing-plus-services model has the potential to slow the growth of healthcare costs.*

Introduction

Older adults prefer to live independently in their own homes for as long as possible (Oswald et al., 2010). Advancing age, however, increases the likelihood of chronic illness, frailty, and disability and consequently places some older adults in greater need of health and long-term services and supports (LTSS; see AARP, 2009; Redford and Cook, 2001). To continue to live independently, older adults may need access to in-home support services and housing that can be adapted to their growing needs (Lawton, 1976).

Living independently as they age may be particularly difficult for lower-income older adults, with fewer resources for support and greater healthcare needs. A recent analysis has shown that tenants assisted by U.S. Department of Housing and Urban Development (HUD) programs have more health problems than unassisted low-income adults, including significantly greater odds of poor general health, disability, and several chronic conditions (Helms, Sperling, and Steffen, 2017).

Taking advantage of the colocation of large numbers of older adults in publicly assisted, multiunit rental properties could help these low-income adults better address their health and functional challenges. Organizing a system of health and LTSS around this type of housing has many potential benefits. Economies of scale can be achieved in organizing, delivering, and purchasing services. Publicly assisted, service-enriched housing also enables onsite staff to observe and respond to residents' health and supportive services needs as they arise. Recent research shows that older residents living in housing with onsite service coordinators had significantly lower odds of being hospitalized than residents in housing without service coordinators (Sanders et al., 2014). Incorporating the surrounding community into service-enriched housing strategies may result in improved health and lower healthcare and LTSS costs among residents.

The Support and Services at Home (SASH) program in Vermont is designed to promote greater care coordination for a high-cost population of older adults and individuals with disabilities living in affordable housing properties. The program's unique contribution is its use of teams embedded in properties as a platform to connect residents to health services and social supports in the community. A full-time SASH coordinator and a quarter-time SASH wellness nurse together serve each panel of approximately 100 participants. The SASH program launched in July 2011 and by December 2016 had expanded into 54 panels in nonprofit affordable housing properties throughout Vermont.

When a participant first enrolls in SASH, the SASH coordinator and wellness nurse complete a comprehensive assessment of health conditions, medications, and support services currently used or needed. This assessment, updated annually, helps the SASH coordinator to identify the health and service needs of the individual and to target group programming toward common needs across the panel. To connect participants to resources in the community, the SASH coordinator and wellness nurse partner with local service provider organizations, such as home health agencies, councils on aging, and community mental health organizations. SASH participants consent to share their healthcare information with the SASH staff, community partners, and healthcare providers, which allows the SASH staff to work with the participants' healthcare providers to ensure proper medication usage, successful hospital discharges, and overall coordination and continuity of care.

The SASH program is a statewide initiative coordinated at the state, regional, and local levels. The nonprofit housing provider Cathedral Square Corporation (CSC) developed the SASH program and oversees the program at the state level, coordinating program expansion and training. At the regional level, six Designated Regional Housing Organizations (DRHOs) are responsible for overseeing the SASH program in their geographic regions. The program is delivered at the community level through the SASH panels, which are operated by more than 20 affordable housing organizations in their properties, called *SASH sites*.¹ HUD, the Low-Income Housing Tax Credit (LIHTC) program, the U.S. Department of Agriculture Rural Development, the State of Vermont, or a combination of agencies fund the participating housing properties.

The SASH program is available to all residents in the SASH sites—we refer to residents who enroll as *site-based participants*. SASH is also available to any Medicare beneficiary living in the surrounding community; participants who are not living in a SASH site are called *community participants*. Most SASH panels have both site-based and community participants. Panels with more site-based participants are called *site-based panels*. Those with more community participants are referred to as *mixed panels*. Our analysis includes only the site-based participants from site-based or mixed panels, who constitute 55 percent of all SASH participants. Using a comparison group of similar Medicare beneficiaries, we estimate the impact of the SASH program on multiple categories of Medicare expenditures.

¹ A complete list of housing organizations participating in SASH is available at <http://sashvt.org/admin/>.

