



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

# **SUPPORT AND SERVICES AT HOME (SASH) EVALUATION:**

## **FIRST ANNUAL REPORT**

September 2014

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This report was prepared under contract #HHSP23337006T between HHS's ASPE/DALTCP and RTI International. For additional information about this subject, you can visit the DALTCP home page at [http://aspe.hhs.gov/office\\_specific/daltcp.cfm](http://aspe.hhs.gov/office_specific/daltcp.cfm) or contact the ASPE Project Officer, Emily Rosenoff, at HHS/ASPE/DALTCP, Room 424E, H.H. Humphrey Building, 200 Independence Avenue, S.W., Washington, D.C. 20201. Her e-mail address is: [Emily.Rosenoff@hhs.gov](mailto:Emily.Rosenoff@hhs.gov).

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RTI International

LeadingAge

September 2014

Prepared for  
Office of Disability, Aging and Long-Term Care Policy  
Office of the Assistant Secretary for Planning and Evaluation  
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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.

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## ACRONYMS

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

AoA	HHS Administration on Aging
ARC	Actuarial Research Corporation
ASPE	HHS Office of the Assistant Secretary for Planning and Evaluation
CAR	LeadingAge Center for Applied Research
CHT	Community Health Team
CMS	HHS Centers for Medicare and Medicaid Services
COR	Contracting Officer's Representative
CSC	Cathedral Square Corporation
DID	Difference-in-Differences
DRHO	Designated Regional Housing Organization
EDB	Enrollment Data Base
EMR	Electronic Medical Record
ER	Emergency Room
ESRD	End-Stage Renal Disease
FFS	Fee-For-Service
HCC	Hierarchical Conditions Category
HHS	U.S. Department of Health and Human Services
HUD	U.S. Department of Housing and Urban Development
LIHTC	Low Income Housing Tax Credit
MAPCP	Multi-payer Advanced Primary Care Practice
OMB	U.S. Office of Management and Budget
OPIIS	Online Property Integrated Information Suite
PBPM	Per-Beneficiary Per-Month
PCP	Primary Care Provider
PIC	Public and Indian Housing Information Center
PS	Propensity Score

SASH	Support and Services at Home
SIM	State Innovation Model
SSN	Social Security Number
TRACS	Tenant Rental Assistance Certification System
USDA	U.S. Department of Agriculture

## EXECUTIVE SUMMARY

This memorandum describes implementation challenges and early impacts of a program intended to improve health and decrease health care expenditures among elderly residents of affordable housing developments. In July 2011, the Support and Services at Home (SASH) program was officially launched with the opening of the Heineberg panel and expanded to include 36.5 panels by the end of 2013. The SASH program connects residents with community-based services and promotes coordination of health care. Using claims data for a sample of 549 Medicare fee-for-service (FFS) beneficiaries, the evaluation compares health care utilization and expenditures among SASH participants and two comparison groups (including Medicare beneficiaries in Vermont and New York). Relative to growth of total Medicare expenditures in two comparison groups, growth in annual total Medicare expenditures was lower by an estimated \$1,756-\$2,197 per beneficiary among beneficiaries enrolled in SASH panels established before April 2012 (i.e., well-established panels). However, SASH participants used more hospital services, a finding that warrants closer examination as the evaluation continues. Additionally, the analysis did not account for programmatic investments provided by the Medicare program to determine if the SASH program resulted in net savings for the Medicare program. Impact estimates in this memorandum are based on the first year of SASH implementation only and are thus preliminary.

### Background

The U.S. Department of Housing and Urban Development (HUD) and the Office of the Assistant Secretary for Planning and Evaluation and the Administration on Aging at the U.S. Department of Health and Human Services (HHS) have a strong interest in affordable congregate housing models that provide long-term services and supports to low-income seniors who wish to age in an independent setting (Lewin Group, 2012). In 2008, the non-profit Cathedral Square Corporation (CSC) in South Burlington, Vermont, began developing the SASH program out of concern that frail residents in its properties were not able to access or receive adequate supports to remain safely in their homes. CSC focused on connecting residents with community-based support services and promoting greater coordination of health care. The SASH teams extend the work of the Blueprint for Health's Community Health Teams and primary care providers by providing targeted support and in-home services to Medicare FFS beneficiaries participating in the Multi-payer Advanced Primary Care Practice (MAPCP) Demonstration. In July 2011, the SASH program was officially launched with the opening of the Heineberg panel.

RTI International, and its subcontractor, the LeadingAge Center for Applied Research, were selected to evaluate the SASH program. The evaluation builds on the



HHS Centers for Medicare and Medicaid Services-funded MAPCP Demonstration evaluation and assesses whether the SASH model of coordinated health and supportive services in affordable properties improves health and functional status of participants, and lowers medical expenditures and acute care utilization for seniors.

## **Implementation**

The SASH program successfully launched 36½ panels as of December 2013 with further expansion continued in 2014. Each panel is staffed to provide services to 100 beneficiaries with one full-time SASH coordinator and one quarter-time SASH wellness nurse. A primary goal of the SASH program has been to create linkages with a diverse team of service, health care, and housing providers, enabling better coordination of care for SASH program participants. Property managers interviewed felt they were better able to perform their primary function because the SASH program focused on the health and wellness of participants. They also hypothesized that SASH activities helped to create a better community within the property and that by addressing unmet needs among aging residents (e.g., falls prevention), the financial risk to their portfolios, such as property legal liabilities, were reduced. Thus, they believed that the SASH program could reduce costs for housing properties.

Despite the successful roll-out of the SASH program broadly across supported housing properties in Vermont, there were a number of operational challenges. Vermont is largely rural and there are large geographic distances between properties or between participating properties and community residents; poor cellular service makes connection to the central data collection platform difficult; and there is limited public transportation for SASH staff and participants. A second challenge noted broadly across interviewees was that the perceived needed work hours exceeds actual budgeted hours for the SASH staff, in general, but, in particular, for the wellness nurse. Third, the SASH program monitors the progress of its participants through Vermont's central clinical registry, DocSite, and is heavily reliant on its functionality. Lack of widespread adoption of the registry by practices has reduced the potential for communication between SASH staff and providers, and a shut-down of DocSite for two months in 2013 negatively impacted program functioning. A fourth challenge was the freezing of program expansion in the fall of 2012. The SASH program relies heavily upon the Medicare program for financial support. Fewer than expected participating Medicare beneficiaries in the MAPCP Demonstration created a funding gap. The Medicare program subsequently increased the payment amount and expansion resumed in May 2013.

## **Characteristics of Properties and Participants in this Analysis**

The SASH intervention group for the analysis reported here consists of Medicare FFS beneficiaries residing in SASH properties who have also been attributed to practices participating in the Blueprint for Health and the MAPCP Demonstration from July 1, 2011 through June 30, 2013. Only SASH participants that have signed a

consent form to allow the SASH program staff to share their personal identification and health information with others participating in the MAPCP Demonstration are included in this analysis. Personal information (e.g., name, Medicare identification number, social security number) are used to link Medicare claims data and housing property data.

The SASH program sites included in this year's analysis are those that implemented the SASH program prior to July 1, 2013. Designated SASH sites include a range of non-profit affordable housing properties funded through a variety of sources, including HUD, the Low Income Housing Tax Credit (LIHTC), the U.S. Department of Agriculture Rural Development, and other sources available through the State of Vermont. Sites also include a few mobile home parks. This current analysis includes only properties that receive funding assistance from HUD. This includes properties receiving assistance through HUD's multi-family programs, such as Section 202 and Section 8, and the public housing program.

Important CSC properties are excluded from this analysis because we do not yet have resident-level data available for LIHTC properties. In future analyses, we will be able to expand our analyses to include LIHTC-funded properties and residents participating in SASH. For the current memorandum, we limited the analysis to HUD-assisted properties.

As of June 30, 2013, 1,502 Medicare FFS beneficiaries were participating in the SASH program. After applying a number of beneficiary and property exclusion filters as noted above, the SASH program sample for this analysis is 549 Medicare beneficiaries. The two primary reasons for exclusion include: (1) not being attributed to a Blueprint for Health practice participating in the MAPCP Demonstration as of June 30, 2013; and (2) residing in non-HUD housing. We also experienced challenges linking residents with HUD data that requires further exploration prior to the next analysis. Thus, we may not have a representative sample of SASH participants in our current analysis; however, a comparison of health status and demographic characteristics of SASH participants with Medicare beneficiaries not included in the analysis found them to be similar (see **Appendix A**). Further, the small sample size of SASH participants and the large variation in the observed outcomes produced large standard errors and confidence intervals limiting the outcomes that we could study for this report and reducing the precision of the regression estimates.

The comparison group comprises Medicare FFS beneficiaries residing in non-SASH, HUD properties. Comparison beneficiaries are separated into two distinct groups. The first comparison group was drawn from residents of non-SASH properties in Vermont and consists of 1,143 Medicare FFS beneficiaries participating in the MAPCP Demonstration. The second group of beneficiaries was drawn from residents of similar supported housing properties in a rural geographic area in upstate New York State that does not have a MAPCP Demonstration program. A total of 1,903 Medicare FFS beneficiaries comprise the second comparison group.

We use these two comparison groups to evaluate two SASH program effects:

- SASH/MAPCP Demonstration beneficiaries versus non-SASH/MAPCP Demonstration beneficiaries: this comparison yields estimates of the **SASH program effect** (among MAPCP Demonstration beneficiaries).
- SASH/MAPCP Demonstration beneficiaries versus non-SASH/non-MAPCP Demonstration beneficiaries: this comparison yields estimates of the combined **SASH/MAPCP Demonstration effect**.

