Report to Congress: The Centers for Medicare & Medicaid Services' Evaluation of Community-based Wellness and Prevention Programs under Section 4202 (b) of the Affordable Care Act

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Executive Summary

Introduction

The Affordable Care Act (the Act), passed in March 2010, contains several provisions relating to prevention under Medicare, Medicaid, and private health insurance coverage. In Section 4202, subsection (b), entitled "Evaluation and Plan for Community-based Prevention and Wellness Programs for Medicare Beneficiaries", Congress directed the Secretary of Health and Human Services to conduct an evaluation of community-based prevention and wellness programs and to develop a plan for promoting healthy lifestyles and chronic disease self-management for Medicare beneficiaries. The Act specifically required that the Secretary examine programs focused on increasing physical activity, reducing obesity, improving diet and nutrition, reducing falls, promoting chronic disease management, and better managing mental health issues.

For the purposes of this evaluation work, The Centers for Medicare & Medicaid Services (CMS) defined community-based prevention and wellness programs as being programs or interventions that are primarily delivered in a community setting, that are either applicable or potentially applicable to the Medicare population, and that are focused on one or more of the six prevention focus areas articulated Section 4202 subsection (b) of the Act. Because of the potentially large number of community-based wellness and prevention programs that might be relevant to this evaluation, CMS adopted a multi-phase approach to evaluating the impacts of these programs on Medicare beneficiaries. The first phase of CMS's research efforts consisted of an environmental scan, evidence review, and pilot evaluation of the Chronic Disease Self-Management Program (CDSMP), a nationally disseminated chronic disease management intervention developed and administered by Stanford University with support from the Administration for Community Living. The purpose of the pilot evaluation of the CDSMP was to test methodologies for linking program participants to Medicare administrative records and assessing claims-

based outcomes. The second phase of CMS's research built upon the work conducted in the first phase and consisted of a retrospective analysis of a select group of wellness and prevention programs. The third phase of CMS's research, which is ongoing, consists of a prospective study of program effects that seeks to round out CMS's understanding of how community based wellness and prevention programs affect Medicare beneficiaries.

This report presents the results of the first two phases of CMS's research, describes CMS's plans for phase 3 of our ongoing evaluation, and briefly discusses ongoing work to promote wellness and prevention among Medicare beneficiaries.

Evidence Review of Community-Based Wellness and Prevention Programs

The first key step in CMS's evaluation of the potential impacts of community-based wellness and prevention programs on Medicare beneficiaries was to conduct a review of the literature surrounding the effects of existing intervention programs. The goal of this evidence review was to both gain an understanding of the global landscape of community-based wellness and prevention interventions and to identify which interventions had the strongest evidence base.

The body of evidence-based, community-delivered interventions that were reviewed was diverse in both focus and approach. The interventions focused on a wide range of conditions, from diabetes to arthritis, and adopted a variety of approaches, from self-paced, Internet-based delivery to highly structured group programs. The results of the evidence review also showed varying levels of evidence for these programs. Some programs had extensive support in the form of randomized controlled trials (RCTs), while others had little to no published evidence related to their efficacy.

While the efficacy of the best-supported programs is generally accepted, much less is known about their effectiveness in reducing healthcare utilization and costs. Only a handful of interventions included

in the evidence review had research that specifically addressed program effects on health care utilization and costs. In the few studies where utilization outcomes were addressed, studies rarely had sufficient power to identify statistically significant effects. This lack of information on how community-based wellness and prevention programs affect healthcare utilization and costs may prove to be a significant barrier to more widespread dissemination and implementation of these interventions.

Environmental Scan of Community-Based Wellness and Prevention Programs

In addition to the review of the existing literature surrounding community-based wellness and prevention programs, CMS also conducted an environmental scan of existing programs. The purpose of this exercise was to gain greater insight into how wellness and prevention programs are being implemented across the country, how wellness and prevention interventions are translated from research studies into operating programs, and how best to interface with programs on future evaluation efforts.

CMS's environmental scan revealed that there was significant diversity in both the range of community-based interventions that were being offered and in how community-based organizations were operationalizing interventions and implementing programs. Often, interventions were not offered to the community in isolation from one another, but rather in conjunction with a broader portfolio of services offered by community-based organizations.

Federal funding of community-based wellness and prevention programs has played an important role in financing and promoting community-based prevention efforts. For example, recent expansions in the implementation of the CDSMP and other evidenced-based interventions were made possible under separate grant funding from the Administration for Community Living (ACL) and the Centers for Disease Control and Prevention (CDC). While direct federal financing of programs has been helpful in

generating an evidence base for program effects and translating interventions from research to practice, grant funding alone is likely not a viable solution for sustaining programs in the long term. More consistent funding streams that can capture some of the benefits that these programs generate to the healthcare system as a whole would be helpful in promoting greater and more sustainable dissemination. Community-based programs are particularly interested in establishing partnerships with various payers in the healthcare system to directly finance operations. Creating these relationships, however, has been far from straightforward as many interventions have not been specifically evaluated under a cost-benefit analysis framework, which is important from a payer's point of view.

Retrospective Study of Program Effects

In the course of its environmental scan of community-based programs, CMS identified 12 nationally disseminated intervention programs that have maintained registries of participants with sufficiently detailed personal identifiers to facilitate potential matching to CMS's administrative databases. These programs include:

- The Chronic Disease Self-Management Program (CDSMP), a chronic disease management intervention for patients with multiple chronic conditions developed and administered by Stanford University
- The Diabetes Self-Management Program (DSMP), a version of the CDSMP tailored to diabetes patients developed and administered by Stanford University
- The Arthritis Foundation Arthritis Self-Management Program (ASMP), a chronic disease self-management program similar to the CDSMP developed by Stanford University for arthritis patients and formerly administered by the Arthritis Foundation
- EnhanceWellness (EW), a chronic disease management intervention developed by the University of Washington and administered by Project Enhance (a partnership between Senior Services of

Seattle, the University of Washington, and Group Health, dedicated to disseminating evidence-based health promotion programs for older adults)

- EnhanceFitness (EF), a fitness program for older adults developed by the University of Washington and administered by Project Enhance
- The Arthritis Foundation Exercise Program (AFEP), a physical activity program for adults with arthritis developed and administered by the Arthritis Foundation
- The Arthritis Foundation Aquatics Program (AFAP), an aquatic physical activity program for adults with arthritis developed and administered by the Arthritis Foundation
- The Arthritis Foundation Tai Chi Program (AFTCP), a physical activity and balance program developed by Dr. Paul Lam and administered by the Arthritis Foundation
- Fit & Strong (FAS), a physical activity program for patients with osteoarthritis developed and administered by the University of Illinois at Chicago
- Matter of Balance (MOB), an intervention designed to reduce fear of falling and promote physical activity for older adults developed by Boston University and administered by the Partnership for Healthy Aging (A public-private partnership dedicated to linking clinicians, evidenced-based programs, and community services)
- Healthy IDEAS (Identifying Depression, Empowering Activities for Seniors), an awareness and depression management program for older adults developed by the Baylor College of Medicine and administered by Care for Elders (a public-private partnership dedicated to increasing access to services, improving the quality of care, and enhancing the quality of life for older adults and their families)
- Program to Encourage Active, Rewarding Lives for Seniors (PEARLS), a depression treatment intervention for older adults developed by the University of Washington and administered by the PEARLS Program at the University of Washington

In order to get a preliminary assessment of potential program impacts, CMS decided to conduct a retrospective study of program effects. The basic premise of this evaluation was to identify Medicare beneficiaries who participated in a wellness and prevention program between 2 and 3 years ago, link their identifying information to Medicare administrative data, and compare changes in subsequent health outcomes and levels of health-care utilization and cost with those of a similar, administratively defined comparison group of beneficiaries who had not participated in a wellness and prevention program. The analyses followed an intention-to-treat (ITT) framework, in which outcomes were evaluated based on beneficiary intentions to participate in a program, not the actual level of beneficiary participation. In other words, beneficiaries were classified as being in the treatment group if they signed up for a program, regardless of whether they actually attended a program session. Participant identifiers from the wellness programs were obtained from the program managers and linked (when possible) to Medicare claims data. CMS was ultimately able to match a sufficient number of program participants to administrative data to evaluate the CDSMP, EW, EF, AFEP, AFAP, AFTCP, and MOB programs.

The main outcomes evaluated during the year after program enrollment were total medical costs, costs by Medicare setting (e.g., inpatient, emergency department, outpatient), and health services utilization by Medicare setting. Additionally, medication adherence, physical and occupational therapy use, and incidence of falls and fall-related fractures were also evaluated, as appropriate, considering the goals of each wellness program.

CMS compared changes in pre-participation and post-participation outcomes between participants and matched controls to quantify potential program effects. This difference in pre-post differences in outcomes is known as the differences-in-differences estimator (DiD) and can be interpreted as the marginal association between program participation and the observed outcome.

CMS's analysis found some initial evidence for total cost savings in EF, AFEP, AFTCP, and MOB. These programs were associated with lower unplanned inpatient costs and fewer unplanned hospitalizations. Participation in CDSMP and AFAP, while not associated with savings in overall medical costs, was associated with reductions in unplanned inpatient costs, suggesting that these programs have the potential to generate future cost savings.

Global Conclusions, Future Directions, and Policy Recommendations

Both the published literature examined in CMS's evidence review and CMS's initial evaluations of potential program effects indicate that some community-based wellness and prevention programs may have the potential to improve beneficiary health outcomes and reduce healthcare costs.

CMS's review of the literature found several established wellness and prevention programs with a firm evidence base. These programs typically demonstrated improvements in health behaviors and proximate health outcomes. Results for chronic disease self-management and physical activity programs were especially promising.

CMS's initial evaluation of program impacts examined claims-based measures of utilization and costs for a select group of wellness and prevention programs where there was sufficient participant level information to match to CMS administrative data. These analyses found some promising evidence suggesting that four nationally disseminated programs (EF, AFEP, AFTCP, and MOB) may have driven down total healthcare costs for participating beneficiaries. The CDSMP and several physical activity programs also demonstrated reductions in unplanned hospital utilization and costs, which may suggest a potential for future long-term savings.

Taken together, these results are promising in that they demonstrate that evidence-based community wellness and prevention programs can improve outcomes and in some cases reduce costs

for Medicare beneficiaries. However, there are some gaps in the established evidence that make more widespread implementation of programs challenging.

First, while CMS's retrospective analysis of program effects found some evidence of cost savings for select programs, the overall evidence of program effects on cost and utilization outcomes is still somewhat limited. To date, there have only been a handful of studies that have directly addressed cost and utilization outcomes. More evidence of cost savings would be helpful in promoting more direct financing of these prevention activities in the healthcare system.

Second, most of the effort in promoting community-based wellness and prevention programs (both in the public and private sphere) has been focused on testing specific interventions and building local program capacity. Very little attention, however, has been paid to examining the demand for these kinds of programs in the general beneficiary population. Understanding the potential scale of program effects is critical to designing widespread dissemination efforts.