Data and Methodology

As of December 2016, 5,386 individuals had at least one quarter of participation in SASH. We linked the CSC list of SASH participants to the housing assistance databases from HUD to identify the participants who were living in the SASH sites. The housing records come from three separate HUD databases and cover the years from 2012 to 2016. The Tenant Rental Assistance Certification System is the database for all properties in programs run by HUD's Office of Multifamily Housing (Section 202, Section 236, Section 8, and so on); the Public and Indian Housing Information Center (PIC) is the database for public housing and Housing Choice Vouchers; and LIHTC is the database for low-income housing developed through tax credits. We further linked the participant data with Medicare fee-for-service (FFS) enrollment data. The 2,986 SASH participants found in both Medicare FFS enrollment and HUD housing databases are included in this analysis.

For the comparison group, we identified Medicare beneficiaries who were not participating in the SASH program and cross-referenced them with HUD housing records to identify beneficiaries who were living in HUD-assisted or LIHTC housing properties that did not host the SASH program. Only nonprofit properties could host the SASH program; also, non-SASH properties had fewer senior residents than the SASH properties (Kandilov et al., 2017). Those who met the comparison group criteria were 3,437 beneficiaries.

Exhibit 1 shows the demographic and health characteristics of the SASH participants and the comparison group, as well as their average monthly Medicare expenditures. Some significant differences in characteristics emerge between the SASH participants and the comparison group. The SASH participants are, on average, 8.5 years older than the comparison group and have smaller households and lower household incomes. A larger proportion of comparison group beneficiaries originally qualified for Medicare due to disability, and a larger proportion are living in LIHTC properties. Because these characteristics may be correlated with healthcare expenditures, we use propensity score matching techniques to balance these covariates between the SASH participants and the comparison group and to increase the comparability of the two groups.

We estimate a propensity score using a logistic regression model to predict the probability of participating in the SASH program, where SASH participation is the dependent variable and beneficiary characteristics prior to SASH enrollment—age, race, gender, income, household size, property type, qualified for Medicare due to disability, Medicaid enrollment (dual eligible), hierarchical condition categories (HCC) risk score, and Charlson index—are the independent variables. The HCC risk score is interpreted as the predicted healthcare costs relative to the average Medicare FFS beneficiary. The Charlson comorbidity index is a mortality predictor that sums across a list of 18 chronic conditions; a higher Charlson score indicates the presence of more chronic conditions. Both the HCC risk score and the Charlson score are created using diagnosis codes on claims in the year before the start of the SASH program. Each SASH participant is matched to up to five comparison beneficiaries with the closest propensity scores. We match with replacement and adjust the weights for comparison

Exhibit 1

Characteristics of SASH Participants and Comparison Group

Demographic and Health Status Characteristics	SASH Participants	Comparison Group
Total beneficiaries (n)	2,986	3,437
Demographics		
Mean age (years)	69.2	60.7
Age ≤ 64 (%)	32.9	54.4
Age 65–74 (%)	29.8	20.6
Age ≥ 75 (%)	37.3	24.9
White (%)	97	95
Female (%)	68	65
Originally qualified for Medicare due to disability (%)	42	57
Mean household income (\$)	16,435	17,369
Mean household size (n)	1.14	1.43
Medicaid eligible (%)	53	53
Property type		
LIHTC only (%)	19.02	52.17
PIC or TRACS	73.04	47.83
Unknown	7.94	0.00
Mean monthly Medicare expenditures (\$)		
Total Medicare	812.60	766.75
Acute care	285.15	254.32
Postacute care	92.32	78.92
Emergency room	41.14	38.16
Hospital outpatient department	143.40	156.32
Primary care physician	25.35	28.68
Specialty physician	51.24	55.12
Hospice	8.19	7.22

LIHTC = Low-Income Housing Tax Credit. PIC = Public and Indian Housing Information Center. SASH = Support and Services at Home. TRACS = Tenant Rental Assistance Certification System.

Notes: Beneficiary characteristics determined in the year prior to the start of the SASH program (June 2010 through July 2011). Monthly Medicare expenditures averaged across all data used in the analysis, January 2006 through December 2016.

beneficiaries who are matched to multiple SASH participants. Further, the weights for both the comparison group and the SASH participants (who start with a weight of 1) are adjusted to account for their Medicare eligibility within the quarter.