## Quantitative Findings

We estimated the impact of the SASH program relative to the non-SASH/MAPCP Demonstration comparison group and the non-SASH/non-MAPCP Demonstration comparison group. Moreover, we estimated the impact for both the group of SASH program participants as a whole and for two subgroups of participants: an “early panel” cohort and a “late panel” cohort. The early panel cohort comprises SASH participants who received SASH services from a panel that started operating before April 1, 2012. The late panel cohort comprises SASH participants who received SASH services from a panel that started operating on or after April 1, 2012. When analyzing the SASH program effects stratified by early versus late panel start dates, under the hypothesis that panels need a certain amount of start-up time before their implementation of the SASH program becomes fully effective, we would expect to see a larger program effect for participants receiving services from earlier and therefore more experienced SASH panels.

The SASH program was associated with a lower rate of growth in total Medicare expenditures<sup>1</sup> and expenditures for post-acute care among SASH participants residing in SASH properties that implemented their program before April 2012 relative to both comparison groups. The SASH program was also associated with a lower rate of growth in acute care payments among participants residing in the early SASH panels, but relative only to beneficiaries in the non-SASH/non-MAPCP Demonstration group; this suggests a possible synergistic effect of the MAPCP Demonstration and the SASH program. Medicare expenditures for hospital outpatient department services increased at a faster rate among SASH participants residing in the early SASH panels, but only relative to beneficiaries in the non-SASH/non-MAPCP Demonstration group; this may reflect identification of previously unmet need by both the SASH program and MAPCP Demonstration providers. Interestingly, while we see reduced rates of growth in Medicare expenditures, we observe higher rates of hospitalizations and emergency room (ER) visits among SASH participants relative to non-SASH/MAPCP Demonstration beneficiaries. Finally, the analysis did not account for programmatic investments provided by the Medicare program to determine if the SASH program resulted in net savings for the Medicare program.

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<sup>1</sup> Total Medicare expenditures excludes the fees paid by the Medicare program to the SASH program for services.

## Conclusion

The findings of the SASH evaluation thus far raise further questions. Impact estimates are based on the first year of SASH implementation only and are thus preliminary. Furthermore, although SASH participants had higher rates of hospitalizations and ER visits relative to non-SASH/MAPCP Demonstration beneficiaries, the early SASH panels were associated with lower rates of growth in Medicare expenditures relative to a comparison group. Future analyses will examine the costs of administering the SASH program relative to benefits that accrue to participants in the SASH program and the impact on Medicare and Medicaid expenditures.

# 1. INTRODUCTION

## 1.1. Support and Services at Home Program Overview

In 2008, the non-profit Cathedral Square Corporation (CSC) in South Burlington, Vermont, began developing the Support and Services at Home (SASH) program out of concern that frail residents in its properties were not able to access or receive adequate supports to remain safely in their homes. CSC focused on connecting residents with community-based support services and promoting greater coordination of health care. The SASH teams extend the work of the Blueprint for Health's Community Health Teams (CHTs) and primary care providers (PCPs) by providing targeted support and in-home services to Medicare fee-for-service (FFS) beneficiaries participating in the Multi-payer Advanced Primary Care Practice (MAPCP) Demonstration. Though closely associated with the MAPCP Demonstration, the SASH program is offered to all Medicare beneficiaries residing in or near SASH properties with active programs including beneficiaries not assigned to Blueprint for Health PCPs participating in the MAPCP Demonstration. In July 2011, the SASH program was officially launched with the opening of the Heineberg panel.

The SASH program is a Vermont-wide initiative coordinated at the state, regional, and local level. CSC oversees the program at the state level and is responsible for defining and implementing the programmatic elements along with coordinating program expansion and training. At the regional level, six Designated Regional Housing Organizations (DRHOs) are responsible for planning the roll-out of the SASH program across their geographic regions. The program is delivered at the community level through SASH panels, which are operated by the housing host organizations.

Each panel has the ability to serve roughly 100 beneficiaries and has a core staff made up of a dedicated full-time SASH coordinator and a quarter-time SASH wellness nurse. The SASH program launched in July 2011 and began expansion of panels immediately, though this growth was paused in the fall of 2012 due to a funding gap. After receiving an enhanced payment from the U.S. Department of Health and Human Services (HHS) Centers for Medicare and Medicaid Services (CMS), the program was able to add more panels and as of December 2013, the SASH program had 36½ panels with 2,010 full benefit participants. Of that total, 1,555 participants resided in SASH properties and 455 lived in surrounding communities. Panels partner with local service provider organizations, such as home health agencies and councils on aging, which create the SASH Team. Using evidence-based practices, key services provided by core SASH staff (coordinator and wellness nurse) include a comprehensive health and wellness assessment, creation of an individualized care plan, on-site one-on-one nurse coaching, care coordination, and health and wellness group programs. Local service providers build on these core tenets by offering additional community activities, health and wellness workshops, and direct services.

When individuals choose to participate in the SASH program, they consent to allowing the SASH staff and community partners to share information about them with each other and their health care providers. With this consent, SASH staff work with the participants' health care providers when necessary to ensure proper medication usage, successful hospital discharges, and overall coordination and continuity of care. Importantly, the SASH program does not "discharge" participants. Rather, the SASH program provides a continuum of support and services that meet participants' needs whether they are extremely healthy and looking for minimal supports or very frail participants in need of more robust support from the full SASH Team. This ensures that the SASH program is ready to provide the help that is needed when circumstances change unexpectedly for participants. Individuals who do not consent, but live in SASH properties can still receive assistance from the SASH coordinator and wellness nurse and participate in SASH programming. However, without consent to share their information, staff cannot serve these individuals as intensively. SASH coordinators and wellness nurses are expected to communicate and meet with participating service providers on the SASH Team regularly (at least once a month) to discuss participant specific cases and group wellness approaches.

The SASH program receives financial support from a variety of sources. As the state coordinator, CSC is responsible for overseeing and securing funds for the program as a whole. At the regional level, DRHOs are encouraged to solicit additional funds from local organizations for ongoing support for their panels. CMS is the largest funding source and makes a per-beneficiary per-month (PBPM) payment to the SASH program through the MAPCP Demonstration. The MAPCP Demonstration provides \$70,000 in funding annually for each panel, which covers the cost of the SASH coordinator and the wellness nurse. Other program costs are covered through a variety of sources. Medicaid is the second largest contributor, sourcing funds at both the federal and state level. Other sources include the Department of Aging and Independent Living, the Department of Vermont Health Access, the Department of Health, and various foundations and grants. These sources represent the funding for the SASH program and not the actual health or long-term care services coordinated and arranged for as part of the SASH program.

The U.S. Department of Housing and Urban Development (HUD) and the Office of the Assistant Secretary for Planning and Evaluation (ASPE) and the Administration on Aging (AoA) at HHS have a strong interest in affordable congregate housing models that provide long-term services and supports to low-income seniors who wish to age in an independent setting. The SASH program offers an important opportunity to evaluate the impact of these services on program participants and, in particular, to determine the impact of the program on health outcomes and Medicare and Medicaid expenditures.

RTI International, and its subcontractor, the LeadingAge Center for Applied Research (CAR), were selected by ASPE/HUD/AoA to evaluate the SASH program. Through a mix of qualitative and quantitative methods, we are conducting a comprehensive evaluation of the first phase of the SASH program. The evaluation

builds on the CMS-funded MAPCP Demonstration evaluation and assesses whether the SASH model of coordinated health and supportive services in affordable properties improves health and functional status of participants and lowers Medicare and Medicaid expenditures and acute care utilization for seniors.

## **1.2. Vermont Multi-payer Advanced Primary Care Practice Demonstration**

In 2010, the State of Vermont applied to join the CMS MAPCP Demonstration. RTI International is evaluating the MAPCP Demonstration for CMS, which also includes analysis for the states Maine, Michigan, Minnesota, New York, North Carolina, Pennsylvania, and Rhode Island. As the culmination of several years of health care reform efforts, the State of Vermont also expanded statewide an advanced primary care practice infrastructure consisting of medical homes supported by CHTs and an integrated information technology infrastructure and payment reforms. A goal of the state's reform efforts is seamless coordination across the broad range of health and human services (medical and non-medical) to optimize patient experience and engagement and improve the health status of the population. As the state began preparing its MAPCP Demonstration application, CSC approached the state about incorporating the SASH program into the demonstration. CSC's argument was that many of the state's high-cost health care users resided in affordable senior housing properties, and the SASH team would have extensive knowledge of the residents and the elements in place to help these individuals and others better manage their health and supportive service needs. The SASH program was included in the demonstration as extenders of the CHTs.

## 2. QUALITATIVE IMPLEMENTATION FINDINGS

To address key evaluation questions and complement our quantitative analyses, we used two methods of primary data collection: semi-structured, in-person interviews and quarterly conference calls with SASH staff and ASPE/HUD/AoA. The primary purpose of these two methods of data collection is to understand the details of program implementation and operation, monitor implementation progress and identify implementation and operational successes and challenges as the SASH program is expanded statewide and matures. More information on the qualitative data and methods is located in **Appendix B**. The analyses of these data have been designed to help the evaluation team understand the issues surrounding the SASH program start-up and operations, with a particular focus on understanding points that bear on program sustainability and replication. In this section, we use qualitative data to answer the following implementation research questions.

1. What are the operational challenges and successes of setting up the SASH program--that is, a coordinated system of housing, health services, and long-term services and supports?
2. What are the operational challenges to statewide expansion of the SASH program?
3. How were residents in assisted properties identified as potentially eligible for the SASH program? How were individuals in the community identified?
4. What were the processes for outreach, enrollment and assessment of SASH participants?
5. What, if any, impacts are there on participating properties, including in the following areas?
  - a. Property maintenance and costs.
  - b. Resident complaints and management's conflicts with residents.
  - c. Property managers' workload, smooth running, or property administration.