Finally, it is unclear how to best implement a sustainable payment model to finance the delivery of these services in the long term. Traditional fee for service payment structures are likely ill-suited to financing community based interventions, as many programs occur outside of the formal clinical settings that CMS's administrative systems are set up to oversee and regulate.

Moving forward, the Department of Health and Human Services (HHS), through CMS and other agencies, will continue to help build the evidence base to determine the effectiveness of wellness and prevention programs in reducing healthcare utilization and costs, through both the ongoing research activities highlighted in this report and future research and evaluation work. Specifically, HHS anticipates conducting studies geared towards establishing a firm business case for direct financing of the most effective programs, including formal cost-benefit and cost effectiveness analyses, studies

designed to estimate beneficiary demand for community-based preventive services, and eventually studies and initiatives designed to both develop new wellness and prevention interventions tailored to the Medicare population and to test viable payment models for these services.

In conclusion, HHS recommends maintaining existing support for community-based wellness and prevention activities, consistent with the emphasis on bolstering effective prevention in the President's FY2014 budget, while HHS, CMS, and other public and private partners work to fill these gaps in the evidence through additional studies and pilot programs. Community-based wellness and prevention programs currently depend on limited grant dollars from various Federal funding streams, and thus their reach is limited. Designing and implementing direct payment mechanisms for these programs and incentives for other healthcare stakeholders, including managed care plans and health systems participating in shared savings programs, to partner with and finance programs could substantially increase the number of Americans that can benefit. Research to date indicates that these programs have the potential to improve health outcomes for Medicare beneficiaries and reduce costs. More research, development, and implementation work however is needed before these benefits can be fully leveraged in the healthcare system.

Introduction

The Affordable Care Act (the Act), passed in March 2010, contains several provisions relating to prevention under Medicare, Medicaid, and private health insurance coverage. In Section 4202, subsection (b), entitled "Evaluation and Plan for Community-based Prevention and Wellness Programs for Medicare Beneficiaries", Congress directed the Secretary of Health and Human Services to conduct an evaluation of community-based prevention and wellness programs and to develop a plan for promoting healthy lifestyles and chronic disease self-management for Medicare beneficiaries. The Act specifically required that the Secretary examine programs focused on increasing physical activity,

reducing obesity, improving diet and nutrition, reducing falls, promoting chronic disease management, and better managing mental health issues. The Act required CMS to conduct an evaluation that would include both an evidence review and an independent evaluation of existing evidence-based community prevention and wellness programs, in consultation with the Assistant Secretary for Aging. These evaluation efforts would then form the basis for recommendations to Congress for policy and regulatory reforms to promote healthy lifestyles and improved chronic disease self-management behaviors for Medicare beneficiaries. This report summarizes the Centers for Medicare & Medicaid Services' (CMS) evaluation work to date.

For the purposes of this evaluation work, The Centers for Medicare & Medicaid Services (CMS) defined community-based prevention and wellness programs as being programs or interventions that are primarily delivered in a community setting, that are either applicable or potentially applicable to the Medicare population, and that are focused on one or more of the six prevention focus areas articulated Section 4202 subsection (b) of the Act. Because of the potentially large number of community-based wellness and prevention programs that might be relevant to this evaluation, CMS adopted a multi-phase approach to evaluating the impacts of these programs on Medicare beneficiaries.

Under the first phase, CMS conducted an environmental scan of all of the potential programs to be evaluated under this provision, an extensive and exhaustive review of the literature surrounding community-based wellness and prevention programs, including evidence of their effectiveness and factors surrounding their implementation, and a pilot evaluation of the Chronic Disease Self-Management Program (a nationally disseminated chronic disease management intervention developed and administered by Stanford University with support from the Administration for Community Living) to test methodologies for linking program participants to Medicare administrative records and assessing claims-based outcomes[1]. CMS is using the information generated in this phase to both help define the

requirements for future evaluation work and to prepare the evidence review portion of this report to Congress.

In the second phase of the evaluation, CMS built upon the work in the phase one pilot evaluation to conduct a retrospective evaluation of existing community-based wellness and prevention programs. The basic premise of this evaluation was to identify Medicare beneficiaries who participated in a wellness and prevention program between 2 and 3 years ago, link their identifying information to Medicare administrative data, and compare changes in subsequent health outcomes and levels of health-care utilization and cost with those of a similar, administratively defined comparison group of beneficiaries who had not participated in a wellness and prevention program. This retrospective evaluation effort primarily focused on evaluating the following nationally disseminated programs:

- The Chronic Disease Self-Management Program (CDSMP), a chronic disease management intervention for patients with multiple chronic conditions developed and administered by Stanford University
- The Diabetes Self-Management Program (DSMP), a version of the CDSMP tailored to diabetes patients developed and administered by Stanford University
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Phase 3 of CMS's evaluation, which is ongoing, aims to round out CMS's understanding of how community-based wellness and prevention programs impact Medicare beneficiaries and what cost

saving opportunities exist for the Medicare program. Specifically, this evaluation effort aims to 1) describe the readiness of Medicare beneficiaries to engage with community-based wellness and prevention programs, 2) better adjust for selection biases in the evaluation of individual programs and interventions using beneficiary level survey data, 3) evaluate program impacts on health behaviors, self-reported health outcomes, and claims-based measures of utilization and costs, and 4) better describe program operations and cost in relation to the expected benefits. The results of these analyses will be used to inform both CMS's and HHS's wellness and prevention activities in the future.

The remainder of this report is divided into four sections. Section 1 will present an overview of CMS's initial review of the published evidence surrounding community-based wellness and prevention programs. Section 2 will present an overview of CMS's environmental scan of existing programs including both a landscape of existing programs and key insights into their operations. Section 3 will present an overview of CMS's retrospective study of selected community-based wellness and prevention programs including the study's methodology and key results. Section 4 will discuss the global results of CMS's evaluation efforts, describe ongoing and future research, and present an initial policy recommendation to continue current support of evidence-based programs.

Section 1: Evidence Review of Existing Community-Based Wellness and Prevention Programs

Introduction

One of the key first steps in CMS's evaluation of the potential impacts of community-based wellness and prevention programs on Medicare beneficiaries was to conduct a review of the literature surrounding the impacts of existing intervention programs. The goal of this evidence review was to both

gain an understanding of the global landscape of community-based wellness and prevention interventions and to identify which interventions had the strongest evidence base.

In late 2010, CMS awarded a contract to the Altarum Institute to conduct this evidence review. The work on the evidence review occurred primarily in the first half of 2011 and was performed in conjunction with a broader environmental scan of community-based programs. The full results of this evidence review can be found in Altarum's final evidence review report, titled "Environmental Scan of Community-Based Prevention and Wellness Programs in the United States: Evidence Review Report." [2] The remainder of this section will provide a brief summary of Altarum's methods and key findings from the review.

Evidence Review Methods

The Altarum team implemented a comprehensive online search and review of peer-reviewed research to identify and collect published and grey literature about evidence-based, community-delivered wellness and prevention programs and evaluate that evidence base to determine the strength and quality of the evidence. Sources for searches included traditional electronic resources like Medline, the Cochrane Review Database, and Google Scholar. Additional sources included clinical trial registries, the Agency for Healthcare Research and Quality (AHRQ) Innovations Exchange, and other Web sites identified by key informants and searches conducted for the environmental scan. Altarum did not exclude negative or neutral trials from the search or review, but no reports with only negative findings were uncovered during the review process.

In the course of the review, 639 documents and resources were identified, covering 209 distinct interventions. In order to be further considered in the evidence review, Altarum required that the interventions be either currently or recently delivered in a community setting, either primarily focused on or potentially applicable to the Medicare beneficiary population, and focused on at least one of the

six focus areas named in section 4202(b) of the Affordable Care Act (ACA), namely, increasing physical activity, reducing obesity, improving diet and nutrition, reducing falls, chronic disease management, and mental health. After applying these selection criteria, a total of 75 programs were eligible for further analysis.

For the formal evidence review, publications were only included in a program's evidence base if it was published in a peer-reviewed journal and reported original empirical results on program effects. Some of the 75 programs identified in Altarum's initial canvassing of the literature and subject matter experts did not appear to be supported by any studies meeting these criteria.

The Evidence Review Team, consisting of two Ph.D.-level reviewers, systematically worked through the selected evidence base to evaluate each publication and independently assign an evidence rating, using the U.S. Preventive Services Task Force's strength of evidence scale. [3] This scale grades evidence using the following criteria:

- Level I: Evidence obtained from at least one properly designed randomized controlled trial (RCT).
- Level II-1: Evidence obtained from well-designed controlled trials without randomization.
- Level II-2: Evidence obtained from well-designed cohort or case control analytic studies, preferably from more than one center or research group.
- Level II-3: Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled trials might also be regarded as this type of evidence.
- Level III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

All publications received two separate and independent reviews. After the review process was complete, disagreements between reviewers were settled by discussion and reexamination of the evidence until consensus was achieved on a rating. The evidence review focused on studies that addressed the efficacy and effectiveness of the interventions as defined by the research authors. The majority of studies did not consider cost or address issues of implementation or translation.

Evidence Review Results

The Altarum team completed written assessments of the level and nature of evidence supporting each of the 75 interventions that were the focus of the evidence review. In addition, the team summarized the overall evidence level for each intervention in order to identify the subset of interventions with the strongest evidence base.

The following discussion provides a high-level overview of the results of the evidence review. Within each emphasis area highlighted in section 4202(b) of the Act, interventions have been ordered by the number of publications included in the evidence review. While many interventions have extensive support from RCTs and quasi-experimental research designs, a handful of interventions have little to no evidentiary basis.

Physical Activity Promotion Programs

Many of the interventions (26 of 75) included in the evidence review focused on physical activity. These interventions represent a wide variety of approaches, from in-home one-on-one instruction to more traditional gym-based exercise classes. Table 1 provides a summary of the evidence surrounding the physical activity promotion programs that were reviewed.