SASH enrollment took place on a rolling basis, with most participants joining the program months or even years after the official start of SASH in July of 2011. To account for this rolling entry, we separated SASH participants into cohorts based on the calendar quarter when they started receiving services. To mimic this rolling entry among the comparison group, control beneficiaries were assigned to a quarter's cohort only if they were alive and Medicare eligible at that point in time. Unlike in the treatment group, in which cohorts are based on enrollment and are mutually exclusive, comparison beneficiaries can be assigned to multiple cohorts based on their longevity and continued Medicare eligibility. This difference is necessary to mimic the trajectory of the treatment group, whose staggered enrollment guarantees a certain longevity after the official start of the program and prevents us from comparing the costs of SASH participants who joined the program in 2014 with those comparison group beneficiaries who died in 2012 or 2013.

This analysis uses a differences-in-differences model to estimate the impact of the SASH program on per-beneficiary-per-month (PBPM) Medicare expenditures. PBPM expenditures

are calculated by dividing quarterly expenditures for each beneficiary by 3, which reduces the proportion of the observations that are zeros compared with actual PBP expenditures. The calculated monthly amount is therefore preferable to actual monthly expenditures for a linear regression analysis. We estimate the following equation using ordinary least squares (OLS)—

$$Y_{it} = \alpha_0 + \alpha_t + \alpha_p + \beta_1 X_{it} + \beta_2 \text{Blueprint}_i + \beta_3 \text{MAPCP}_i + \beta_4 \text{Att}_{it} + \gamma_1 \text{Cohort}_{i1} + \gamma_2 \text{Cohort}_{i2} \dots + \gamma_C \text{Cohort}_{iC} + \beta_5 \text{SASH}_i + \beta_6 \text{Demo}_{it} + \varepsilon_{it} \quad (1)$$

In the previous equation, the subscript i identifies each beneficiary and the subscript t identifies the time period (quarter). The dependent variable, Y_{it} , denotes the outcome for the i th beneficiary in quarter t . The intercept is α_0 . We include two sets of fixed effects; α_t ($t = 1, 2, \dots, T$) are quarterly fixed effects that control for average trends in outcomes across time for all beneficiaries, and α_p ($p = 1, 2, \dots, P$) are property fixed effects that control for property characteristics that do not change across time but could be correlated to healthcare expenditures (such as distance to the nearest hospital). Beneficiary-level demographic characteristics prior to SASH enrollment—age, race, gender, income, household size, and property type—and beneficiary-level healthcare characteristics prior to SASH enrollment—qualified for Medicare due to disability, Medicaid eligibility (dual eligible), HCC risk score, and Charlson comorbidity score—are included in X_{it} . The error term is denoted ε_{it} .

The state of Vermont initiated a medical home program for primary care practices, called Blueprint for Health, which later expanded as part of the Multi-Payer Advanced Primary Care Practice (MAPCP) Demonstration. Primary care practice participation in these initiatives could affect healthcare expenditures, and so we include time-invariant indicator variables Blueprint_i and MAPCP_i to denote beneficiaries whose recent primary care practice (based on frequency of visits) participated in these programs. The variable Att_{it} ($= 0, 1$) is an indicator that equals 1 starting in the quarter that a beneficiary was first assigned to a MAPCP practice. MAPCP_i , Blueprint_i , and Att_{it} are independent of SASH participation (and often unknown to the participant). Indicators for the cohorts (described previously) are represented by the variables Cohort_{i1} , Cohort_{i2} , ... Cohort_{iC} , where C equals the total number of cohorts in the analysis to date.

The variable SASH_i is equal to 1 in all time periods for SASH participants and is equal to 0 in all time periods for the comparison beneficiaries. The variable Demo_{it} denotes quarters after SASH participants joined the program and its coefficient (β_6) is the outcome of interest, the estimate of the impact of the SASH program on Medicare expenditures. This coefficient is interpreted as the difference between SASH and comparison beneficiaries with respect to their average change in outcomes between before and after periods. A *negative* value corresponds to a *slower rate of change* in expenditures among SASH participants relative to comparison beneficiaries. Among this population of older and disabled adults, healthcare costs generally are increasing over time, so a negative coefficient typically indicates that the average outcomes increased among both groups but at a slower rate among SASH participants. Conversely, a *positive* value corresponds to a *faster rate of change* in expenditures among SASH participants relative to comparison beneficiaries, which typically indicates that average outcomes increased among both groups but at a slower rate among comparison beneficiaries. A negative coefficient indicates that the SASH program had a favorable impact on Medicare expenditures.