RTI and CAR conducted a site visit of four SASH panels over a three-day period in February 2013. During the site visit, we interviewed SASH coordinators and wellness nurses, case managers and visiting nurses, CHT staff, and DRHO directors and property managers. In addition, the evaluation team conducts quarterly calls with SASH staff to receive ongoing feedback on the implementation of the program. Each call focuses on a specific aspect of the SASH program, giving the evaluation team a deeper understanding of the infrastructure and processes of the program. In the first year of the evaluation, we conducted four calls which focused on the structure and general



components of the program, funding sources, the process for starting new panels, and the Blueprint for Health's clinical registry, DocSite, and its uses.

A main focus of the site visit and quarterly calls was the outreach, enrollment and assessment of SASH participants. SASH program participation is open to any resident living in a housing property included in the SASH program or any Medicare beneficiary living in the surrounding community. Residents in SASH properties and individuals living in the community are identified as potentially eligible for the SASH program through outreach conducted by the SASH team (described below). Additionally, referrals are made to the program by health care providers, community partners, hospitals, and CHTs.

Outreach for the SASH program is conducted in various ways. The SASH coordinators hold informational events in housing properties to educate residents about the program. Property managers inform residents about the program. One property manager always asks residents if she could give their name to the SASH coordinator to follow-up with them, believing residents would be less likely to follow-up if the onus was on the resident to contact the SASH coordinator. Another housing organization we spoke with promoted the program on the local community access channel. Some physicians and psychiatrists found out about the program through this method and contacted the SASH program to see if it could help their patients. One SASH coordinator hosts information sessions at the senior centers that are co-located in the panel's housing properties. Another SASH coordinator we spoke with wrote articles for the local paper about the SASH program.

After identifying residents, a formal enrollment and assessment is conducted. When enrolling in the SASH program, individuals first sign an Authorization for Use and Disclosure Agreement, which authorizes the SASH staff and team members to receive and share information about the participant's health. Next, participants receive a comprehensive assessment conducted by the SASH wellness nurse and SASH coordinator. The assessment collects information on health conditions, medications, care providers, history of falls, fall risk, emergency room (ER) visits, hospitalizations, nursing home stays, functional abilities, mental health, nutritional and cognitive status, and support services currently used or needed.

One SASH wellness nurse estimated that the assessment takes approximately 45-90 minutes to conduct. In the initial recruiting stage, the assessment appears to dominate the nurses' limited time. Some of the council on aging and home health agency representatives we spoke with believed the participant assessment is too invasive and/or too long and collects more information than necessary. Some also felt the assessment duplicates information that is also collected by their agency's assessment process. Currently, however, there is no mechanism for sharing assessment information that may have already been collected by a SASH team staff member with other community-based providers. Additionally, only a fraction of SASH participants are clients of the partner organizations. The goal of the Blueprint for Health

and the SASH program is to create one integrated health record that can be accessed by all partner agencies.

SASH coordinators also complete an interview with each individual. The interview is designed to understand the participant in a more holistic manner and asks about the person's life milestones, personal interests and goals, significant events and relationships, daily routine, and existing social support network. From the assessment and interview, SASH staff develops a healthy living plan with the individual and the SASH team helps implement and monitor this plan. Results from the individual assessments are also aggregated across the SASH panel and a community healthy living plan is developed. Evidenced-based programming is then identified to help address common needs and issues.

The SASH program monitors the progress of its participants through the Blueprint for Health's clinical registry, DocSite, which records participant demographics, health status, and wellness goals. The coordinator and wellness nurse monitor SASH program activities and individual progress towards customized healthy living plans. At the state level, CSC runs reports through DocSite that track progress made by panels and highlight problem areas at the community level to help the SASH core staff identify possible group wellness activities. It is expected that, eventually, all Blueprint for Health patient-centered medical home electronic medical records (EMRs) will be connected with DocSite, allowing for a seamless exchange of information between health providers and SASH staff.

DocSite is credited for improving communication within panels, workflow tracking, and reporting. As a web-based platform, DocSite can be accessed from any location with an Internet connection which is helpful for SASH panels that are geographically dispersed. Also, because SASH staff members have the most experience working with DocSite, CSC has been able to take a leadership role in Vermont health information technology initiatives and talks.

The major SASH program implementation success has been the linkages the program has created among different community organizations. The SASH program formally links the SASH staff with dedicated staff from community service organizations, including the local home health agency, area agency on aging, and the mental health agency. The SASH team also creates linkages with CHTs, PCPs, and local hospital(s) serving their community. Establishing this diverse team of service, health care and housing providers enables better coordination of care for SASH program participants.

Despite the successful roll-out of the 36½ panels to date, operational challenges also exist. The large geographic distance between properties in rural areas of the state present challenges when it comes to the operation of the SASH program. In some cases, SASH staff must travel long distances between properties and to participants' homes. Transportation is a major problem for both SASH staff and participants. There is limited public transportation in most regions making it difficult for participants to get to appointments or activities. Communication can be difficult because of spotty cell

service and Internet access. In particular, rural panel staff felt that Internet access hindered their ability to enter data directly during participant visits. This caused more work as they needed to enter data into the electronic data base, DocSite, on their own time after visits. To help address this issue, some SASH resources were used to open up Internet and cell phone “hot spots” at different hub locations.

Additionally, the perceived needed work hours exceeds actual budgeted hours for the SASH staff. The SASH coordinators with whom we spoke said it was difficult to judge the adequacy of staffing by panel size alone (i.e., ratio of 100 participants to a full-time SASH coordinator and quarter-time wellness nurse), because the complexity of participant needs varies across panels. One panel, for example, has a number of participants with mental health issues, which consumes a large percentage of the SASH coordinators’ time, especially when they have co-occurring physical health issues. Inadequate funded hours for the SASH wellness nurses was also highlighted as a challenge. Wellness nurses work quarter-time for each panel, which limits the amount of time they can spend with SASH participants, especially conducting one-on-one in home visits with the community participants.

Though SASH staff understands it is critically important to enter data into a central registry, and SASH staff members are the biggest users of DocSite, there have been operational challenges with the technology. As its sole data platform, the SASH program relies heavily on DocSite’s functionality. Vermont has experienced delays connecting practice EMRs with DocSite, but continues to make progress towards statewide adoption of the registry. Over the summer of 2013, Vermont was forced to shut-down DocSite for two months while connecting the registry with the state’s multi-payer claims data base and health information exchange. While DocSite was down over the summer of 2013, SASH staff had to record data in a paper format, creating a backlog of data-entry needs. This hiccup resulted in an estimated 300 additional hours of work. Also, the number of practices feeding data into DocSite was found to be lower than the Blueprint for Health had expected. DocSite will not reach its full potential until it is widely adopted across providers and is interoperable with Vermont’s multi-payer claims data base and health information exchange.

There is also concern around the sustainability of the SASH program’s data capture and reporting. As mentioned in the site visit findings, SASH staff enters substantial amounts of data manually. This creates a serious time burden, especially for the wellness nurses. Discussions also arose around whether or not the SASH program was trying to collect too much data. Furthermore, SASH coordinators and wellness nurses are not currently able to run reports for their panels on their own-- almost all reports are created by a central person at CSC. Though Covisint, the company which hosts DocSite, is working on one click reporting capabilities, this current workflow seems challenging.

Another topic the evaluation team has focused on during site visit interviews and quarterly calls is the SASH program’s statewide expansion. This topic was highlighted by CSC as one of the major successes of the program. In July 2011, the SASH

program was officially launched with the opening of the Heineberg panel. In October 2011, the program expanded by 4½ panels. Over the course of 2012, 21 panels joined the initiative. Expansion of the program was then frozen at 26½ panels in the fall of 2012 due to a funding gap, which occurred because fewer than anticipated Medicare FFS beneficiaries were attributed to PCPs participating in the MAPCP Demonstration. With a \$1.89 increase in the Blueprint for Health's PBPM payment from CMS, expansion resumed and the SASH program added 5½ more panels in May 2013 giving a total of 32 panels. Though they were able to overcome this hurdle, CSC felt that the freeze in expansion greatly hindered the program's momentum and reduced the amount of time CSC could plan with the housing hosts for the May roll-out. As of December 2013, the SASH program had 36½ panels with further expansion expected in 2014.

One of our quarterly calls was framed around learning more about the process of identifying and setting up new SASH panels. SASH program expansions occur by either starting brand new panels or expanding existing panels. The foundational cornerstone of the SASH program is the relationship it maintains with community partners. For this reason, CSC worries that, by adding panel capacity to established areas, the number of team meetings partner agencies attend may strain their staff resources. CSC will examine ways to utilize partner time as efficiently as possible.

As the state-level entity, CSC identifies opportunities for new SASH sites and facilitates the launch of new panels. To determine new sites, CSC takes into consideration:

1. Areas in need; Vermont's Blueprint for Health medical homes that do not have SASH supports nearby.
2. The non-profit housing presence in the area whose mission is to serve both the community and its residents.
3. Community provider partnerships already established in the area, such as Area Agencies on Aging, CHTs, and nursing associations.

When selecting housing organizations, CSC ensures that the potential site is fully aware of the program's mission and the changes that must be made in order to join the SASH program. Once the housing organization agrees to become a SASH property, CSC and the DRHO walks them through the legal agreements and sets clear expectations of the organization.

After the contracts are signed, the housing host is responsible for hiring the core SASH staff (coordinator and wellness nurse). CSC echoed concerns uncovered during the site visit that the wellness nurse position was severely underfunded. With the core staff in place, CSC conducts initial and ongoing training for the staff. As soon as the core staff are trained, the housing host is responsible for marketing and launching the program. In the first year of the program, there was some confusion surrounding the

roles between the DHROs and CSC. CSC has since learned the importance of clearly dividing responsibilities between the two groups.