Table 1: Summary of Physical Activity Promotion Program Evidence

Intervention Name	Total Studies Reviewed	Level I	Level II-1	Level II-2	Level II-3	Level III
AF Aquatic Program (AFAP)[4,5,6,7]	4	3	0	0	1	0
AF Exercise Program (AFEP)[8,9]	2	2	0	0	0	0
AF Tai Chi Program (AFTCP) [10,11,12,13,14]	5	5	0	0	0	0
Strong for Life[15,16,17]	3	2	0	0	1	0
Fit and Strong! (FAS)[18,19,20,21]	4	2	0	1	1	0
Active Choices[22,23,24,25]	4	2	0	1	1	0
EnhanceFitness (EF)[26,27,28,29]	4	1	0	2	1	0
People Exercising Program[30]	1	1	0	0	0	0
Active for Life After Cancer[31]	1	1	0	0	0	0
Community Healthy Activities Model Program for Seniors (CHAMPS)[32,33,34]	3	1	0	0	2	0
Active Living Every Day (ALED)[35,36]	2	1	0	1	0	0
Sisters in Motion[37]	1	1	0	0	0	0
Reach out to EnhanceWellness in Older Cancer Survivors (RENEW)[38]	1	1	0	0	0	0

Intervention Name	Total Studies Reviewed	Level I	Level II-1	Level II-2	Level II-3	Level III
AF Walk With Ease (WWE)[39]	1	0	1	0	0	0
Better Bones & Balance[40,41]	2	0	1	1	0	0
Health EASE Move Today	0	0	0	0	0	0
Active Start[42]	1	0	0	1	0	0
SilverSneakers Fitness Program[43,44]	2	0	0	2	0	0
Live Long, Live Well Walking Program	0	0	0	0	0	0
Alive! (A Lifestyle Intervention via E-mail)[45]	1	0	0	0	1	0
Get Fit for Active Living	0	0	0	0	0	0
Healthy Moves for Aging Well[46]	1	0	0	0	1	0
ExerStart[47]	1	0	0	1	0	0
Resources and Activities for Life-Long Independence (RALLI)[48]	1	0	0	0	1	0
Wisdom Steps	0	0	0	0	0	0
First Step to Active Health	0	0	0	0	0	0

The AF Aquatic Program, AF Exercise Program, AF Tai Chi Program, Strong for Life, Fit and Strong, and Active Choices all had multiple Level I studies demonstrating their effectiveness. In addition to

these programs, the EnhanceFitness, People Exercising, Active Life after Cancer, Community Healthy Activities Model Program for Seniors (CHAMPS), Active Living Every Day (ALED), Sisters in Motion, and Reach out to EnhanceWellness in Cancer Survivors (RENEW) programs were also supported by at least 1 Level I study. Evaluations of these physical activity interventions primarily focused on measuring improvements in physical activity, physical functioning, quality of life, strength, balance, agility, aerobic fitness, and reductions in health care utilization and costs. A complete description of both these physical activity programs and the specific study outcomes that were assessed can be found in Appendix A of Altarum's evidence review report.[2]

Obesity Reduction Programs

The evidence review only identified two interventions specifically focused on reducing obesity. Table 2 provides a summary of the evidence surrounding two obesity reduction programs that were reviewed.

Table 2: Summary of Obesity Prevention Program Evidence

Intervention Name	Total Studies Reviewed	Level I	Level II-1	Level II-2	Level II-3	Level III
Coordinated Approach to Child Health (CATCH) Healthy Habits	0	0	0	0	0	0
Group Lifestyle Balance (GLB)[49,50,51]	3	0	0	1	2	0

Neither of the obesity specific programs identified in the review was supported by a Level I study. Group Lifestyle Balance (GLB) was supported by 1 Level II-2 and 2 Level II-3 studies, making it the program with the largest evidence base in Altarum's review. The evaluations GBL focused on assessing weight loss, waist circumference and physical activity. While the Coordinated Approach to Child Health (CATCH) program has been widely evaluated, no publications specifically focused on the older adult component of the intervention were found to meet the inclusion criteria for this evidence review. More

detail on the obesity reduction programs and the outcomes that were assessed can be found in Appendix A of Altarum's evidence review report.[2]

Diet and Nutrition Programs

Twelve interventions were identified during the evidence review aimed at improving diet and nutrition. These programs typically focused on providing seniors greater access to healthy foods and promoting better dietary choices. Table 3 provides a summary of the evidence surrounding nutrition programs that were reviewed.

Table 3: Summary of Diet and Nutrition Program Evidence

Intervention Name	Total Studies Reviewed	Level I	Level II-1	Level II-2	Level II-3	Level III
Stanford Nutrition Action Program (SNAP)[52]	1	1	0	0	0	0
Partners in Wellness (PIW)[53]	1	1	0	0	0	0
Healthy Eating Every Day (HEED)[54]	1	1	0	0	0	0
Healthy Body/Healthy Spirit[55]	1	1	0	0	0	0
Group-Organized YMCA Diabetes Prevention Program (YDPP)[56]	1	0	1	0	0	0
Eat Smart Live Strong	0	0	0	0	0	0
Senior Farmers Market Nutrition Program (SFMNP)[57,58,59]	3	0	0	0	2	1
Steps to Healthy Aging: Eating Better and Moving More (EBMM)[60]	1	0	0	0	1	0
Healthy Eating for Life Program (HELP)[61,62]	2	0	0	0	2	0
Elderly Nutrition Program[63,64,65,66]	4	0	0	0	4	0

Intervention Name	Total Studies Reviewed	Level I	Level II-1	Level II-2	Level II-3	Level III
Heart Smart for Women (HSFW)	0	0	0	0	0	0
Healthy Eating for Successful Living in Older Adults	0	0	0	0	0	0

The Stanford Nutrition Action Program (SNAP), Partners in Wellness (PIW), Healthy Eating Every Day (HEED), and Health Body/Healthy Spirit were all supported by at least 1 Level I study. The YMCA's Diabetes Prevention program was supported by 1 Level II-1 study. Typical outcomes in these studies included nutrient intake, adherence to dietary guidelines, physical activity, and weight loss. More information on these diet and nutrition programs and the outcomes that were evaluated can be found in Appendix A of Altarum's evidence review report.[2]

Falls Prevention Programs

Eleven interventions had a primary focus on falls prevention. The interventions discussed in this section include approaches as diverse as educational programs to address the fear of falling, home environmental modifications to reduce fall hazards, and progressive exercise programs designed to improve strength and balance. Table 4 provides a summary of the evidence surrounding the fall prevention programs that were reviewed.

Table 4: Summary of Fall Prevention Program Evidence

Intervention Name	Total Studies Reviewed	Level I	Level II-1	Level II-2	Level II-3	Level III
Otago Exercise Program (OEP)[67,68,69,70,71,72,73]	7	5	2	0	0	0
Osteofit[74,75]	2	2	0	0	0	0
Stay Active and Independent for Life (SAIL)[76,77]	2	1	0	0	1	0
Stepping On: Building Confidence and Reducing Falls[78]	1	1	0	0	0	0

Intervention Name	Total Studies Reviewed	Level I	Level II-1	Level II-2	Level II-3	Level III
Farewell to Falls/Sit and Be Fit	0	0	0	0	0	0
Fall Proof!	0	0	0	0	0	0
Fit and Fall Proof	0	0	0	0	0	0
Healthy Steps for Older Adults	0	0	0	0	0	0
Tai Chi—Moving for Better Balance[79]	1	0	0	0	1	0
No More Falls (NMF)[80]	1	0	0	0	1	0
MoB-Volunteer Lay Leader (MOB) [81,82,83]	3	0	0	0	3	0

The Otago Exercise Program (OEP) and Osteofit were both supported by multiple Level I studies, indicating that these programs had the strongest evidence base among those reviewed by Altarum. The OEP, Osteofit, Stay Active and Independent for Life (SAIL), and Stepping on: Building Confidence and Reducing Falls programs were all supported by at least 1 Level I study. The Matter of Balance-Volunteer Lay Leader program was also supported by 3 observational studies demonstrating that the lay leader model was equally effective as the professional based program that was evaluated in the original trials of the program. Studies evaluating these programs typically focused on assessing impacts on falls, fall risk, balance, agility, mobility, and physical activity. Detailed information on these fall prevention programs and the specific outcomes that were assessed in their evaluations can be found in Appendix A of Altarum's evidence review report.[2]

Chronic Disease Self-Management Programs

The chronic disease self-management focus area has numerous offerings relevant to Medicare beneficiaries. Our evidence review identified 14 interventions with a primary focus on helping individuals to manage chronic diseases. Interventions in this category offer education on chronic disease management generally, as well as for specific conditions such as arthritis and diabetes, and

employ various modes of delivery, including self-paced workbooks, in-person classes, and Internet-based delivery. Table 5 provides a summary of the evidence surrounding the Chronic Disease Self-management programs that were reviewed.

Table 5: Summary of Disease Self-management Program Evidence

Intervention Name	Total Studies Reviewed	Level I	Level II-1	Level II-2	Level II-3	Level III
CDSMP[84,85,86,87]	4	3	0	1	0	0
Arthritis Toolkit[88]	1	1	0	0	0	0
Tomando Control de su Salud (Spanish CDSMP)[89,90]	2	1	0	1	0	0
Healthier Living with Arthritis.[91]	1	1	0	0	0	0
Diabetes Self-Management Program (DSMP) Stanford[92]	1	1	0	0	0	0
EnhanceWellness (formerly Health Enhancement Program)[93,94,95]	3	1	0	0	2	0
Arthritis Self-Management Program (ASMP) [96,97]	2	1	0	0	1	0
Better Choices, Better Health (Internet-based CDSMP)[98,99]	2	1	0	0	1	0
Programa de Manejo Personal de la Diabetes (Spanish DSMP)[100]	1	1	0	0	0	0
Programa de Manejo Personal de la Artritis (Spanish ASMP)[101]	1	1	0	0	0	0
On the Road to Living Well With Diabetes[102]	1	0	0	0	1	0
Healthy Changes[103]	1	0	0	0	1	0
Healthy Bones	0	0	0	0	0	0
Live Well, Be Well (LWBW)	0	0	0	0	0	0

The Chronic Disease Self-Management Program (CDSMP) appeared to have the strongest evidence base in Altarum's review, with multiple Level I studies providing evidence of the program's benefits. The

CDSMP, Arthritis Toolkit, Tomando de su Salud (Spanish Language CDSMP), Healthier Living with Arthritis, Diabetes Self-Management (DSMP), EnhanceWellness, Arthritis Self-management Program (ASMP), Better Choices Better Health (Internet-based CDSMP), Programa de Manejo Personal de la Diabetes (Spanish DSMP), and Programa de Manejo Personal de la Artritis (Spanish ASMP) all were supported by at least one Level I study. Evaluations of these programs typically focused on assessing changes in self-reported health status, physical functioning, physical activity, specific health behaviors (such as diet and condition-specific disease management), and pain. More details on these chronic disease self-management programs and the outcomes that were assessed in their evaluations can be found in Appendix A of Altarum's evidence review report.[2]

Mental Health Programs

Altarum's review identified 10 interventions that addressed mental health. Interventions in this category include programs that focus on screening community-dwelling elders through existing case management programs or by training employees of businesses that frequently encounter older adults in their homes. Table 6 provides a summary of the evidence surrounding the mental health programs that were reviewed.

Table 6: Summary of Mental Health Program Evidence

Intervention Name	Total Studies Reviewed	Level I	Level II-1	Level II-2	Level II-3	Level III
Program to Encourage Active, Rewarding Lives for Seniors (PEARLS)[104,105]	2	2	0	0	0	0
Reducing Disability in Alzheimer's Disease (RDAD)[106,107]	2	1	1	0	0	0
Staff Training in Assisted-Living Residences–Caregivers (STAR-C)[108]	1	1	0	0	0	0

Intervention Name	Total Studies Reviewed	Level I	Level II-1	Level II-2	Level II-3	Level III
Senior Odyssey[109,110]	2	0	2	0	0	0
Memory PLUS (Canada only)	0	0	0	0	0	0
GateKeeper Program[111]	1	0	0	0	1	0
Healthy Identifying Depression, Empowering Activities for Seniors (IDEAS)[112]	1	0	0	0	1	0
ElderVention	0	0	0	0	0	0
OASIS	0	0	0	0	0	0
Elder Community Care (ECC)	0	0	0	0	0	0

The Program to Encourage Active, Rewarding Lives for Seniors (PEARLS) was supported by 2 Level I studies, making it the program with the largest evidence base among the mental health interventions that Altarum reviewed. The PEARLS, Reducing Disability in Alzheimer's Disease (RDAD), and the Staff-Training in Assisted-Living Residences—Caregivers were all supported by at least 1 Level I study. Evaluations of these mental health interventions typically focused on measuring reduction of depression, awareness of depression symptoms, improvements in physical and role functioning, quality of life, and improvements in health behaviors. More detail on these Mental Health program and the outcome that were assessed in their respective evaluations can be found in Appendix A of Altarum's evidence review report.[2]

Discussion

The body of evidence-based, community-delivered interventions reviewed by Altarum was diverse in both focus and approach. The interventions focused on a wide range of conditions, from diabetes to arthritis, and adopted a variety of approaches, from self-paced, Internet-based delivery to highly structured group programs. The results of the evidence review also showed varying levels of evidence for these programs. Some programs had extensive support in the form of randomized controlled trials (RCTs), while others had little to no published evidence related to their efficacy.