Results

The results reported in exhibit 2 are denominated at the PBPM level. In the first column, we see that the SASH program does not have a significant impact on the entire sample of site-based SASH participants. The ability of the SASH program to have a significant impact on Medicare expenditure growth, however, may be enhanced or hindered by certain characteristics of the individual SASH panels. For example, panels with a larger proportion of community participants may be less effective at slowing the growth of Medicare expenditures because the coordinator and wellness nurse may not have the same level of interaction with participants who are not living in the SASH site, and the need to travel to many community participants may further reduce the limited number of wellness nurse hours (10 hours per week). We hypothesized that certain types of SASH panels would have participants who demonstrated more favorable or less favorable outcomes. The panel characteristics we tested were as follows—

1. Site-based panels versus mixed panels—for site-based panels, more than 50 percent of SASH participants are living in a HUD-assisted or LIHTC housing property that is hosting the SASH program, whereas for the mixed panels more than 50 percent of participants are living in the community. Site-based panels may perform better because most of the participants have easy and more regular in-person access to the SASH staff in the host property. Note, even in the mixed panels, the SASH participants included in the analysis are the ones living in the HUD-assisted or LIHTC host property, not the participants living in the community.
2. CSC DRHO panels versus other DRHO panels—the statewide administrator for the SASH program, CSC, also serves as one of the six DRHOs that oversee the SASH program. A substantial portion (48 percent) of SASH participants in our sample are in panels in the CSC DRHO. Most CSC DRHO panels were established in the first year of the SASH program and thus have more experience. These panels have fewer community participants, and most are in urban areas where travel time is less of a constraint on the SASH staff. CSC panels also benefited earlier than other panels from an additional level of support provided by SASH team leaders.
3. Urban panels versus rural panels—the urban panels are those in Chittenden County, whereas rural panels are in all other counties. Urban areas tend to have more community resources that can be tapped to aid the SASH participants. Also, rural panels require that SASH staff travel long distances to reach their participants. Note that the urban panels are a subset of the CSC DRHO panels.

Our results in exhibit 2 indicate that the SASH program has no significant impact, on site-based panels or on mixed panels, for total Medicare expenditures or for any of the seven subcategories of Medicare expenditures. Despite our hypothesis that a larger proportion of community participants in a panel could reduce the impact of the SASH program, we find no significant impact of the SASH program on the site-based participants in the site-based panels.

In the fourth and fifth columns of exhibit 2, we consider separately the impact of the SASH program among site-based participants in CSC DRHO panels and in other DRHO panels. Among CSC DRHO panels, the SASH program is associated with \$91.59 PBPM lower cost

Exhibit 2

Difference-in-Differences Per-Beneficiary-Per-Month Estimates for Eight Categories of Medicare Expenditures, Comparing SASH Program Participants to Non-SASH Comparison Beneficiaries