One organization decided not to join the SASH program out of concern over the lack of permanency of the funding; a concern shared by CSC. CMS payments, which make up the bulk of the SASH program's funding, are only guaranteed through the end of the MAPCP Demonstration. The SASH program would need to find another large funding source if CMS funds expire on December 31, 2014. CSC mentioned approaching state officials in charge of the Vermont State Innovation Model (SIM) initiative (another CMS-funded project) and the ACOs that are supported through that grant. However, they feel it is important that they receive guidance from CMS as to what criteria must be met under the MAPCP Demonstration in order for the SASH program to receive continued support under the SIM initiative. Although 16 housing authorities and non-profit housing providers are participating in the SASH program, some housing organizations decided not to adopt the SASH model due to the additional costs they may incur as a result of becoming a SASH program property.

During the site visit and quarterly calls, the evaluation team was able to glean some information about the impacts of the SASH program on participating properties' maintenance and costs, tenant conflicts, and property managers' workload. The DHRO and housing organization staff mentioned perceived general successes with the SASH program. Property managers that had not formerly had support services in place before the SASH program felt that they are better able to perform their primary function because the SASH coordinator and wellness nurse are able to focus on the health and wellness of participants. One property manager felt that aging residents with unmet needs present financial risk to their portfolios such as physical property damages and property legal liabilities. For this reason, they felt the SASH program could reduce costs for the housing properties. Furthermore, SASH staff and property managers felt that SASH activities help create a better community within the property. In addition to providing opportunities for social engagement, the program helps address resident conflicts and complaints which can be disruptive to the community.

In future site visits, the evaluation team will investigate the SASH program's impacts on participating properties in more depth. In addition to learning more about the property maintenance and costs, resident conflicts, and property managers' workload, we will also inquire about turnover rates and vacancy reductions and property improvements for accessibility.

## 3. PARTICIPATION ANALYSIS

RTI's participation analysis is designed to compare characteristics of properties and individuals that participate in the SASH program and properties and individuals in the comparison areas. In this section of the memorandum, we provide descriptive statistics on participating properties and Medicare FFS beneficiaries participating in the MAPCP Demonstration and the SASH program. Specifically, we address the following two primary research questions:

1. What are the characteristics of the participating properties and properties in the comparison areas?
2. How do SASH participants compare to individuals in the comparison groups that reside in properties similar to those participating in the SASH program?

### 3.1. Data

The quantitative data sources used in this memorandum include the Medicare Enrollment Data Base (EDB) and claims data, HUD tenant and property-level data, and SASH program participant files. Medicare claims are quarterly observations of payments and health care utilization from January 2006 through June 2013. Medicare claims data are also used to develop measures of health status during the year prior to the launch of SASH program under the MAPCP Demonstration (July 1, 2010 - June 30, 2011). The Medicare EDB is used to identify beneficiary demographic characteristics also during the year preceding program launch. Property data on SASH and non-SASH facilities are taken from 2012 HUD records. Our evaluation team used two HUD data sources; the Tenant Rental Assistance Certification System (TRACS) and the Public and Indian Housing Information Center (PIC). TRACS is the data base for all multi-family properties (Section 202, Section 236, Section 8, etc.), and the PIC is the data base for all HUD supported public properties and vouchers.

### 3.2. Evaluation Property and Beneficiary Sample

The SASH intervention group for this evaluation memorandum consists of Medicare FFS beneficiaries residing in SASH properties who have also been attributed to practices participating in the Blueprint for Health and the MAPCP Demonstration from July 1, 2011 through June 30, 2013. Only SASH participants who have signed a consent form to share their personal information are included in this analysis. There are several reasons for this restriction. First, beneficiaries who consent to have sharing of their personal information with other medical and service providers are considered full participants and are most likely to receive the most benefit from the SASH program.

Second, for this subset of SASH participants, CSC was able to provide us with name, date of birth, Medicare identification number, and Social Security number (SSN). We use these variables in addition to information obtained from the Medicare EDB to link the SASH participant lists to Medicare claims data and HUD data. Community residing SASH program participants are excluded from this current analysis but consideration will be given to including them in subsequent analyses. The primary reason for exclusion is the difficulty linking comparison group beneficiaries to housing properties in the same geographic area. Under the SASH program, only Medicare beneficiaries residing near a SASH property can participate.

The SASH program sites included in this year's analysis are those that implemented the SASH program prior to July 1, 2013. Designated SASH sites include a range of non-profit affordable housing properties funded through a variety of sources, including HUD, the Low Income Housing Tax Credit (LIHTC), the U.S. Department of Agriculture Rural Development (USDA), and other sources available through the State of Vermont. Sites also include a few mobile home parks. This current analysis includes only properties that receive funding assistance from HUD. This includes properties receiving assistance through HUD's multi-family programs, such as Section 202 and Section 8, and the public housing program.

The analysis is currently limited to these types of communities because we were able to obtain information on both the properties and the residents in the properties, which allows us to link to the residents' Medicare data. This is necessary, in particular, to draw the comparison group sample and to create a propensity score (PS) for matching on property characteristics and to adjust estimation standard errors for clustering at the property level. Properties that receive multiple forms of funding assistance are included in the analysis, if one of the funding sources is HUD. For example, if a property receives LIHTC funding and also receives Section 8 assistance, that property is included. It also includes individuals living in a non-HUD-assisted SASH housing site who are receiving rental assistance through a project-based voucher or tenant-based voucher (i.e. housing choice voucher) provided by the public housing authorities. For example, a property that is funded through the LIHTC program may have project-based vouchers for some of their units and/or may accept housing choice vouchers. These individuals are represented in the "voucher" count under the "SASH program properties" in **Table 1**. These voucher recipients are included only because they reside in a designated SASH housing site. No other voucher recipients are included in the SASH or comparison group samples.

In future analyses, we will be able to access data on LIHTC-funded properties and residents and will be able to expand our analyses to include these additional properties and residents. We will be unable to include properties funded through the USDA, the State of Vermont (other than LIHTC) or the mobile home parks that do not also receive assistance through HUD or LIHTC. This is because we cannot identify comparable properties and residents in our comparison areas for these properties. These excluded properties will represent a small portion of the total SASH properties.

<b>TABLE 1. Characteristics of Properties in Which Medicare FFS SASH Program Participants and Comparison Group Beneficiaries Reside</b>			
<b>Property Characteristics</b>	<b>SASH Program Properties</b>	<b>Properties Associated with Non-SASH/MAPCP Demonstration Comparison Group</b>	<b>Properties Associated with Non-SASH/Non-MAPCP Demonstration Comparison Group</b>
<b>Total Number of Properties in TRACS</b>	<b>37</b>	<b>104</b>	<b>124</b>
Mean Number of Units	38	25	70
Mean Occupancy Length	6	6	6
Mean Household Size	1	2	1
Mean Household Income	\$14,296	\$14,771	\$13,863
Mean Tenant Rent	\$303	\$311	\$256
Mean Percent Elderly Residents	72%	41%	59%
Section 8 (%)	81%	88%	76%
Other Financing (%)	19%	12%	24%
Mean OPIIS Risk Score	6.9	6.4	7.1
Metropolitan (%)	41%	27%	30%
Micropolitan (%)	35%	50%	51%
Rural (%)	24%	23%	19%
Median Household Income (by County)	\$51,617	\$50,618	\$44,393
Average Annual Medicare Expenditures	\$6,878	\$6,954	\$7,673
Mean Primary Care Physicians per 100,000 Population	108	102	45
<b>Total Number of Properties in PIC</b>	<b>11</b>	<b>3</b>	<b>37</b>
Mean Number of Units	159	155	151
Mean Occupancy Length (years)	6.4	11.9	6.8
Mean Household Size	2	3	2
Mean Household Income	\$16,901	\$22,241	\$16,716
Mean Tenant Rent	\$325	\$367	\$269
Elderly Residents (%)	34%	26%	38%
Public Housing (%)	91%	100%	100%
Voucher (%)	9%	0%	0%
<b>NOTE:</b> HUD supplied data are from calendar year 2012.			

We would like to note that important CSC properties are excluded from this analysis because we do not have resident-level data available for LIHTC properties. For example, the SASH pilot was conducted at a LIHTC community, Heineberg, and this property and its residents are currently excluded. Thus, we may not have a representative sample of SASH participants for this early evaluation and have excluded some Medicare beneficiaries with the longest exposure to the SASH program. Future analyses will include a greater percentage of SASH participants.

As of June 30, 2013, 1,502 Medicare FFS beneficiaries were participating in the SASH program. After applying a number of beneficiary and property exclusion filters as noted above, the SASH program sample for this analysis is 549 Medicare beneficiaries. The two primary reasons for exclusion include: (1) not being attributed to a Blueprint for Health practice participating in the MAPCP Demonstration as of June 30, 2013; and (2) a resident in non-HUD housing. A comparison of health status and demographic characteristics of SASH participants with Medicare beneficiaries not included in this year's analysis found them to be similar.

The comparison group comprises Medicare FFS beneficiaries residing in non-SASH program HUD properties. Comparison beneficiaries are separated into two distinct groups. The first comparison group was drawn from residents of non-SASH program properties in Vermont and consists of 1,143 Medicare FFS beneficiaries



participating in the MAPCP Demonstration. The second group of beneficiaries was drawn from a rural geographic area in upstate New York State that does not have a MAPCP Demonstration program but are residents of similar supported properties. A total of 1,903 Medicare FFS beneficiaries comprise the second comparison group.