As a result of the fairly stringent criteria Altarum used in defining the level of evidence, some programs that are termed "evidence based" by their developers or disseminators may not have been considered evidence-based for the purposes of this review. Program developers often extract elements from various interventions known to be effective from published trials. While some of these reformatted programs go on to collect evidence of their own effectiveness, others are implemented without additional testing. These latter programs are often termed "evidence based" to the extent that they have been developed from other evidence-based elements.

While efficacy of the best-supported programs is generally accepted, much less is known about their effectiveness in reducing healthcare utilization and costs. Only a handful of interventions included in the evidence review had research that specifically addressed program effects on health care utilization and costs. In the few studies where utilization outcomes were addressed, unless the effects were dramatic, studies infrequently had sufficient power to identify statistically significant effects. This lack of information on how community-based wellness and prevention programs impact healthcare utilization and costs may prove to be a significant barrier to more widespread dissemination and implementation of these interventions.

Section 2: Environmental Scan of Existing Community-Based Wellness and Prevention Programs

In addition to the review of the existing literature surrounding community-based wellness and prevention programs, CMS also conducted an environmental scan of existing programs. The purpose of this exercise was to gain greater insight into how wellness and prevention programs are being implemented across the country, how wellness and prevention interventions are translated from research studies into operating programs, and how best to interface with programs on future evaluation efforts.

In late 2010, CMS awarded a contract to the Altarum Institute to conduct this environmental scan. The work on the environmental scan occurred primarily in the first half of 2011 and was performed in conjunction with the evidence review described in Section 1. The full results of this environmental scan can be found in Altarum's final environmental scan report, titled "Environmental Scan of Community-Based Prevention and Wellness Programs in the United States: Environmental Scan and Site Selection Report."[113] The remainder of this section will describe Altarum's approach to the environmental scan and provide an overview of the results.

Analytic Approach

Altarum's approach to the environmental scan moved forward in two main components. The first component consisted of developing a comprehensive catalog of potential wellness and prevention programs for further examination. The second component consisted of an in-depth examination of selected wellness and prevention programs that included site visits, interviews with key stakeholders, and a detailed examination of program operations and data infrastructure.

The development of the catalog of potential programs and interventions to examine went hand-in-hand with the evidence review described in Section 1. Altarum conducted comprehensive online

searches to identify evidence-based wellness and prevention interventions for further review. During this process, Altarum also contacted key Federal informants, grantees and other experts via e-mail and telephone to learn of promising programs that were either not extensively reported on in the literature or were still under development.

Once the wellness and prevention programs were identified, Altarum reached out to intervention sponsors and site representatives to obtain more specific information about the programs and how they were being implemented. The Altarum team then selected sites for in-person visits based on their nomination as an exemplar by one or more key informants, their mix of supported interventions, the program site's maturity and stability, the availability and quality of program data, the site's location and focus population, and the site's availability and willingness to participate in site visits and future evaluation efforts.

Altarum conducted site visits at 34 locations, assessing interventions from mid-March to mid-May 2011. Two-person teams visited sites, often participating in classes or workshops offered as part of interventions, such as Matter of Balance, EnhanceFitness, and Walk with Ease. During the site visits, team members obtained more detailed information about the sites and interventions, including assessing what works, what doesn't, and why.

Key findings

This report describes findings from the 34 site visits conducted by Altarum. The specific sites examined by Altarum were purposely selected to represent a cross section of exemplar programs offering a broad range of evidence-based interventions in diverse contexts and settings. The primary goal of the review was to examine community-based wellness and prevention programs operating at their best in order to gain a better understanding of the potential impact of these activities. Table 7 describes the community-based programs that were reviewed and the interventions that were offered

at the various program sites. A complete description of all of the programs and interventions included in the environmental scan can be found in Altarum's final environmental scan report and accompanying appendices.

Table 7: Community-based Wellness and Prevention Programs and Interventions

Location	Program Site	Interventions Offered
Los Angeles, CA	Partners in Care Foundation–Los Angeles	• Walk with Ease • Healthy Moves for Aging Well
Los Angeles, CA	OASIS	• CATCH Healthy Habits
Broward County, FL	YMCA	• Tomando Control de su Salud (Spanish CDSMP) • Tomando Control de su Diabetes (Spanish DSMP)
Ft. Lauderdale, FL	First Presbyterian Church of Ft. Lauderdale	• EnhanceFitness
Miami, FL	Miami Jewish Health Services	• Healthy Ideas
Tampa, FL	West Central Fla. AAA	• Active Living Every Day • Matter of Balance (English and Spanish Language) • Tai Chi-Moving for Better Balance • Chronic Disease Self-Management Program (CDSMP) • Tomando Control de su Salud (Spanish CDSMP)
Westin, FL	Sheinberg YMCA	• Fit and Strong!
Wilton Manors, FL	Pride Center/Gay and Lesbian Community Center	• EnhanceFitness
Atlanta, GA	Atlanta AAA	• Walk with Ease • Senior Farmers' Market Nutrition Program
Atlanta, GA	Senior Center	• Chronic Disease Self-Management Program (CDSMP)

Location	Program Site	Interventions Offered
Atlanta, GA	Arthritis Foundation	• Arthritis Foundation Aquatics Program • Arthritis Self-Help Program
Cedar Rapids, IA	Aging Resources	• Matter of Balance • Chronic Disease Self-Management Program (CDSMP)
Des Moines, IA	Aging Resources	• Matter of Balance • Healthy Ideas • Program to Encourage Active, Rewarding Lives for Seniors (PEARLS) • Chronic Disease Self-Management Program (CDSMP)
Des Moines, IA	Des Moines Veterans Aging	• Chronic Disease Self-Management Program (CDSMP)
Waterloo, IA	Marshalltown YMCA	• Silver Sneakers • Eat Better, Move More • Rusty Hinges (YMCA Arthritis)
Evanston, IL	Evanston Community Street Services	• Fit and Strong!
Boston, MA	MA General	• EnhanceWellness
Boston, MA	Action For Boston Community Development	• Healthy Eating for Successful Living
Boston, MA	Hebrew Senior Life	• Chronic Disease Self-Management Program (CDSMP) • Diabetes Self- Management Program
Framingham, MA	Advocates	• Healthy Ideas • Elder Community Care
Augusta, ME	Spectrum Generations AAA	• Matter of Balance • Chronic Disease Self-Management Program (CDSMP)
Belfast, ME	Waldo County YMCA	• Matter of Balance • Arthritis Foundation Aquatics Program
Gilford, ME	Friends of Community Fitness	• EnhanceFitness • Matter of Balance

Location	Program Site	Interventions Offered
Portland, ME	Southern Maine AAA	• Matter of Balance • Chronic Disease Self-Management Program (CDSMP)
Ann Arbor, MI	National Kidney Foundation	• Chronic Disease Self-Management Program (CDSMP) • Diabetes Self-Management Program
Detroit, MI	Detroit AAA	• EnhanceFitness • Chronic Disease Self-Management Program (CDSMP)
Flint, MI	National Kidney Foundation	• Chronic Disease Self-Management Program (CDSMP)
Lansing, MI	Oak Valley YMCA	• EnhanceFitness
MN	Central MN AAA	• Healthy Eating for Successful Living
Minneapolis, MN	Wilder Foundation	• Health Moves for Aging Well • Healthy Ideas
Minneapolis, MN	Native American Community Clinic	• Chronic Disease Self-Management Program (CDSMP)
Minneapolis, MN	Dakotas Regional Office	• Arthritis Foundation Aquatics Program
St. Louis, MO	OASIS	• Active Living Every Day • CATCH Healthy Habits • Chronic Disease Self-Management Program (CDSMP) • Diabetes Self-Management Program
Dayton, OH	YMCA	• YMCA Diabetes Prevention Program
Providence, RI	YMCA	• YMCA Diabetes Prevention Program
Houston, TX	Sheltering Arm	• Healthy Ideas
Seattle, WA	Central Area Senior Center	• EnhanceFitness • Chronic Disease Self-Management Program (CDSMP)
Seattle, WA	Seattle Senior Services	• EnhanceWellness • Senior Farmers' Market Nutrition Program
Seattle, WA	Chinese Information and Service Center	• Matter of Balance

The community-based programs that Altarum examined "lived" in diverse community contexts, from inner city neighborhoods to suburban communities and remote rural areas. They were delivered in urban teaching hospitals like University of Chicago, University of Washington, and Massachusetts General Hospital; Area Agencies on Aging networks; local YMCAs; small community organizations; and even outdoor parks and walking paths. Some interventions were supported by a rich infrastructure of other programs and services. Others pieced together programs as they could, with limited funding and resources. The availability of local resources can make the difference between seniors attending one of two or three independent wellness and prevention programs in the community, or accessing a full range of programs as part of a framework of supports for seniors, from housing, meals, and transportation, to exercise and fitness classes, and chronic disease self-management.

Most of the evidence-based interventions identified during the environmental scan, key-informant interviews, and evidence reviews were developed as part of funded research investigations. Interventions that have been successfully translated to the community setting are usually those that were identified by groups with entrepreneurial intentions within or outside the research setting that adapt, market, and disseminate the program.

The path from research to translation to the field can take many directions. However, the interventions that were identified as broadly disseminated and scaled through the environmental scan share some commonalities:

- Community-based, evidence-based interventions may originate in the research setting or be developed with the intention of dissemination throughout the community, but an individual or organizational champion is essential to identify its potential as a target for broader implementation at the community level.

- In the current environment emphasizing evidence-based programs, some potentially beneficial programs that initially focus only on service delivery, and do not incorporate data collection as part of a rigorous research design, will face a difficult path toward dissemination.
- Interventions that do not require expensive equipment or resources, or can be delivered by lay leaders rather than professionals, tend to be popular and feasible choices across all settings.
- Successful models and dissemination strategies are found in the public, nonprofit, and private sectors. Networks of community partners are important channels for dissemination and key to effectively spread and scale interventions.
- Data collection and monitoring are feasible when required as a part of obtaining permission to deliver an evidence-based intervention from the respective program's administrator. Data collection and monitoring, on the other hand, may be quite site-specific if providers are not specifically required to collect and report data.