	All SASH Partici- pants (n = 2,845)	Site- Based Panels (n = 2,166)	Mixed Panels (n = 679)	CSC DRHO Panels (n = 1,374)	Other DRHO Panels (n = 1,471)	Urban Panels (n = 1,122)	Rural Panels (n = 1,723)
Total Medicare	12.72 (42.56)	- 17.32 (46.61)	22.31 (75.16)	- 91.59* (46.37)	59.95 (50.49)	- 122.24* (48.74)	63.35 (47.51)
Acute care	- 2.82 (22.06)	- 23.01 (23.56)	15.08 (47.89)	- 56.63* (23.60)	21.82 (28.20)	- 70.64** (24.91)	21.40 (26.27)
Postacute care	16.79 (12.34)	12.07 (13.78)	17.43 (20.54)	- 8.78 (13.29)	31.71* (14.88)	- 16.81 (13.81)	32.10* (13.92)
Emergency room	- 3.67 (3.70)	- 5.04 (4.04)	- 3.93 (5.14)	- 9.84* (4.32)	- 0.87 (4.39)	- 12.48** (4.37)	0.03 (4.22)
Hospital outpatient department	- 8.68 (7.85)	- 5.77 (8.45)	- 20.90 (13.30)	- 8.51 (10.09)	- 9.97 (9.71)	- 7.71 (11.43)	- 9.96 (8.94)
Primary care physician	2.29 (1.48)	2.10 (1.73)	1.75 (2.38)	1.65 (1.36)	2.14 (2.41)	1.54 (1.51)	2.27 (2.14)
Specialist physician	- 3.34 (2.24)	- 4.48 (2.48)	- 3.66 (3.69)	- 6.83* (2.79)	- 1.92 (2.67)	- 6.70* (2.99)	- 2.55 (2.60)
Hospice care	- 0.25 (3.61)	- 0.90 (3.75)	- 2.24 (6.21)	4.19 (4.56)	- 6.50 (4.37)	4.29 (4.64)	- 4.84 (4.23)

* p < .05. ** p < .01.

CSC = Cathedral Square Corporation. DRHO = Designated Regional Housing Organization. SASH = Support and Services at Home.

Notes: Standard errors are in parentheses. Medicare Part A and Part B claims data from January 2006 through December 2016. The SASH program began in July 2011. Baseline data for each beneficiary looks back to January 2006, if available.

growth. Most of this lower cost growth is driven by the \$56.63 PBPM in lower acute care cost growth. The SASH program also has statistically significant favorable impacts on Medicare expenditures for emergency departments (-\$9.84 PBPM) and specialist physicians (-\$6.83 PBPM). No significant favorable impacts are on the Medicare expenditures of participants in the other DRHO panels.

In the sixth and seventh columns of exhibit 2, we divide the panels into urban and rural panels and consider the impact of SASH on those two types of panels separately. Among urban panels, the SASH program is associated with \$122.24 PBPM lower growth in total Medicare expenditures. Most of this lower cost growth is driven by the \$70.64 PBPM lower growth in acute care costs. The SASH program also has statistically significant favorable impacts on Medicare expenditures for emergency departments (-\$12.48 PBPM) and specialist physicians (-\$6.70 PBPM). No significant favorable impacts were found on the Medicare expenditures of participants in the rural panels.

In addition to our primary analysis presented in exhibit 2, we also conducted two robustness checks and two subgroup analyses to better highlight the populations where the SASH program has a favorable impact. In the first row of exhibit 3, we estimate the impact of the SASH program as in exhibit 2, but we topcode expenditures (that is, reassign the highest expenditure values) at the 99th percentile, to reduce the impact of outliers on the results. We

Exhibit 3

Difference-in-Differences Per-Beneficiary-Per-Month Estimates for Total Medicare Expenditures, Comparing SASH Program Participants to Non-SASH Comparison Beneficiaries, Robustness Checks and Subpopulations

	All SASH Partici- pants (n = 2,845)	Site-Based Panels (n = 2,166)	Mixed Panels (n = 679)	CSC DRHO Panels (n = 1,374)	Other DRHO Panels (n = 1,471)	Urban Panels (n = 1,122)	Rural Panels (n = 1,723)
Outliers trimmed at 99th percentile	9.76 (37.32)	- 11.35 (41.81)	8.12 (55.45)	- 88.47** (38.66)	61.95 (43.72)	- 110.88 *** (40.83)	60.20 (41.19)
General linearized model estimation	39.09 (48.20)	- 0.38 (52.53)	76.70 (83.84)	- 60.33 (47.71)	106.67 (60.32)	- 82.80 (48.59)	108.38 (57.41)
	(n = 1,345)	(n = 1,053)	(n = 292)	(n = 747)	(n = 598)	(n = 621)	(n = 724)
Medicare-only beneficiaries	12.20 (56.74)	- 8.57 (61.27)	- 11.89 (87.86)	- 69.63 (65.25)	63.90 (71.51)	- 108.19 (68.95)	80.15 (65.14)
	(n = 1,500)	(n = 1,1613)	(n = 387)	(n = 627)	(n = 873)	(n = 501)	(n = 999)
Dually eligible Medicare/ Medicaid beneficiaries	17.83 (50.06)	- 22.56 (51.83)	50.81 (104.65)	- 105.66* (54.76)	60.92 (61.53)	- 127.65 ** (56.67)	55.15 (58.91)

* $p < .05$. ** $p < .01$. *** $p < .001$.