We use these two comparison groups to evaluate the following two SASH program effects:

- SASH/MAPCP Demonstration beneficiaries versus non-SASH/MAPCP Demonstration beneficiaries: this comparison yields estimates of the **SASH program effect** (among MAPCP Demonstration beneficiaries).
- SASH/MAPCP Demonstration beneficiaries versus non-SASH/non-MAPCP Demonstration beneficiaries: this comparison yields estimates of the **combined SASH/MAPCP Demonstration effect**.

Since the comparison group may differ from the intervention group in terms of baseline characteristics, all descriptive statistics and outcome analysis are re-weighted using weights from a PS model (see **Appendix C**). PS weights attempt to balance the intervention and comparison groups with respect to baseline characteristics to reduce the potential for bias in the estimate of the intervention effect.

Descriptive analyses present unweighted and weighted beneficiary characteristics at baseline. Baseline is defined as the year before the launch of the MAPCP Demonstration and the SASH program (July 1, 2010 - June 30, 2011). Variation between SASH program beneficiaries and the comparison groups are quantified using standardized differences (Austin, 2011). A standardized difference greater than 0.10 or less than -0.10 reflects a meaningful difference between group means. For this memorandum, we also report average quarterly outcomes during baseline and the first 24 months of the SASH program. Regression results for these outcomes are given in **Section 4.2**.

### 3.3. Property Characteristics

In **Table 1**, we present the property characteristics for SASH program and comparison properties, using HUD data from calendar year 2012. Because there are differences between the two HUD property data sources, we present statistics separately for properties listed in the PIC and TRACS data bases.

We were able to link intervention and comparison group beneficiaries to 37 SASH program properties, 104 non-SASH/MAPCP Demonstration properties, and 124 non-SASH/non-MAPCP Demonstration properties in the TRACS data base. Overall, the SASH properties and the two sets of comparison group properties have many similarities. The TRACS data show that SASH program properties on average have a larger number of housing units than non-SASH/MAPCP program properties (38 vs. 25)

but are much smaller than properties in the non-SASH/non-MAPCP group (38 vs. 70). SASH properties in the TRACS data base have a higher percentage of elderly residents (72% versus 41% or 59%), and are more likely to be in a metropolitan area (41% vs. 27% and 30%). There is also some variation in the distribution of type of financing across the three groups.

We were also able to link intervention and comparison group beneficiaries to 11 SASH program properties, three non-SASH/MAPCP Demonstration properties, and 37 non-SASH/non-MAPCP Demonstration properties in the PIC data base representing a much smaller proportion of SASH program and comparison group beneficiaries. Similar to TRACS, the PIC data show that the properties in the three groups generally have similar characteristics with a few noted differences. Mean number of years of occupancy, mean household income and mean tenant rent is highest among non-SASH/MAPCP Demonstration comparison group beneficiaries compared to the other two samples. There are no voucher holders in the two comparison groups. The voucher holders in the SASH program group are included only because they live in designated SASH properties.

### 3.4. Participant Characteristics

**Table 2a** presents the unweighted demographic and health status characteristics for the SASH program beneficiaries and the two comparison groups. **Table 2b** presents the propensity weighted averages for the three groups.

<b>TABLE 2a. Unweighted Baseline Demographic Characteristics and Health Status for SASH Participants, Non-SASH/MAPCP Demonstration Beneficiaries, and Non-SASH/Non-MAPCP Demonstration Beneficiaries for July 1, 2010 - June 30, 2011</b>			
<b>Demographic and Health Status Characteristics</b>	<b>SASH Program Beneficiaries</b>	<b>Non-SASH/MAPCP Demonstration Comparison Beneficiaries</b>	<b>Non-SASH/Non-MAPCP Demonstration Comparison Beneficiaries</b>
<b>Total Beneficiaries</b>	<b>549</b>	<b>1,143</b>	<b>1,903</b>
<b>Demographics</b>			
Mean Age	72	67*	72
White (%)	98	98	95*
Female (%)	75%	67%*	74%
Disabled (%)	42%	51%*	41%
Medicaid (%)	68%	73%*	55%*
ESRD (%)	1%	1%	1%
Mean Household Income (\$)	\$15,031	\$15,195	\$14,998
Mean Household Size	1.12	1.30	1.14
<b>Health Status</b>			
Mean HCC Score	1.28	1.18*	1.28
Mean Charlson Comorbidity Index	1.13	0.92*	1.09
<b>NOTE:</b> Standardized differences comparing: (1) SASH program beneficiaries to non-SASH/MAPCP Demonstration comparison beneficiaries; and (2) SASH program beneficiaries to non-SASH/non-MAPCP Demonstration comparison beneficiaries that are greater than or equal to 0.10 are noted with an *.			

**SASH program beneficiaries versus non-SASH/MAPCP Demonstration comparison beneficiaries.** **Table 2a** shows that SASH program beneficiaries were on average slightly older than non-SASH/MAPCP Demonstration comparison beneficiaries (72 vs. 67), more likely to be female, but less likely to be disabled or to receive

Medicaid. They were also in poorer health, as measured by the average hierarchical conditions category (HCC) risk score (1.28 vs. 1.18) and Charlson index (1.13 vs. 0.92). Prior to applying the propensity weights there were seven variables with standardized differences greater than 0.10 or less than -0.10 when comparing these two groups. After applying the PS weights (see **Table 2b**), there were none, indicating that PS weighting is creating a good balance in demographic characteristics and health status between the two groups.

<b>TABLE 2b. Weighted Baseline Demographic Characteristics and Health Status for SASH Participants, Non-SASH/MAPCP Demonstration Comparison Beneficiaries, and Non-SASH/Non-MAPCP Demonstration Comparison Beneficiaries for July 1, 2010 - June 30, 2011</b>			
<b>Demographic and Health Status Characteristics</b>	<b>SASH Program Beneficiaries</b>	<b>Non-SASH/MAPCP Demonstration Comparison Beneficiaries</b>	<b>Non-SASH/Non-MAPCP Demonstration Comparison Beneficiaries</b>
<b>Total beneficiaries (weighted)</b>	<b>542</b>	<b>1,001</b>	<b>1,740</b>
<b>Demographics</b>			
Mean age	72	72	72
White (%)	98%	99%	98%
Female (%)	76%	75%	75%
Disabled (%)	43%	41%	42%
Medicaid (%)	67%	67%	66%
ESRD (%)	1%	1%	1%
Average Household Income	\$15,029	\$15,246	\$15,290
Average Household Size	1.12	1.15	1.13
<b>Health Status</b>			
Mean HCC Score	1.28	1.33	1.27
Mean Charlson Comorbidity Index	1.13	1.16	1.09
<b>NOTE:</b> Standardized differences comparing: (1) SASH program beneficiaries to non-SASH/MAPCP Demonstration comparison beneficiaries; and (2) SASH program beneficiaries to non-SASH/non-MAPCP Demonstration comparison beneficiaries that are greater than or equal to 0.10 are noted with an *.			

**SASH program beneficiaries versus non-SASH/non-MAPCP Demonstration comparison beneficiaries.** **Table 2a** shows that SASH program participants were more likely to be White and on Medicaid than non-SASH/non-MAPCP Demonstration comparison beneficiaries (White: 98% vs. 95%; Medicaid: 68% vs. 55%). Prior to applying PS weighting, these were the only two variables with a standardized differences greater than 0.10 or less than -0.10. After weighting (see **Table 2b**), there were no covariates with standardized differences that exceeded these boundaries, again indicating that PS weighting is creating a good balance in demographic characteristics and health status between the two groups.

## 4. QUANTITATIVE FINDINGS

### 4.1. Methods

Our quantitative outcomes analysis consists of two parts: (1) a comparison of average outcomes before and after the start of the SASH program, and between SASH program participants and beneficiaries in the two comparison groups; and (2) estimating the impact of the SASH program on outcomes in a regression framework. The statistical model we use to estimate the program impact is a difference-in-differences (DID) model. It is estimated separately for the two SASH comparison groups: the non-SASH/MAPCP Demonstration group and the non-SASH/non-MAPCP Demonstration group (see **Appendix C**).

For the Medicare expenditure outcomes, we use a linear version of the DID model. In this case, the impact estimate is the (regression-adjusted) difference between SASH program participants and the comparison group in the *change in outcome levels between the baseline and intervention periods*. As such, we will refer to this estimate as a DID estimate, which can be considered the average program effect across the entire period of SASH participation to date. A negative DID estimate indicates that, between the baseline and intervention periods, average outcomes among SASH program participants either increased by a smaller amount or decreased by a larger amount, relative to the comparison group. Thus, negative DID estimates are indications that the SASH program was successful in reducing the expenditure trend among intervention beneficiaries, relative to the comparison group. Positive DID estimates reflect the opposite.

For the utilization outcomes, we use a non-linear (negative binomial) version of the DID model. In this case, the impact estimate shows whether during the intervention period the (regression-adjusted) utilization rate increased or decreased among SASH program participants, relative to the comparison group. The estimate does not have a DID interpretation, so for utilization outcomes we will simply refer to the “impact estimate” or “SASH program effect.” Positive numbers indicate that the SASH program was associated with increased utilization relative to the comparison group, whereas negative numbers indicate a decrease in utilization.

### 4.2. Support and Services at Home Program Outcomes Analysis

SASH participants are evaluated across the following expenditure outcomes: total Medicare expenditures, and expenditures for acute care hospitalizations, post-acute care providers, ER visits, and hospital outpatient department services; and the following utilization outcomes: all-cause hospitalizations and all-cause ER visits. In future reports, an expanded set of acute care utilization measures will be reported as the sample size

of the SASH program beneficiaries increases thereby allowing for more stable estimation of less frequently occurring events (e.g., hospital readmission). All expenditure outcomes are measured in dollars PBPM and were calculated by dividing quarterly expenditures by three. All utilization outcomes are measured in rates per 1,000 Medicare FFS beneficiaries.