Importantly, the conditions for translating and scaling evidence-based interventions to the community can be supported and enhanced when funding is targeted to translation efforts, and combined with community networks. While some networks, such as the Aging Services Networks, are already established and can be leveraged to disseminate and scale interventions, networks can also be established with previously unaffiliated partners. Data collection and reporting can be supported with modest investment in central infrastructure to process and maintain participant information, provided by the sponsoring organization directly, or provided through subcontracting arrangements.

Discussion

In summary, Altarum observed that there was significant diversity in both the range of community-based interventions that were being offered and in how community-based organizations were operationalizing interventions and implementing programs. Often, interventions were not offered to the community in isolation from one another, but rather in conjunction with a broader portfolio of services offered by community-based organizations. Future evaluation work should take both this vast heterogeneity of program offerings and the interconnectedness of interventions in programs into account in determining impacts on Medicare beneficiaries.

Federal funding of community-based wellness and prevention programs has played an important role in financing and promoting community-based prevention efforts. For example, recent expansions in the implementation of the CDSMP and other evidenced-based interventions were made possible under separate grant funding from the ACL and CDC. While direct federal financing of programs has been helpful in generating an evidence base for program effects and translating interventions from research to practice, grant funding alone is likely not a viable solution for sustaining programs in the long term. Indeed, during site visits to programs implementing CDSMP, many program administrators expressed concerns about the sustainability of operations past the end of their current grant funding from ACL under the American Recovery and Reinvestment Act. The relatively short funding horizon of programs also has implications for future evaluation work as it could limit the availability of future partners.

More consistent funding streams that can capture some of the benefits that these programs generate to the healthcare system as a whole would be helpful in promoting greater and more sustainable dissemination. Of particular interest to community-based programs is establishing partnerships with various payers in the healthcare system to directly finance operations. Creating these relationships however has been far from straightforward as many interventions have not been

specifically evaluated under a cost-benefit analysis framework from a payer's point of view and many community-based organizations may lack the institutional capability, infrastructure, and community stature to successfully form these partnerships.

Section 3: Retrospective Study of Select Community-Based Wellness and Prevention Interventions

In the course of its environmental scan of community-based programs, CMS identified 12 nationally disseminated intervention programs that have maintained registries of participants with sufficiently detailed personal identifiers to facilitate potential matching to CMS's administrative databases. These programs include:

- The Chronic Disease Self-Management Program (CDSMP), a chronic disease management intervention for patients with multiple chronic conditions developed and administered by Stanford University
- The Diabetes Self-Management Program (DSMP), a version of the CDSMP tailored to diabetes patients developed and administered by Stanford University
- The Arthritis Foundation Arthritis Self-Management Program (ASMP), a chronic disease self-management program similar to the CDSMP developed by Stanford University for arthritis patients and formerly administered by the Arthritis Foundation
- EnhanceWellness (EW), a chronic disease management intervention developed by the University of Washington and administered by Project Enhance (a partnership between Senior Services of Seattle, the University of Washington, and Group Health dedicated to disseminating evidence-based health promotion programs for older adults)

- EnhanceFitness (EF), a fitness program for older adults developed by the University of Washington and administered by Project Enhance
- The Arthritis Foundation Exercise Program (AFEP), a physical activity program for adults with arthritis developed and administered by the Arthritis Foundation
- The Arthritis Foundation Aquatics Program (AFAP), an aquatic physical activity program for adults with arthritis developed and administered by the Arthritis Foundation
- The Arthritis Foundation Tai Chi Program (AFTCP), a physical activity and balance program developed by Dr. Paul Lam and administered by the Arthritis Foundation
- Fit & Strong (FAS), a physical activity program for patients with osteoarthritis developed and administered by the University of Illinois at Chicago
- Matter of Balance (MOB), an intervention designed to reduce fear of falling and promote physical activity for older adults developed by Boston University and administered by the Partnership for Healthy Aging (a public-private partnership dedicated to linking clinicians, evidenced-based programs, and community services)
- Healthy IDEAS (Identifying Depression, Empowering Activities for Seniors), an awareness and depression management program for older adults developed by the Baylor College of Medicine and administered by Care for Elders (a public-private partnership dedicated to increasing access to services, improving the quality of care, and enhancing the quality of life for older adults and their families)
- Program to Encourage Active, Rewarding Lives for Seniors (PEARLS), a depression treatment intervention for older adults developed by the University of Washington and administered by the PEARLS Program at the University of Washington

In order to get a preliminary assessment of potential program impacts in time for this Report to Congress, CMS decided to conduct a retrospective study of program effects by linking participant

identities to CMS administrative data and examining changes in healthcare utilization and cost before and after program participation. In early 2012, CMS contracted with a new contractor, Acumen LLC, to complete these analyses. The remainder of this section will provide a brief overview of the programs that were examined in this study, a description of Acumen's analytic approach, a summary of the results, and a discussion of the global implications of the findings and directions for future research. A more detailed treatment of this retrospective study can be found in Acumen's final evaluation report, titled "Retrospective Study of Community-Based Wellness and Prevention Programs Final Report."[114]

Overview of Wellness and Prevention Programs

The ten programs included in this report are grouped into three intervention areas: chronic disease self-management, falls prevention, and physical activity. Analyses of the two mental health interventions (Healthy IDEAS and PEARLS) that were identified have not been completed due to unforeseen methodological challenges and will not be discussed in this report. Most of the programs that were examined were national in scope and offered well-defined, standardized classes taught by trained leaders at community centers, YMCAs, and places of worship across the United States. Detailed information about each of the programs that were examined is summarized in Table 8.

Table 8: Overview of Community-based Wellness and Prevention Programs Included in the Evaluation

Program	Description	Duration and Intensity	Providers	Content	Potential Impact
Chronic Disease Self-Management Programs					
CDSMP	Group class for individuals with one or more chronic conditions, and their caregivers or significant others	6 weeks 2.5 hrs/week	Two trained leaders, one or both of whom are non-health professionals or peers with chronic diseases	Techniques to manage: • Frustration and pain • Chronic disease risk and symptoms Knowledge to improve: • Diet and exercise • Medication use • Communication with healthcare providers	Improvement in: • Self-efficacy • Medication adherence • Chronic disease risk and symptom management Reduction in: • Progression of chronic disease
DSMP	Group class for individuals with diabetes, and their caregivers or significant others.	6 weeks 2.5 hrs/week	Two trained leaders, including one with diabetes	Similar to CDSMP but specific to diabetes	Similar to CDSMP but specific to diabetes
ASMP	Group class for individuals with rheumatic diseases including osteoarthritis, rheumatoid arthritis, fibromyalgia, and lupus.	6 weeks 2 hrs/week	Two trained leaders, including one with arthritis	Similar to CDSMP but specific to arthritis	Similar to CDSMP but specific to arthritis including: • Improvement in mobility, strength, and balance • Reduction in use of pain medications
EW	Individualized class for older adults with one or more chronic conditions.	6 months at varied frequency	Two healthcare professionals (i.e., a nurse and a social worker)	Participants identify personal strengths and risks, develop a health action plan, and work with providers to meet health goals in the areas of chronic disease management, exercise, mental health, social isolation, and nutrition.	Dependent on chosen health goal including improvements in: • Self-efficacy • Physical activity • Ease with activities of daily living (ADLs)
Physical Activity Programs					

Program	Description	Duration and Intensity	Providers	Content	Potential Impact
EF	Group exercise class for older adults.	Ongoing classes 2-3 times/week	Fitness instructor trained in EF protocols	Physical activity training for: • Stretching • Cardiovascular endurance • Strength training • Balance and flexibility	Improvements in: • Self-efficacy • Strength, balance, and mobility Reduction in: • Pain • Falls, and related fractures • Progression of chronic disease
AFEP	Group exercise class for individuals with arthritis and related conditions	6-8 weeks 3 times/week	AF-trained instructor	Health education Exercises: • Endurance-building routines • Relaxation • Balance • Range of motion (ROM) • Strength building	Improvements in: • Functional ability, and strength • Self-efficacy Reduction in: • Depression • Pain, and stiffness
AFAP	Group water-based exercise class targeted at individuals with arthritis and related conditions.	6-8 weeks 3 times/week	AF-trained instructor	Similar to AFEP but the exercises are performed in heated pools	Improvements in: • Functional ability, range of motion • Knee and hip flexibility • Strength in leg muscle • Aerobic fitness Reduction in: • Pain
AFTCP	Group Tai Chi class targeted at individuals with arthritis and related conditions	6-8 weeks 3 times/week	AF-trained instructor	Sun-style Tai Chi and other gentle exercises.	Improvements in: • Movement • Balance, strength and flexibility Reduction in: • Pain • Falls

Program	Description	Duration and Intensity	Providers	Content	Potential Impact
FAS	Group exercise class targeted at sedentary and de-conditioned adults with lower extremity mobility challenges, with or without arthritis.	8 weeks 3 times/week (90-minute classes)	Certified exercise instructor	Health education Goal-setting Problem solving Exercises: • Stretching and balance • Low-impact aerobics • Strength training	Improvements in: • Physical activity • Lower-extremity strength, mobility Reduction in: • Lower-extremity pain and stiffness • Falls • Depression and anxiety
Falls Prevention					
MOB	Group class to reduce the fear of falling and to prevent falls.	8 two-hour sessions over several weeks	Trained lay volunteers	Coping strategies to: • Reduce fear of falling • Set realistic goals for increasing activity • Change the environment to reduce falls risk factors.	Improvements in: • Strength, mobility, and balance • Social activity Reductions in: • Fear of falling • Incidence of falls and fall-related fractures

The four chronic disease self-management programs that Acumen examined in this analysis were the CDSMP, the DSMP, the ASMP, and EW. The first three programs were developed by the Stanford Patient Education Research Center, and based on the same model: two trained peer-leaders, at least one of whom had a chronic condition, led weekly group meetings to teach participants how to manage their conditions, set goals, and review their progress according to a detailed curriculum. EnhanceWellness, on the other hand, was a less circumscribed program developed by University of Washington that offered individuals the opportunity to set goals and review their progress one-on-one with health professionals over several months. These four programs were focused on improving participants' self-efficacy through exposure to others' successes, verbal encouragement, and/or planned and informed action to achieve health goals.

The five physical activity wellness programs that Acumen examined in this analysis were EF, FAS, the AFEP, the AFAP, and the AFTCP. EF was targeted at all older adults. FAS was targeted at older adults with osteoarthritis. The three Arthritis Foundation programs were targeted at all adults with arthritis and related conditions. These programs taught participants aerobic exercises and movements that promote strength, flexibility, and balance. They were all based on the theory that a supportive exercise class environment would increase participants' ability to perform these activities on their own, resulting in improved physical function and mental health, and slower progression of any chronic conditions. EnhanceFitness was developed by University of Washington, while Fit&Strong! was developed by the University of Illinois-Chicago.

The MOB program, developed by Boston University, is the most widely implemented falls intervention program in the United States. The intervention was organized into eight group sessions led by a trained volunteer, who emphasized strategies to help individuals deal with the fear of falling such as engaging in appropriate exercise and modifying their environment to reduce falls risk factors. This program was based on the theory that minimizing risk factors and improving balance and strength would improve participants' confidence to decrease their vulnerability to severe falls.