CSC = Cathedral Square Corporation. DRHO = Designated Regional Housing Organization. SASH = Support and Services at Home.

Notes: Standard errors are in parentheses. Medicare Part A and Part B claims data from January 2006 through December 2016. The SASH program began in July 2011. Baseline data for each beneficiary looks back to January 2006, if available.

continue to find that the SASH program has a significant favorable impact on total Medicare expenditures for CSC DRHO panels and for urban panels. Another way to reduce the impact of outlier expenditure values is to estimate a general linearized model (GLM) instead of the OLS model employed elsewhere. In this specification (second row of exhibit 3), we find no significant impact of the SASH program. In the third row of exhibit 3, we consider the SASH participants who have only Medicare, whereas in the fourth row of exhibit 3, we report the results for dual-eligible SASH participants. We do not find a significant impact of the SASH program on the Medicare-only participants, but we do see significantly slower Medicare cost growth among the dual eligible in CSC DRHO and urban panels.

Limitations

Our methodological approach sought to limit the impact of selection bias by focusing on participants who lived in the housing properties where the SASH program was implemented and removing from the sample the community participants who enrolled in SASH on their own or were referred by their healthcare providers due to their healthcare needs. Some selection bias may remain, however, because not all residents of the SASH sites chose to participate in the program, and those who did sign up were older and had more comorbidities than those who did not participate (Kandilov et al., 2017).

We were unable to include Medicaid claims data; also, Medicare claims data for substance abuse disorders were redacted from research-identifiable files during the analysis period. To

the extent that SASH participants and the comparison group had similar levels of Medicaid expenditures, or similar levels of substance abuse disorder claims, these omissions should have little impact on our results. If the SASH program had a favorable effect on Medicaid expenditures or on expenditures for substance abuse disorder claims, then our results will understate the true effect of SASH of healthcare expenditures.

Finally, our analysis is limited to beneficiaries enrolled in Medicare FFS, excluding those with Medicare Advantage. Only 8 percent of Vermont's Medicare beneficiaries have Medicare Advantage (Jacobson et al., 2017).

Discussion

When we examine all SASH panels, and when we examine site-based panels and mixed panels separately, we find no evidence that the SASH program has a significant impact on any of the eight Medicare expenditure outcomes that we considered. Note that more than one-half of the SASH participants in the mixed panels are community participants excluded from the analysis.

We do find favorable impacts of the SASH program among CSC DRHO panels and among urban panels, which make up 48 and 39 percent of the sample, respectively. Note that all the urban panels, which are the panels in Chittenden County, are panels in the CSC DRHO but not all these CSC DRHO panels are in Chittenden County, which makes it difficult for us to separate the influence of these two characteristics. These results are robust to trimming the outliers, suggesting that the effectiveness estimates are not driven by only SASH participants with the highest expenditures. The results from the GLM do not provide evidence that the SASH program was able to reduce growth in Medicare expenditures, although the estimates do have the same sign and are of similar magnitude to the OLS estimates, but with larger standard errors. A possible reason for this lack of precision is that the gamma distribution used in the GLM specification might not fit the healthcare expenditures in our sample particularly well.

Why might CSC DRHO panels, and particularly those in Chittenden County, be more successful in reining in Medicare costs? In the site visits that our evaluation team conducted, we identified a few possible differences that could help to explain these results. The CSC panels benefited earlier from having an additional level of support and management, called SASH team leaders. The SASH team leader role was created to support the SASH coordinators and remove some of their administrative burden, enabling them to focus more time on SASH participants' care coordination and healthcare needs. SASH team leaders help organize events and programs, assist with resident issues, and aid with documentation. Although this team leader role has now been implemented throughout the SASH program, during much of the analysis period only the CSC panels benefited from this additional support-management role. Also, our site-visit interviews revealed that the urban panels in Vermont tended to have access to more healthcare and social support services in their communities than those in rural areas. Chittenden County had multiple initiatives to coordinate and integrate care across service providers, which could contribute to the favorable impact of SASH found among these panels.