#### 4.2.1. Expenditure Outcomes

**Descriptive Statistics.** The (weighted) average quarterly PBPM Medicare expenditures for SASH program beneficiaries and the two comparison groups are shown in **Table 3**. We present average quarterly PBPM Medicare expenditures during a baseline period (July 2010 - June 2011) and the intervention period (July 2011 - June 2013).

<b>TABLE 3. Average Quarterly PBPM Medicare Expenditures for SASH Participants, Non-SASH/MAPCP Demonstration Comparison Beneficiaries, and Non-SASH/Non-MAPCP Demonstration Comparison Beneficiaries, for the Periods July 2010 - June 2011 (baseline) and July 2011 - June 2013 (intervention)</b>						
<b>Expenditures</b>	<b>Baseline</b>			<b>Intervention</b>		
	<b>SASH Program Participants</b>	<b>Non-SASH/MAPCP Comparison Group</b>	<b>Non-SASH/Non-MAPCP Comparison Group</b>	<b>SASH Program Participants</b>	<b>Non-SASH/MAPCP Comparison Group</b>	<b>Non-SASH/Non-MAPCP Comparison Group</b>
Total Medicare	\$819	\$1,145	\$764	\$905	\$1,406	\$1,121 <sup>b</sup>
Acute Care	\$270	\$389	\$280	\$273	\$638	\$452 <sup>b</sup>
Post-Acute Care	\$83	\$180	\$76	\$85	\$231	\$167 <sup>b</sup>
ER	\$31	\$44	\$43	\$51	\$66	\$37
Hospital outpatient department	\$157	\$242 <sup>a</sup>	\$99	\$197	\$182	\$106
<b>NOTES:</b> Average expenditures are weighted by PS weights for the comparison groups and eligibility fraction for all Medicare beneficiaries.						
a. $p < 0.05$ in comparison of baseline differences between the SASH program participants and the non-SASH/MAPCP comparison group.						
b. $p < 0.05$ in comparison of baseline and demonstration period differences within the non-SASH/non-MAPCP comparison group.						

During the baseline period, average total PBPM Medicare expenditures were similar for SASH program participants, non-SASH/MAPCP Demonstration comparison group beneficiaries, and non-SASH/non-MAPCP Demonstration comparison group beneficiaries. Hospital outpatient department PBPM Medicare expenditures were higher among non-SASH/MAPCP Demonstration comparison group beneficiaries than among SASH program beneficiaries (\$242 vs. \$157). Between the intervention and baseline periods, all three groups experienced increases in total PBPM Medicare expenditures, but the SASH participants experienced less of a growth than either comparison group. Increases in total Medicare expenditures were mainly driven by increases in expenditures to acute care hospitals and post-acute care providers. Statistically significant growth was observed among non-SASH/non-MAPCP comparison group beneficiaries in total PBPM Medicare expenditures and expenditures for acute care hospital services and post-acute care services.

**Regression Estimates.** Estimates of the SASH program effects are shown in **Table 4**. We estimated the impact of the SASH program relative to the non-SASH/MAPCP Demonstration comparison group (columns 2-4) and the non-SASH/non-MAPCP Demonstration comparison group (columns 5-7). Moreover, we estimated the impact for both the group of SASH program participants as a whole and for two subgroups of participants: an “early panel” cohort and a “late panel” cohort. The early panel cohort comprises SASH participants who received SASH services from a panel that started operating before April 1, 2012. The late panel cohort comprises SASH participants who received SASH services from a panel that started operating on or after April 1, 2012. As discussed in the implementation section of this memorandum, there are many start-up activities associated with hiring staff, gaining participation consent, conducting a detailed needs assessment, and initiating supportive services. Thus, we wanted to evaluate whether there is a differential impact observed among participants in the more mature SASH panels versus those that became operational toward the latter part of our evaluation period.

<b>TABLE 4. Regression-Adjusted DID Estimates for PBPM Medicare Payments, Comparing SASH Program Participants to non-SASH/MAPCP Demonstration and Non-SASH/Non-MAPCP Demonstration Comparison Groups</b>						
<b>Payment</b>	<b>SASH Participants vs. Non-SASH/MAPCP Demonstration Comparison Group</b>			<b>SASH Participants vs. Non-SASH/Non-MAPCP Demonstration Comparison Group</b>		
	<b>All SASH Participants</b>	<b>Early SASH Panels</b>	<b>Late SASH Panels</b>	<b>All SASH Participants</b>	<b>Early SASH Panels</b>	<b>Late SASH Panels</b>
Total Medicare	8.78 (79.84)	-146.32* (75.74)	150.45 (118.67)	-46.53 (86.60)	-183.10** (91.96)	54.00 (118.23)
Acute Care	20.36 (47.77)	-45.17 (50.72)	74.62 (65.92)	-59.95 (54.95)	-125.08** (60.26)	-33.03 (73.02)
Post-Acute Care	-32.98 (26.89)	-90.99*** (23.92)	26.05 (36.67)	-9.13 (23.36)	-59.69*** (21.88)	41.75 (32.39)
ER	-0.91* (5.71)	5.07 (6.87)	-6.96 (6.72)	-2.49 (5.22)	1.77 (7.38)	-7.35 (7.07)
Hospital Outpatient Department	-3.90 (18.49)	-9.48 (22.74)	-3.17 (25.57)	27.11* (15.72)	31.66** (15.94)	25.63 (24.50)
<b>NOTES:</b> The early SASH panel cohort comprises SASH participants receiving services from SASH panels that were operating before April 1, 2012. The late SASH panel cohort comprises participants receiving services from SASH panels that were operating on or after April 1, 2012.						
* p<0.10; ** p<0.05; *** p<0.01; standard errors are in parentheses.						

From **Table 4**, we can draw several preliminary conclusions about the impact of the SASH program on Medicare payments. When the entire group of SASH program participants is compared against both comparison groups (columns 2 and 5), we observe the rate of growth among the SASH program participants’ PBPM Medicare payments trending lower in seven of the ten payment categories; however, none reach statistical significance. SASH program participants did experience a higher rate of growth in PBPM hospital outpatient department payments than beneficiaries assigned to the non-SASH/non-MAPCP Demonstration comparison group. Between the baseline and intervention periods, these payments increased by an additional \$27 PBPM for SASH program participants. This may reflect identification of previously unmet need during the assessment period by the SASH program or from the SASH beneficiaries’ medical home providers.

When analyzing the SASH program effects stratified by early versus late panel start dates, under the hypothesis that panels need a certain amount of start-up time before their implementation of the SASH program becomes fully effective, we would expect to see a larger program effect for participants receiving services from earlier and therefore more experienced SASH panels. The results in **Table 4** confirm that this is indeed the case. Relative to the non-SASH/MAPCP Demonstration comparison group, the rate of growth in total and post-acute care PBPM Medicare expenditures was \$146 and \$91 lower, respectively, for SASH participants residing in early SASH panels. The rate of growth in PBPM Medicare payments for acute care hospital services and hospital outpatient department services were also trending lower among SASH participants residing in early SASH panels, but did not reach statistical significance.

Relative to non-SASH/non-MAPCP Demonstration comparison beneficiaries, we also observe lower rates of growth in PBPM total Medicare payments, -\$183, PBPM payments to acute care hospital payments, -\$125, and post-acute care payments, -\$60, for SASH participants receiving services from early SASH panels. Among participants receiving services from early SASH panels, PBPM payments to hospital outpatient departments increased faster than for the non-SASH/non-MAPCP Demonstration comparison group, +\$32.

#### 4.2.2. Utilization

**Descriptive Statistics.** Presented in **Table 5** are the weighted quarterly utilization rates for the SASH program beneficiaries and the two comparison groups. For the three groups, the weighted quarterly rates are shown at baseline and during the first two years of the intervention time period.

<b>TABLE 5. Quarterly Average Utilization of Services for SASH Participants, Non-SASH/MAPCP Demonstration Group Beneficiaries and Non-SASH/MAPCP Demonstration Group Beneficiaries for the Periods July 2010 - June 2011 (baseline) and July 2011 - June 2013 (intervention)</b>						
Utilization (per 1,000 beneficiaries)	Baseline			Intervention		
	SASH Program Participants	Non-SASH/MAPCP Comparison Group	Non-SASH/Non-MAPCP Comparison Group	SASH Program Participants	Non-SASH/MAPCP Comparison Group	Non-SASH/Non-MAPCP Comparison Group
All-cause acute care hospitalizations	66	84	97	80	131 <sup>b</sup>	154 <sup>a</sup>
All-cause ER visits	238	243	347	318	370 <sup>a</sup>	316

**NOTES:** Average utilization is weighted by propensity weights for the comparison group.  
a.  $p < 0.05$  in comparison of baseline and demonstration period differences within the non-SASH/MAPCP comparison group or the non-SASH/non-MAPCP comparison group.  
b.  $p < 0.10$  in comparison of baseline and demonstration period differences within the non-SASH/MAPCP comparison group.

During the baseline period, we observe variation in the levels of acute care utilization but no statistically significant differences. It is a common observation within a cohort of Medicare FFS beneficiaries to observe increasing rates of utilization over time. Although the rates of all-cause hospitalizations and ER visits rose among SASH

participants, we only observe statistically significant increases among Medicare beneficiaries in the two comparison groups.

**Regression Estimates.** The rate of all-cause hospitalization (**Table 6**) increased among SASH participants relative to non-SASH/MAPCP Demonstration group beneficiaries (15 per 1,000 beneficiaries) but was driven by utilization of participants residing in later starting SASH panels (24 per 1,000 beneficiaries). In contrast, we observed higher rates of ER visits among participants residing in earlier starting SASH panels (52 per 1,000 beneficiaries). We observe no systematic differences in the growth of acute care utilization between SASH participants and non-SASH/non-MAPCP Demonstration group beneficiaries.