Analytic Approach

Acumen used a retrospective cohort study design to investigate how Medicare beneficiary participation in each of the wellness programs that were examined was associated with health outcomes and resource utilization. Acumen obtained Medicare fee-for-service (FFS) claims data from 1999 through 2012.

The analyses followed an intention-to-treat (ITT) framework, in which outcomes were evaluated based on beneficiary intentions to participate in a program, not the actual level of beneficiary participation. In other words, beneficiaries were classified as being in the treatment group if they signed

up for a program, regardless of whether they actually attended a program session. The intention-to-treat framework is a conservative approach to estimating program effects that seeks to limit the bias introduced from healthier participants being more likely to complete the interventions being evaluated.

Participant identifiers from the wellness programs were obtained from the program managers and linked (when possible) to Medicare claims data. Data starting one year prior to enrollment and continuing through one year post-participation was collected for each participant. Using these data, Acumen calculated participant sample sizes needed to detect a 20% or greater change in the main outcome measure and total medical costs for each program at 80% power with 95% confidence. For programs where there was a reasonable expectation of detecting program effects, Acumen pursued further analysis using a differences-in-differences (DiD) approach to estimate cost savings and reductions in utilization. The DiD approach compares changes in pre- and post-participation outcomes with those of a similar, administratively defined, comparison group. The difference in the pre-post differences in outcomes between these two groups can be interpreted as the program's effect on outcomes. Comparison groups for each wellness program were selected for analysis from the universe of beneficiaries enrolled in the Medicare FFS program. Program participants were matched to control beneficiaries on important combinations of characteristics including preceding medical cost trends, comorbid medical conditions, and demographic variables in a one-year pre-enrollment period for each program.

The outcomes evaluated during the year after program enrollment were total medical costs, costs by Medicare setting (e.g., inpatient, emergency department, outpatient), health services utilization by Medicare setting, medication adherence, physical and occupational therapy use, and incidence of falls or fall-related fractures. Outcomes were evaluated, as appropriate, considering the goals of each

wellness program. A break-down of the various outcomes that were assessed by intervention can be found in Table 9.

Table 9: Evaluation Outcomes by Program

Program	Healthcare Costs	Health Service Utilization	Falls or Fall-Related Fractures	Physical and Occupational Therapy Use	Medication Adherence
CDSMP	√	√			√
DSMP	√	√			√
AF ASMP	√	√			
EW	√	√			
EF	√	√	√	√	
AFEP	√	√	√	√	
AFAP	√	√	√	√	
AFTCP	√	√	√	√	
FAS	√	√	√	√	
MOB	√	√	√	√	

Acumen used a DiD estimator to compare changes in outcomes between the wellness program participants and the matched control populations during the 12-month period following initial program enrollment, relative to the baseline period of 12 months preceding participation. Because of an observed lower rate of outcome period survival in controls as compared to participants, Acumen also performed sensitivity analyses by analyzing only beneficiaries surviving through the outcome period to better remove the effect of increased health service use for end-of-life care.

Results

The CDSMP, EW, EF, AFEP, AFAP, AFTCP, and MOB all met the sample size requirements for further testing with the differences-in-differences method. The DSMP, the ASMP, and FAS were excluded because available sample sizes were too small to reasonably detect program effects. A breakdown of the inclusion criteria for each of the programs that were studied, how these criteria impacted sample sizes, and the minimum required sample sizes for further analysis can be found in Table 10.

Table 10: Sample Sizes, Exclusions, and Required Sample Sizes to Detect Program Effects

	Chronic Disease Self-Management Programs [a]				Physical Activity Programs [a]					Falls Prevention Programs [a]
Selection Criteria	**CDSMP**	**DSMP**	**EW**	**AF ASMP**	**EF**	**AFEP**	**AFAP**	**AFTCP**	**FAS**	**MOB**
In Program Data[b]	86,691	11,554	5,610	2,521	30,065	14,157	23,618	7,659	787	17,616
Linked to Medicare Data	28,449	3,545	2,487	983	10,719	8,786	11,189	3,962	428	9,622
Enrolled in Wellness Workshops that started before January 1, 2013	25,046	2,925	2,417	977	10,649	8,100	10,812	3,431	379	9,537
Enrolled in Medicare FFS throughout the Study Period	13,536	1,483	1,249	477	5,286	4,737	5,708	1,773	249	6,188
With No End-Stage Renal Disease (ESRD)	13,432	1,468	1,245	477	5,268	4,726	5,705	1,770	248	6,174
Not Receiving Hospice Care	13,411	1,465	1,245	476	5,264	4,706	5,701	1,768	247	6,164
Not Receiving Long-Term Institutional (LTI) Care[c]	13,338	1,454	Data Not Available[c]	Data Not Available[c]	Data Not Available[c]	Data Not Available[c]	Data Not Available[c]	Data Not Available[c]	247	6,139
Claims-identified Diabetes (Only for DSMP)	N/A	989	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	Chronic Disease Self-Management Programs [a]				Physical Activity Programs [a]					Falls Prevention Programs [a]
Selection Criteria	**CDSMP**	**DSMP**	**EW**	**AF ASMP**	**EF**	**AFEP**	**AFAP**	**AFTCP**	**FAS**	**MOB**
Claims-identified Arthritis and Related Conditions (Only for AF ASMP)	N/A	N/A	N/A	400	N/A	3,615	4,749	1,324	187	N/A
Included in Final Intervention Group	13,338	989	1245	400	5,264	3,615	4,749	1,324	187	6,139
Required Sample Size to Detect 20% reduction in total costs at 80% power	973	997	815	974	1,190	818	737	791	922	1,011

Chronic Disease Self-Management Programs

Participants in CDSMP and EW did not have significant differences from controls in their total medical costs during the outcome period. However, there were some differences by care setting. These results are illustrated in Table 11 and 12. CDSMP participation was associated with a $245 reduction in average inpatient (IP) unplanned costs (95% CI: $437 to $52). This was slightly offset by a $27 increase in emergency outpatient (ER OP) costs among CDSMP participants. EW participants and matched controls did not have statistically significant differences in medical cost changes in any Medicare setting.

Table 11: Chronic Disease Self-management Program Cost Analyses

Setting [a]	Pre-Enrollment Period [b] Costs Participants	Pre-Enrollment Period [b] Costs Controls	Outcome Period [c] Costs Participants	Outcome Period [c] Costs Controls	Differences-in-Differences Estimator [d]	Standard Error	95% Confidence Interval	
Total	$9,976	$10,141	$12,012	$12,298	-$122	$193	-$500	$256
IP Planned	$828	$913	$1,074	$1,093	$66	$67	-$65	$197
IP Unplanned	$1,873	$1,997	$2,766	$3,136	-$245*	$98	-$437	-$52
ER OP	$309	$288	$353	$304	$27*	$9	$9	$46
Non ER OP	$1,828	$1,530	$1,881	$1,574	$8	$42	-$74	$90
PB	$3,568	$3,782	$3,791	$3,946	$60	$41	-$21	$140
HH	$596	$723	$642	$752	$17	$19	-$21	$55
SNF	$501	$480	$1,030	$1,083	-$74	$52	-$176	$29
DME	$473	$427	$475	$411	$18	$13	-$8	$44

a. IP = Inpatient, ER OP = Outpatient Emergency Room, Non ER OP = Outpatient, Non-Emergency Room setting, PB = services furnished by non-institutional providers in all settings, including office visits, some surgical procedures, diagnostic and therapeutic services, etc., HH= Home Health, SNF = Skilled Nursing Facility, DME = Durable Medical Equipment.

b. The pre-enrollment period is the 12 months before each individual's program start date. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

c. The outcome period is the 12 months after each individual's program start date. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups'

Table 12: EnhanceWellness Cost Analyses

Setting [a]	Pre-Enrollment Period [b] Costs Participants	Pre-Enrollment Period [b] Costs Controls	Outcome Period [c] Costs Participants	Outcome Period [c] Costs Controls	Differences–in-Differences Estimator [d]	Standard Error	95% Confidence Interval	
Total	$11,085	$11,134	$13,160	$13,120	$89	$643	-$1,171	$1,349
IP Planned	$1,241	$1,234	$1,443	$1,347	$89	$266	-$433	$611
IP Unplanned	$2,402	$2,543	$3,496	$3,673	-$36	$338	-$699	$627
ER OP	$280	$211	$302	$220	$13	$23	-$32	$57
Non ER OP	$1,800	$1,399	$1,893	$1,389	$103	$116	-$126	$331
PB	$3,946	$4,113	$4,162	$4,310	$19	$117	-$211	$248
HH	$476	$563	$542	$644	-$13	$59	-$130	$103
SNF	$423	$599	$876	$1,043	$10	$162	-$308	$328
DME	$519	$473	$446	$494	-$94	$57	-$206	$17

***Significant at the p=.05 level**

a. IP = Inpatient, ER OP = Outpatient Emergency Room, Non ER OP = Outpatient, Non-Emergency Room setting, PB = services furnished by non-institutional providers in all settings, including office visits, some surgical procedures, diagnostic and therapeutic services, etc., HH= Home Health, SNF = Skilled Nursing Facility, DME = Durable Medical Equipment.

b. The pre-enrollment period is the 12 months before each individual's program start date. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

c. The outcome period is the 12 months after each individual's program start date. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in total and category costs from the pre-enrollment period to the outcome period. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

Participation in CDSMP and EW was not associated with reductions in healthcare utilization in any of the Medicare settings; instead, CDSMP participation was associated with an increase in ER OP visits and physician office visits, and EW participation was associated with an increase in physician office visits. The health services utilization results for CDSMP and EW are shown in Table 13 and 14. CDSMP participation was associated with 0.03 additional ER OP visits per participant, or one additional ER OP visit per 33 program participants on average in the outcome period. CDSMP and EW participants also had an average of 0.41 and 0.36 additional physician office visits respectively in the outcome period compared with controls.

Table 13: Chronic Disease Self-management Program Utilization Analyses

	Pre-enrollment Period [b] Visits		**Outcome Period [c] Visits**		**Differences-in-Differences Estimator[d]**	**Standard Error**	95% Confidence Interval	
Setting [a]	Participants	Controls	Participants	Controls				
IP Planned	0.05	0.05	0.06	0.06	0.00	0.00	0.00	0.01
IP Unplanned	0.22	0.23	0.30	0.32	-0.01	0.01	-0.03	0.00
ER OP	0.52	0.50	0.57	0.51	0.03*	0.01	0.01	0.06
Physician Office	9.88	9.69	9.94	9.34	0.41*	0.05	0.31	0.51

***Significant at the p=.05 level**

a. IP = Inpatient, ER OP = Outpatient Emergency Room, Non ER OP = Outpatient, Non-Emergency Room setting, PB = Non-institutional Part , HH= Home Health, SNF = Skilled Nursing Facility, DME = Durable Medical Equipment.

b. The pre-enrollment period is the 12 months before each individual's program start date.

c. The outcome period is the 12 months after each individual's program start date.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in the average number of visits from the pre-enrollment period to the outcome period.