Finally, the significant impact of the SASH program on expenditures among dual-eligible participants but not among Medicare-only participants suggests that additional research on the program impact for the Medicaid population is warranted.

Conclusion

In the evaluation of the SASH program, our team explored whether coordinated services provided in an affordable housing setting affected healthcare costs for older adults and individuals with disabilities by examining total Medicare costs and many subcategories of Medicare costs to determine any shifts in healthcare utilization. In addition to these analyses, our evaluation incorporated a survey of SASH participants and interviews with SASH staff, stakeholders, and community partners.

When we compared all SASH participants living in properties hosting the SASH program to a comparison group of similar Medicare beneficiaries living in other HUD-assisted or LIHTC housing, we found no evidence that the SASH program had an impact on the growth in Medicare costs. However, for a subset of the SASH panels, namely those under the direction of CSC and those in Chittenden County, Medicare cost growth was significantly slower relative to the comparison group. Favorable impacts of the SASH program were particularly pronounced for dual-eligible participants.

Although slowed growth in Medicare costs is an important goal of the SASH program, the program also has other potential benefits. For example, SASH participants surveyed had higher self-reported physical function scores and less difficulty with medication management (Kandilov et al., 2017). Future work will examine the impact of the SASH program on Medicaid expenditures, because Medicare expenditures do not capture total health care costs for the dual eligible.

We have identified promising features of the SASH program that could provide baseline knowledge for establishing future housing-plus-services programs; we have also identified populations that experience favorable outcomes from this type of program. Using multidisciplinary teams embedded in affordable housing properties to link residents to healthcare and social service supports available in the community has the potential to help control expanding medical costs. Continuing research efforts should delve further into identifying the characteristics of care coordination initiatives in an affordable housing setting that are associated with achieving favorable outcomes for participants.

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References

AARP. 2009. *Beyond 50.09 Chronic Care: A Call to Action for Health Care Reform*. Washington, DC: AARP Public Policy Institute.

Helms, Veronica E., Jon Sperling, and Barry L. Steffen. 2017. *A Health Picture of HUD-Assisted Adults, 2006–2012: HUD Administrative Data Linked With the National Health Interview Survey*. Washington, DC: U.S. Department of Housing and Urban Development.

Jacobson, Gretchen, Anthony Damico, and Tricia Neuman. 2017. *Medicare Advantage 2017 Spotlight: Enrollment Market Update*. San Francisco: Kaiser Family Foundation.

Kandilov, Amy, Vincent Keyes, Noelle Siegfried, Kevin Smith, Patrick Edwards, Jenna Brophy, Ann Larsen, Martijn van Hasselt, Alisha Sanders, and Robyn Stone. 2017. *Support and Services at Home (SASH) Evaluations: Evaluation of the First Four Years*. Washington, DC: Office of the Assistant Secretary for Planning and Evaluation.

Lawton, M. Powell. 1976. "The Relative Impact of Congregate and Traditional Housing on Elderly Tenants," *Gerontologist* 16: 237–242.

Oswald, Frank, Daniela Jopp, Christoph Rott, and Hans-Werner Wahl. 2010. "Is Aging in Place a Resource for or Risk to Life Satisfaction?" *Gerontologist* 51: 238–250.

Redford, Linda, and David Cook. 2001. "Rural Health Care in Transition: The Role of Technology. The Public Policy and Aging Report, National Academy on an Aging Society," *Gerontological Society of America* 12 (1): 1–5.

Sanders, Alisha, Kimberly Smathers, Taryn Patterson, Robyn Stone, Jordan Kahn, Jaclyn Marshall, and Lisa Alecxih. 2014. *Affordable Senior Housing Plus Services: What's the Value?* Washington, DC: LeadingAge Center for Housing Plus Services.