<b>TABLE 6. SASH Program Effect Estimates for Utilization, Comparing SASH Program Participants to MAPCP and Non-MAPCP Medicare Beneficiaries in the Comparison Group</b>						
	<b>SASH Beneficiaries vs. Non-SASH/MAPCP Beneficiaries</b>			<b>SASH Beneficiaries vs. Non-SASH/Non-MAPCP Beneficiaries</b>		
	<b>All Participants to Date</b>	<b>Early Panel Cohort</b>	<b>Late Panel Cohort</b>	<b>All Participants to Date</b>	<b>Early Panel Cohort</b>	<b>Late Panel Cohort</b>
All-cause, acute care hospitalizations <sup>a</sup>	15.5* (8.3)	9.3 (10.5)	24.4* (13.0)	2.4 (10.4)	-9.9 (13.1)	10.3 (14.7)
All-cause ER visits <sup>a</sup>	23.8 (18.8)	52.0** (24.0)	0.9 (25.8)	-8.8 (22.0)	4.07 (3.44)	-26.1 (25.0)
<b>NOTES:</b>						
a. Measured in rates per 1,000 Medicare FFS beneficiaries per quarter.						
* p<0.10; ** p<0.05; *** p<0.01; standard errors are in parentheses.						



## 5. CONCLUSION

The SASH program successfully launched 36½ panels statewide as of December 2013 with further expansion expected in 2014. A primary goal of the SASH program has been to create linkages with a diverse team of service, health care, and housing providers enabling better coordination of care for SASH program participants. Property managers we interviewed felt they were better able to perform their primary function because the SASH program focused on the health and wellness of participants. It was also opined that SASH activities helped to create a better community within the property and that by addressing unmet needs among aging residents (e.g., falls prevention) the financial risk to their portfolios, such as property legal liabilities, were reduced. Thus, it was felt that the SASH program could reduce costs for housing properties.

Despite the successful roll-out of the SASH program broadly across supported housing properties in Vermont, a number of operational challenges have existed. The rural nature of the state presents a number of logistical challenges with large geographic distances between properties or between participating properties and community residents; poor cellular service makes connection to the central data collection platform difficult; and limited public transportation for SASH staff and participants. A second challenge noted broadly across interviewees was the perceived needed work hours exceeds actual budgeted hours for the SASH staff, in general, but the wellness nurse, in particular. Third, the SASH program monitors the progress of its participants through Vermont's central clinical registry, DocSite, and is heavily reliant on its functionality. Lack of widespread adoption of the registry by practices has reduced the full potential for communication between SASH staff and providers, and a shut-down of DocSite for two months in 2013 negatively impacted program functioning. A fourth challenge was freezing program expansion in the fall of 2012. The SASH program relies heavily upon the Medicare program for financial support. Fewer than expected participating Medicare beneficiaries in the MAPCP Demonstration created a funding gap. The Medicare program subsequently increased the payment amount and expansion resumed in May 2013.

The SASH intervention group for this evaluation memorandum consists of Medicare FFS beneficiaries residing in SASH properties who have also been attributed to practices participating in the Blueprint for Health and the MAPCP Demonstration from July 1, 2011 through June 30, 2013. Only SASH participants that have signed a consent form to allow the SASH program staff to share their personal identification and health information with others participating in the MAPCP Demonstration are included in this analysis.

The SASH program sites included in this year's analysis are those that implemented the SASH program prior to July 1, 2013. Designated SASH sites include a range of non-profit affordable housing properties funded through a variety of sources,

including HUD, LIHTC, USDA, and other sources available through the State of Vermont. Sites also include a few mobile home parks. This current analysis includes only properties that receive funding assistance from HUD, which excludes important CSC properties because we do not have resident-level data available for LIHTC properties. In future analyses, we will be able to access data on LIHTC-funded properties and residents participating and will be able to expand our analyses to include these additional properties and residents.

As of June 30, 2013, 1,502 Medicare FFS beneficiaries were participating in the SASH program. After applying a number of beneficiary and property exclusion filters as noted above, the SASH program sample for this analysis is 549 Medicare beneficiaries. The two primary reasons for exclusion include: (1) not being attributed to a MAPCP Demonstration practice as of June 30, 2013; and (2) a resident in non-HUD housing. We also experienced challenges linking residents with HUD data that requires further exploration prior to the next analysis. Thus, we may not have a representative sample of SASH participants in our current analysis; however, a comparison of health status and demographic characteristics of SASH participants with Medicare beneficiaries not included in the analysis found them to be similar. Further, the small sample size of SASH participants and the large amount of variation in the observed outcomes produced large standard errors and confidence intervals limiting the outcomes that we could study for this report and reducing the precision of the regression estimates.

Despite these limitations, we observe that among early participants the SASH program was associated with a slower rate of growth in total Medicare expenditures and expenditures for post-acute care among SASH participants residing in SASH properties that implemented their program within the first nine months after the launch of the MAPCP Demonstration and relative to both comparison groups. The SASH program was also associated with a lower rate of growth in acute care payments among participants residing in the early SASH panels but relative only to beneficiaries in the non-SASH/non-MAPCP Demonstration group suggesting a possible synergistic effect of the MAPCP Demonstration and the SASH program. Medicare expenditures for hospital outpatient department services increased among SASH participants residing in the early SASH panels relative only to beneficiaries in the non-SASH/non-MAPCP Demonstration group, and may reflect identification of previously unmet need by both the SASH program and MAPCP Demonstration providers.

When combining the beneficiaries from the early and late SASH panels, we observe the rate of growth among the SASH program participants' Medicare expenditures trending lower in seven of the ten payment categories; however, none reach statistical significance at this point in the demonstration. Despite the findings with respect to reduced rates of growth in Medicare expenditures, we do observe higher rates of hospitalizations and ER visits among SASH participants relative to non-SASH/MAPCP Demonstration beneficiaries. Further exploration of the reasons for the high rates of admission is warranted. Additionally, the analysis did not account for programmatic investments provided by the Medicare program to determine if the SASH program resulted in net savings for the Medicare program.

The findings of the SASH evaluation thus far raise further questions. Impact estimates are based on the first year of SASH implementation only and are thus preliminary. Furthermore, although SASH participants had higher rates of hospitalizations and ER visits relative to non-SASH/MAPCP Demonstration beneficiaries, the early SASH panels were associated with lower rates of growth in Medicare expenditures relative to a comparison group. Future analyses will explore in more detail the costs of administering the SASH program relative to benefits that accrue to participants in the SASH program and the impact of on Medicare and Medicaid expenditures.

## REFERENCES

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## APPENDIX A. BASELINE DEMOGRAPHICS AND HEALTH STATUS FOR SASH BENEFICIARIES

<b>TABLE A-1. Unweighted Baseline Demographics and Health Status for SASH Beneficiaries Included in the Sample and SASH Beneficiaries with Medicare FFS Claims With and Without HUD Data for July 1, 2010 - June 30, 2011</b>		
<b>Demographic and Health Status Characteristics</b>	<b>SASH Program Beneficiaries Included in Sample</b>	<b>SASH Program Beneficiaries With Claims Results; With and Without HUD Merge</b>
<b>Total Beneficiaries</b>	<b>549</b>	<b>795</b>
<b>Demographics</b>		
Mean Age	72	73
White (%)	98%	98%
Female (%)	75%	73%
Disabled (%)	42%	36%
Medicaid (%)	68%	55%
ESRD (%)	1%	1%
<b>Health Status</b>		
Mean HCC Score	1.28	1.27
Mean Charlson Comorbidity Index	1.13	1.07

## APPENDIX B. QUALITATIVE DATA AND METHODS

### B.1. Annual Site Visits

The RTI International/LeadingAge CAR team conducted a site visit of four SASH panels over a three-day period in February 2013. The purpose of the site visits was to understand the SASH program implementation and operation, implementation/operation successes and challenges, and perceived impacts on program participants, SASH providers and partners and the state's MAPCP Demonstration.

The visits were conducted by two two-person teams and each team visited two SASH panels. At the time of the visits, 26.5 panels were operating around the state. The team prioritized selecting a mix of panels operating in different environments to provide insight on how the program worked in varying contexts. Several factors were considered, including:

- Panel location (urban/rural, different areas of state).
- Type of housing properties in the panel (public housing, subsidized [HUD, Rural Development, LIHTC, state], mobile home park).
- Number of housing sites SASH coordinator/wellness nurse responsible for in the panel (one versus multiple).
- Number/proportion of community dwelling participants in the panel.
- Maturity of CHT in the panel's region.
- Anything exceptional about the SASH team's interaction with the CHT.
- Anything exceptional about composition of the SASH team.
- Roll-out date of the SASH panel.

In each panel, one-on-one interviews were conducted with a range of stakeholders involved with the panel. Interviewees included the SASH Coordinator, SASH Wellness Nurse, representatives from organizations participating on the SASH team, CHT representatives, housing property managers, and the executive director of the DRHO for the region in which the panel is located.

Protocols were developed by RTI/CAR and reviewed by ASPE/HUD. The protocols were designed to help understand the facilitators and barriers to program implementation and operations, the perceived impact on program participants and the

property and service providers, and the possibilities for sustainability and replicability in other locations. Interview protocols were tailored to specific respondent types.

Due to limitations on the number of individuals within a stakeholder category that can be interviewed without triggering a review by the U.S. Office of Management and Budget (OMB), the teams were not able to interview all representatives of each SASH Team. However, the team did conduct interviews with representatives from each of the types of organizations represented on the team (home health agency, area agency on aging or mental health agency) to make sure the different organizational perspectives were captured.