Table 14: EnhanceWellness Utilization Analyses

	Pre-enrollment Period [b] Visits		**Outcome Period [c] Visits**		**Differences-in-Differences Estimator [d]**	**Standard Error**	95% Confidence Interval
Setting [a]	Participants	Controls	Participants	Controls			

Setting [a]	Pre-enrollment Period [b] Visits		Outcome Period [c] Visits		Differences-in-Differences Estimator [d]	Standard Error	95% Confidence Interval	
	Participants	Controls	Participants	Controls				
IP Planned	0.06	0.07	0.08	0.07	0.01	0.01	-0.01	0.04
IP Unplanned	0.25	0.26	0.33	0.35	-0.01	0.03	-0.06	0.04
ER OP	0.54	0.41	0.57	0.41	0.04	0.03	-0.03	0.10
Physician Office	9.82	9.14	10.03	9.00	0.36*	0.16	0.04	0.68

***Significant at the p=.05 level**

a. IP = Inpatient, ER OP = Outpatient Emergency Room, Non ER OP = Outpatient, Non-Emergency Room setting, PB = Non-institutional Part , HH= Home Health, SNF = Skilled Nursing Facility, DME = Durable Medical Equipment.

b. The pre-enrollment period is the 12 months before each individual's program start date.

c. The outcome period is the 12 months after each individual's program start date.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in the average number of visits from the pre-enrollment period to the outcome period.

In addition to examining healthcare cost and utilization outcomes, Acumen also examined the impact of program participation on medication adherence outcomes for subpopulations of CDSMP participants and controls that were enrolled in Medicare Part D throughout the study period and actively taking chronic disease maintenance medications at the beginning of that period. Unfortunately, small sample sizes prevented Acumen from performing a similar analysis on EnhanceWellness participants. Individual control groups were created to measure adherence to each of the six medication regimens of interest.

As shown in Table 15, Acumen did not find statistically significant associations between participation in CDSMP and adherence to most of the assessed medication regimens. However, CDSMP participation was associated with an 8% increase in average adherence (proportion of days covered) to chronic obstructive pulmonary disease (COPD) combination regimens of long-acting anticholinergics (LAAC) and long-acting beta-agonists (LABA) over controls. Adherence to all assessed regimens decreased from the pre-enrollment period to the outcome period among both participants and controls in each disease cohort, and the decrease did not differ significantly between participants and controls in most cases.

Table 15: Chronic Disease Self-management Medication Adherence Analyses

Condition and Medication Regimens [a b]	Medication Adherence Measure [c]	Pre-enrollment Period [d]		Outcome Period [e]		Differences-in-Differences Estimator[f]	Standard Error	95% Confidence Interval	
		Participants	Controls	Participants	Controls				
CHF ACE/ARB/beta-blockers	Avg. PDC	89%	90%	85%	86%	0%	1%	-1%	1%
N=716	% with PDC≥80%	83%	83%	77%	77%	-1%	2%	-4%	2%
COPD LABA	Avg. PDC	63%	63%	55%	55%	-1%	2%	-4%	3%
N=186	% with PDC≥80%	40%	39%	33%	36%	-4%	3%	-10%	2%
COPD LAAC	Avg. PDC	67%	67%	58%	59%	-1%	2%	-5%	4%
N=126	% with PDC≥80%	41%	47%	39%	43%	1%	4%	-7%	9%
COPD LABA + LAAC	Avg. PDC	57%	58%	53%	46%	8%*	4%	1%	15%
N=45	% with PDC≥80%	33%	36%	31%	28%	5%	5%	-5%	16%
Diabetes Oral Medications	Avg. PDC	90%	88%	85%	84%	0%	1%	-2%	1%
N=987	% with PDC≥80%	81%	80%	77%	75%	1%	1%	-2%	3%
Hypertension	Avg. PDC	88%	87%	83%	81%	0%	0%	-1%	1%
N=2,878	% with PDC≥80%	80%	78%	74%	72%	0%	1%	-2%	1%

***Significant at the p=.05 level**

a. ACE = angiotensin-converting enzyme inhibitors, ARB =angiotensin receptor blockers, LAAC= long-acting anticholinergic, LABA = long-acting beta-agonists.

b. Participants were defined as taking a medication regimen if they were continuously enrolled in Part D during the study period, were in possession of a medication regimen at the beginning of the pre-enrollment period, and were identified as having the associated medical condition category (CC) in inpatient, outpatient, or carrier claims.

c. PDC = Proportion of Days covered by a medication. PDC was calculated by examining Part D claims for each medication in question to determine the proportion of days during the 12 month period when an individual possessed any of the specified medications. For the LABA-LAAC drugs, individuals must have had supply of both a LABA and a LAAC to be counted as having full possession of their COPD regimen on each day.

d. The pre-enrollment period is the 12 month period prior to an individual enrolling in the wellness program.

e. The outcome period is the 12 months after each individual's program start date.

f. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in the percentage who were adherent to a medication regimen from the pre-enrollment period to the outcome period. A positive value is associated with greater medication adherence among program participants as opposed to controls.

One key observation from the analysis of the chronic disease self-management programs was that participants tended to have lower mortality rates in the outcome period than their matched controls (e.g., 1.5% among CDSMP participants vs. 3.4% among controls). While both CDSMP and EW may have an effect on mortality, it is also possible that the mortality differentials between cases and controls may

have been indicative of selection effects on program participation. To investigate whether the results of the analyses were robust to the differences in mortality, Acumen performed the cost and utilization comparisons on a subset of participants and controls that survived through the entire outcome period.

Similar to the base case results, the analysis on survivors did not find a difference in total costs for surviving program participants compared with controls; however, the results for some of the other outcomes differed. The previous result of unplanned hospitalization cost savings for CDSMP participants was not found in this analysis on survivors. The increase in non-institutional Part B costs that was previously insignificant among CDSMP participants became statistically significant in this analysis. Increased emergency outpatient costs and visits and increased physician office visits associated with CDSMP participation remained a stable finding for survivors. The increase in physician office visits among EW participants, however, did not remain statistically significant. Results of analyses on surviving beneficiaries for other cost and utilization outcomes were similar to those from the base case analyses for CDSMP and EW, and are detailed in Acumen's final evaluation report.[114]

Physical Activity Programs

Participation in three of the four physical activity programs (EF, AFEP, and AFTCP) was associated with total medical cost savings during the outcome period (Tables 16-19). EF program participants incurred an estimated total cost savings of $945 (95% CI: $1,480, $411). Similarly, AFEP and AFTCP participants incurred an estimated total cost savings of $761 (95% CI: $1,452, $70), and $1,111 (95% CI: -$2,074, -$148), respectively. AFAP participation was not associated with statistically significant total medical cost savings.

Acumen also examined program effects on costs by setting and found that all physical activity programs were associated with cost savings in the IP unplanned setting, and EF, AFEP and AFAP were also associated with cost savings in the skilled nursing facility (SNF) setting (Table 16-19). EF

participation was associated with cost savings of $545 (95% CI: $817, $272) in the IP unplanned setting and $139 (95% CI: $276, $3) in the SNF setting. AFEP participation was associated with cost savings of $670 (95% CI: $953, $387) in the IP unplanned setting, and $227 (95% CI: $438, $15) in the SNF setting. AFAP participation was associated with cost savings of $526 (95% CI: $815, $238) in the IP unplanned setting, and $158 (95% CI: $295, $21) in the SNF setting. Participation in AFTCP was associated with a cost saving of $594 (95% CI: $1,089, $98) in the IP unplanned setting but the cost saving estimate in the SNF setting was not statistically significant for AFTCP.

Table 16: EnhanceFitness Cost Analyses

Setting [a]	Pre-Enrollment Period [b] Costs		Outcome Period [c] Costs		Differences-in-Differences Estimator [d]	Standard Error	95% Confidence Interval	
	Participants	Controls	Participants	Controls				
Total	$7,995	$8,076	$9,175	$10,201	-$945*	$273	-$1,480	-$411
IP Planned	$980	$895	$973	$1,058	-$170	$98	-$362	$21
IP Unplanned	$1,392	$1,570	$1,873	$2,596	-$545*	$139	-$817	-$272
ER OP	$177	$175	$203	$202	-$1	$11	-$23	$21
Non ER OP	$1,365	$1,153	$1,510	$1,254	$43	$54	-$62	$149
PB	$3,035	$3,098	$3,266	$3,444	-$116	$62	-$238	$7
HH	$454	$426	$536	$522	-$13	$28	-$68	$41
SNF	$355	$449	$567	$800	-$139*	$70	-$276	-$3
DME	$237	$311	$246	$325	-$5	$12	-$28	$18

***Significant at the p=.05 level**

a. IP = Inpatient, ER OP = Outpatient Emergency Room, Non ER OP = Outpatient, Non-Emergency Room setting, PB = services furnished by non-institutional providers in all settings, including office visits, some surgical procedures, diagnostic and therapeutic services, etc., HH= Home Health, SNF = Skilled Nursing Facility, DME = Durable Medical Equipment.

b. The pre-enrollment period is the 12 months before each individual's program start date. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

c. The outcome period is the 12 months after each individual's program start date. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in total and category costs from the pre-enrollment period to the outcome period. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

Table 17: Arthritis Foundation Exercise Program

Setting [a]	Pre-Enrollment Period [b] Costs		Outcome Period [c] Costs		Differences-in-Differences Estimator [d]	Standard Error	95% Confidence Interval	
	Participants	Controls	Participants	Controls				
Total	$10,365	$10,816	$11,700	$12,912	-$761*	$353	-$1,452	-$70
IP Planned	$1,136	$1,217	$1,309	$1,269	$122	$137	-$146	$390
IP Unplanned	$1,793	$2,040	$2,221	$3,137	-$670*	$144	-$953	-$387
ER OP	$250	$257	$277	$277	$6	$16	-$25	$37
Non ER OP	$1,692	$1,455	$1,753	$1,539	-$22	$67	-$154	$109
PB	$3,802	$4,011	$4,047	$4,182	$74	$81	-$85	$233
HH	$532	$651	$609	$774	-$47	$40	-$124	$31
SNF	$862	$837	$1,182	$1,384	-$227*	$108	-$438	-$15
DME	$297	$348	$300	$349	$2	$13	-$25	$28

***Significant at the p=.05 level**

a. IP = Inpatient, ER OP = Outpatient Emergency Room, Non ER OP = Outpatient, Non-Emergency Room setting, PB = services furnished by non-institutional providers in all settings, including office visits, some surgical procedures, diagnostic and therapeutic services, etc., HH= Home Health, SNF = Skilled Nursing Facility, DME = Durable Medical Equipment.

b. The pre-enrollment period is the 12 months before each individual's program start date. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

c. The outcome period is the 12 months after each individual's program start date. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in total and category costs from the pre-enrollment period to the outcome period. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