Interview lengths ranged 1-2 hours depending on the type of respondent:

1. CHT staff (1 hour).
2. DRHO staff (1 hour).
3. Property managers (1 hour).
4. SASH coordinators (1.5-2 hours).
5. SASH wellness nurses (1.5-2 hours).
6. Community service providers (home health agency, area agency on aging, etc.) (1 hour).

The first round of site visits were conducted without OMB approval, thus, we were very careful to limit our interviewing to no more than nine interviews per type of respondent. For subsequent rounds of sites visits, we will develop a Paperwork Reduction Act package for submission to OMB. We believe that we will need to secure OMB approval before the site visits in the second year, as the aggregate number of respondents by respondent type will exceed nine.

For the first site visit report, RTI/CAR produced a high level summary of findings to address key research questions and highlight the key issues identified during the particular site visit. In future site visit reports, notes and other information gathered from the interviews will be coded and entered in a qualitative data base, NVivo 10 (<http://www.qsrinternational.com>), for more in-depth analysis.

## **B.2. Quarterly Conference Calls**

The RTI/LeadingAge team held four quarterly conference calls with SASH staff and the Contracting Officer's Representative (COR) during the first year of evaluation. The primary purpose of the quarterly calls was to understand the details of program implementation and operation, monitor implementation progress, and identify

implementation and operational successes and challenges as the SASH program is expanded statewide and matures. The quarterly calls helped inform the evaluation team on areas of investigation for the annual site visits.

Each call was organized around the following structure:

- An update on the current status of implementation, including the number of existing panels and participants and any planned new panels.
- An update of any significant changes, challenges or success regarding program implementation.
- An in-depth discussion of a specific program implementation or operational element.

In year one, the following four topical areas were discussed:

- General background and organizational structure of the SASH program.
- Funding and financing mechanisms for SASH program.
- Start-up of new SASH panels.
- Data collection and information technology (DocSite and clinical registry).

The calls were conducted with the appropriate SASH staff depending on the focused topic of the call. Staff included the CSC SASH program staff for the first year of the evaluation. A discussion guide was created for each quarterly call. The guide was sent to the COR for review and input and then forwarded to the SASH program staff prior to the call to allow them to prepare any necessary information or data.

The topical areas for years two and three will be identified based on priority issues identified in previous quarterly calls, the annual site visits and the quantitative data analysis that the team believes it needs to gain a greater understanding of. Examples of potential topical areas could include: serving community-based SASH participants (versus property residents), addressing mental health needs (or other special needs), engagement with CHTs and other health providers, and working with community-based partners (SASH interdisciplinary team).



# APPENDIX C. QUANTITATIVE DATA AND METHODS

## C.1. Data

RTI receives Medicare claims on a quarterly basis from the Actuarial Research Corporation (ARC). ARC takes prospective TAP claims from CMS on a monthly basis and quarterly creates netted claims files for analytic purposes. With each new quarter of data, ARC updates past files with claims processed after the previous cutoff date. This update process covers a two-year run-out period. The ARC files contain the Medicare claims for demonstration and comparison beneficiaries from January 2010 forward. Prior to 2010, Medicare claims are pulled from the Data Extract System by RTI analysts.

Property-level data used in this report come from two separate HUD data bases. TRACS is the data base for all multi-family properties (Section 202, Section 236, Section 8, etc.), and the PIC is the data base for all public properties. Medicare claims and HUD records were merged using the person's SSN. If SSN was missing, merges were attempted using first and last name and date of birth.

RTI also received permission from the State of Vermont to receive the Medicare identification number for beneficiaries participating in the SASH program. Along with the start date of their particular SASH property, this information was then merged with their Medicare claims data through the use a cross-referenced Health Insurance Claim number.

## C.2. Comparison Groups

The analysis considers the following two between-group comparisons:

- SASH/MAPCP Demonstration beneficiaries versus non-SASH/MAPCP Demonstration beneficiaries: this comparison yields estimates of the SASH program effect (among MAPCP Demonstration beneficiaries).
- SASH/MAPCP Demonstration beneficiaries versus non-SASH/non-MAPCP Demonstration beneficiaries: this comparison yields estimates of the combined SASH and MAPCP Demonstration effect.

Similar to the SASH intervention group, the non-SASH/MAPCP Demonstration comparison group is drawn from HUD housing within Vermont. Like the SASH sites, these properties are distributed across the state and exhibit a similar range of housing

units per property. The non-SASH/non-MAPCP Demonstration comparison group is drawn from properties in 16 counties in upstate New York. Located in the state's northeast quadrant, these counties form the closest non-MAPCP Demonstration area to Vermont.

### C.3. Weights

All quantitative analysis in this report uses a beneficiary-level weight that is a function of the person's PS (for beneficiaries in the comparison group) and their quarterly Medicare eligibility during the demonstration period. The PS is the probability of participating in the SASH program, conditional on beneficiary and property characteristics. PSs are estimated from a logistic regression that uses the indicator for SASH program participation as the dependent variable and beneficiary and property characteristics as independent variables. For beneficiaries in the comparison group, the PS contributes a factor  $PS/(1-PS)$  to the final regression weight. The purpose of including this factor is to better align the comparison group with the intervention group in terms of beneficiary-level and property-level characteristics. As such, it reduces the confounding bias that can result from using a non-randomized comparison group. Covariates in the PS model include the following beneficiary-level and property-level characteristics:

- Beneficiary-level: age (continuous), female, non-White, disabled, Medicaid dual-eligible, end-stage renal disease (ESRD), HCC risk score, Charlson score, household income, household size, length of occupancy, rent amount.
- Property-level: subsidy type, number of units, percent of elderly residents.

A beneficiary's quarterly eligibility was measured as the fraction of days (out of 90) they met the following criteria: (1) they were a Medicare FFS beneficiary with Medicare as the primary payer; (2) they were attributed to a practice in the MAPCP Demonstration or comparison groups; and (3) they resided in Vermont or upstate New York. This quarterly eligibility fraction was then multiplied by PS weights to create the final analytic weight.

### C.4. Regression Analysis

In the following notation,  $i$  is an index of the beneficiary and  $t$  the quarterly period. The outcome is denoted by  $Y_{it}$ ,  $X_{it}$  is set of beneficiary-level and property-level covariates included in the model as controls, and  $\varepsilon_{it}$  is an error term.

For the Medicare payment outcomes we use the following linear DID model to estimate the impact of the SASH program.

$$Y_{it} = \alpha_0 + \alpha_t + \beta_1 I_i + \beta_2 D_{PILOT,it} + \beta_3 D_{ATT,it} + \beta_4 D_{SASH,it} + \beta_5 X_{it} + \varepsilon_{it} \quad (B.1)$$

The variables  $\alpha_t$  ( $t=1,2,\dots$ ) are a set of time fixed effects for each quarter in the sampling period (the  $\alpha_t$ 's are estimated by including as independent variables a set of indicator variables for each quarter). The variable  $I_i$  ( $=0,1$ ) is an indicator for membership in the SASH intervention group; it equals 1 for beneficiaries who are SASH participants and 0 for beneficiaries in the comparison group. The variable  $D_{PILOT,it}$  ( $=0,1$ ) allows for a change in the average outcome starting in the quarter when a beneficiary's practice started participating in the Blueprint for Health program. The variable  $D_{ATT,it}$  ( $=0,1$ ) is an indicator that equals 1 in the quarter when a beneficiary was first attributed to a practice participating in the MAPCP Demonstration, and all quarters thereafter. The variable  $D_{SASH,it}$  ( $=0,1$ ) is an indicator for SASH participation. For beneficiaries in the intervention group, it switches from 0 to 1 in the quarter when the property in which they reside started implementing the SASH program, and remains 1 thereafter. It is equal to zero in all quarters for beneficiaries in the comparison group. The coefficient for  $D_{SASH,it}$  ( $\beta_4$ ) is the measure of the SASH program effect in terms of the change in the level of the outcome--relative to the comparison group--after implementation of the SASH program. It is the coefficient that is presented in **Table 4**.

The linear specification in **Equation B.1** is less appropriate for the utilization outcomes which are count variables. For these outcomes we estimate a negative binomial model instead.<sup>2</sup> The same parameters as on the right-hand side of **Equation B.1** appear in this model, but the impact of the SASH program on utilization is calculated as follows.<sup>3</sup>

$$\tau = \exp(\alpha_0 + \alpha_t + \beta_1 + \beta_2 + \beta_3 + \beta_5 X_{ij}) * [\exp(\beta_4) - 1] \quad (B.2)$$

The parameter  $\tau$  measures the increase ( $\beta_4 > 0$ ) or decrease ( $\beta_4 < 0$ ) in utilization during the period of SASH program participation, among SASH participants relative to beneficiaries in the comparison group. We multiply  $\tau$  by 1,000 to express the SASH program effect in terms of a rate per 1,000 Medicare FFS beneficiaries.

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<sup>2</sup> See Cameron and Trivedi (2005) for an extensive discussion of this model. The average outcome, conditional on the covariates, in the negative binomial model is  $\exp(\text{linear index})$ , where  $\exp(\cdot)$  is the exponential function and the "linear index" is the right-hand side of Equation B.1.

<sup>3</sup> Puhani, P.A. (2012). "The treatment effect, the cross difference, and the interaction term in non-linear 'difference-in-differences' models." *Economics Letters*, 115, pp.85-87. Note that the demonstration effects in equation 1.2 depend on  $X_{ij}$ , the vector of beneficiary-level and practice-level characteristics.

<sup>4</sup> Since  $\alpha_t$  must be a fixed constant,  $t$  was chosen to represent the start of the SASH demonstration.

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