Table 18: Arthritis Foundation Aquatics Program Cost Analyses

Setting [a]	Pre-Enrollment Period [b] Costs		Outcome Period [c] Costs		Differences-in-Differences Estimator [d]	Standard Error	95% Confidence Interval	
	Participants	Controls	Participants	Controls				
Total	$11,397	$11,053	$12,382	$12,444	-$405	$321	-$1,034	$223
IP Planned	$2,054	$1,713	$1,951	$1,529	$80	$138	-$190	$351
IP Unplanned	$1,714	$1,820	$2,125	$2,756	-$526*	$147	-$815	-$238
ER OP	$201	$238	$214	$252	-$1	$13	-$26	$24
Non ER OP	$1,850	$1,575	$1,918	$1,607	$34	$70	-$104	$173
PB	$4,437	$4,291	$4,655	$4,359	$150	$78	-$3	$302
HH	$365	$516	$458	$601	$8	$30	-$51	$66
SNF	$441	$517	$710	$944	-$158*	$70	-$295	-$21
DME	$334	$384	$353	$395	$8	$15	-$21	$37

***Significant at the p=.05 level**

a. IP = Inpatient, ER OP = Outpatient Emergency Room, Non ER OP = Outpatient, Non-Emergency Room setting, PB = services furnished by non-institutional providers in all settings, including office visits, some surgical procedures, diagnostic and therapeutic services, etc., HH= Home Health, SNF = Skilled Nursing Facility, DME = Durable Medical Equipment.

b. The pre-enrollment period is the 12 months before each individual's program start date. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

c. The outcome period is the 12 months after each individual's program start date. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in total and category costs from the pre-enrollment period to the outcome period. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

Table 19: Arthritis Foundation Tai Chi Program

Setting [a]	Pre-Enrollment Period [b] Costs		Outcome Period [c] Costs		Differences-in-Differences Estimator [d]	Standard Error	95% Confidence Interval	
	Participants	Controls	Participants	Controls				
Total	$8,864	$8,865	$10,521	$11,633	-$1,111*	$491	-$2,074	-$148
IP Planned	$912	$952	$1,053	$1,304	-$211	$172	-$548	$125
IP Unplanned	$1,289	$1,199	$1,989	$2,493	-$594*	$253	-$1,089	-$98
ER OP	$173	$229	$198	$253	$2	$23	-$43	$46
Non ER OP	$1,583	$1,395	$1,647	$1,531	-$73	$105	-$279	$133
PB	$4,005	$3,892	$4,299	$4,131	$55	$112	-$165	$275
HH	$250	$453	$330	$589	-$57	$50	-$154	$40
SNF	$377	$419	$741	$1,005	-$221	$135	-$486	$43
DME	$273	$326	$263	$328	-$12	$24	-$59	$36

***Significant at the p=.05 level**

a. IP = Inpatient, ER OP = Outpatient Emergency Room, Non ER OP = Outpatient, Non-Emergency Room setting, PB = services furnished by non-institutional providers in all settings, including office visits, some surgical procedures, diagnostic and therapeutic services, etc., HH= Home Health, SNF = Skilled Nursing Facility, DME = Durable Medical Equipment.

b. The pre-enrollment period is the 12 months before each individual's program start date. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

c. The outcome period is the 12 months after each individual's program start date. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in total and category costs from the pre-enrollment period to the outcome period. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

Participation in all four physical activity programs (EF, AFEP, AFAP, and AFTCP) was associated with reductions in unplanned hospitalizations in the inpatient setting, and participation in the Arthritis Foundation physical activity programs was associated with increases in physician office visits. The results of Acumen's analyses of health service utilization can be found in Tables 20-23. EF, AFEP, AFAP, and AFTCP participants experienced decreases in unplanned hospitalizations by 0.04-0.05 per patient

per year, which implied that one unplanned hospitalization was prevented during the outcome period for every 20-25 participants. Along with the decrease in unplanned hospitalizations, AFAP participation was associated with an increase in planned hospitalizations by 0.02 per patient in the inpatient setting. Participation in the three Arthritis Foundation programs (AFEP, AFAP, and AFTCP) was also associated with increases in physician office visits by 0.36-0.51 per person per year.

Table 20: EnhanceFitness Utilization Analyses

Setting [a]	Pre-enrollment Period [b] Visits		Outcome Period [c] Visits		Differences-in-Differences Estimator [d]	Standard Error	95% Confidence Interval	
	Participants	Controls	Participants	Controls				
IP Planned	0.06	0.05	0.06	0.06	-0.01	0.01	-0.02	0.00
IP Unplanned	0.16	0.17	0.19	0.26	-0.05*	0.01	-0.07	-0.04
ER OP	0.31	0.32	0.34	0.35	0.00	0.01	-0.02	0.02
Physician Office	7.77	7.69	7.96	7.82	0.06	0.07	-0.08	0.19

***Significant at the p=.05 level**

a. IP = Inpatient, ER OP = Outpatient Emergency Room, Non ER OP = Outpatient, Non-Emergency Room setting, PB = Non-institutional Part , HH= Home Health, SNF = Skilled Nursing Facility, DME = Durable Medical Equipment.

b. The pre-enrollment period is the 12 months before each individual's program start date.

c. The outcome period is the 12 months after each individual's program start date.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in the average number of visits from the pre-enrollment period to the outcome period.

Table 21: Arthritis Foundation Exercise Program Utilization Analysis

Setting [a]	Pre-enrollment Period [b] Visits		Outcome Period [c] Visits		Differences-in-Differences Estimator [d]	Standard Error	95% Confidence Interval	
	Participants	Controls	Participants	Controls				
IP Planned	0.07	0.07	0.08	0.07	0.00	0.01	-0.01	0.02
IP Unplanned	0.20	0.22	0.26	0.32	-0.04*	0.01	-0.07	-0.02
ER OP	0.39	0.43	0.42	0.44	0.03	0.02	-0.01	0.06
Physician Office	10.35	10.13	10.44	9.86	0.36*	0.10	0.17	0.54

***Significant at the p=.05 level**

a. IP = Inpatient, ER OP = Outpatient Emergency Room, Non ER OP = Outpatient, Non-Emergency Room setting, PB = Non-institutional Part , HH= Home Health, SNF = Skilled Nursing Facility, DME = Durable Medical Equipment.

b. The pre-enrollment period is the 12 months before each individual's program start date.

c. The outcome period is the 12 months after each individual's program start date.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in the average number of visits from the pre-enrollment period to the outcome period.

Table 22: Arthritis Foundation Aquatics Program Utilization Analysis

	Pre-enrollment Period [b] Visits		Outcome Period [c] Visits		Differences-in-Differences Estimator[d]	Standard Error	95% Confidence Interval	
Setting [a]	Participants	Controls	Participants	Controls				
IP Planned	0.13	0.11	0.13	0.09	0.02*	0.01	0.00	0.03
IP Unplanned	0.18	0.20	0.21	0.28	-0.05*	0.01	-0.07	-0.03
ER OP	0.34	0.42	0.34	0.42	0.01	0.01	-0.02	0.04
Physician Office	11.57	10.62	11.70	10.35	0.41*	0.09	0.25	0.58

***Significant at the p=.05 level**

a. IP = Inpatient, ER OP = Outpatient Emergency Room, Non ER OP = Outpatient, Non-Emergency Room setting, PB = Non-institutional Part , HH= Home Health, SNF = Skilled Nursing Facility, DME = Durable Medical Equipment.

b. The pre-enrollment period is the 12 months before each individual's program start date.

c. The outcome period is the 12 months after each individual's program start date.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in the average number of visits from the pre-enrollment period to the outcome period.

Table 23: Arthritis Foundation Tai Chi Program Utilization Analysis

	Pre-enrollment Period [b] Visits		Outcome Period [c] Visits		Differences-in-Differences Estimator[d]	Standard Error	95% Confidence Interval	
Setting [a]	Participants	Controls	Participants	Controls				
IP Planned	0.06	0.06	0.07	0.08	0.00	0.01	-0.02	0.02
IP Unplanned	0.14	0.14	0.21	0.26	-0.05*	0.02	-0.09	-0.01
ER OP	0.31	0.39	0.34	0.40	0.02	0.03	-0.03	0.07
Physician Office	10.90	10.27	11.19	10.05	0.51*	0.17	0.18	0.84

***Significant at the p=.05 level**

a. IP = Inpatient, ER OP = Outpatient Emergency Room, Non ER OP = Outpatient, Non-Emergency Room setting, PB = Non-institutional Part , HH= Home Health, SNF = Skilled Nursing Facility, DME = Durable Medical Equipment.

b. The pre-enrollment period is the 12 months before each individual's program start date.

c. The outcome period is the 12 months after each individual's program start date.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in the average number of visits from the pre-enrollment period to the outcome period.

Acumen found that participation in all physical activity programs was associated with increases in physical therapy (PT) use, while participation in EF, AFAP, and AFTCP was associated with mixed effects on occupational therapy (OT) use (Table 24). The number of participants in EF, AFEP, AFAP, and AFTCP with any physical therapy visit increased by 1.8%-6.8% from the pre-enrollment period to the outcome period compared with matched controls. The average number of physical therapy visits per person also increased by 0.8 for the AFEP, 1.12 for the AFAP, and 1.1 for the AFTCP. While EF and AFTCP participation was associated with reductions in the average number of occupational therapy visits by 0.1 and 0.3 per person respectively, the number of AFAP participants with any occupational therapy visit increased by 1.0% in the outcome period.

Table 24: Physical Activity Program Physical and Occupational Therapy Utilization Analyses

Program [a]	Setting [b]	Measure	Physical or Occupational Therapy				Differences –in-Differences Estimator [e]	Standard Error	95% Confidence Interval	
			Pre-enrollment Period [c]		Outcome Period [d]					
			Participants	Controls	Participants	Controls				
EF	Physical Therapy	Avg. # Visits	2.8	2.8	2.7	2.8	-0.1	0.1	-0.3	0.1
		% with a Visit	21.4%	21.4%	22.2%	20.4%	1.8%*	0.7%	0.5%	3.1%
	Occupational Therapy	Avg. # Visits	0.3	0.3	0.4	0.5	-0.1*	0.0	-0.2	0.0
		% with a Visit	4.1%	4.1%	5.0%	5.1%	-0.1%	0.4%	-0.8%	0.6%
AFEP	Physical Therapy	Avg. # Visits	5.0	5.0	5.3	4.5	0.8*	0.2	0.4	1.2
		% with a Visit	35.1%	35.1%	35.8%	30.2%	5.6%*	1.0%	3.7%	7.5%
	Occupational Therapy	Avg. # Visits	0.8	0.8	0.8	0.9	0.0	0.1	-0.2	0.1
		% with a Visit	8.0%	8.0%	9.0%	8.8%	0.2%	0.6%	-0.9%	1.3%
AFAP	Physical Therapy	Avg. # Visits	6.6	6.6	5.7	4.6	1.12*	0.2	0.7	1.5
		% with a Visit	42.8%	42.8%	37.6%	30.8%	6.8%*	0.9%	5.1%	8.5%
	Occupational Therapy	Avg. # Visits	0.5	0.5	0.6	0.6	0.0	0.1	-0.1	0.1
		% with a Visit	7.0%	7.0%	7.7%	6.6%	1.0%*	0.5%	0.1%	2.0%
AFTCP	Physical Therapy	Avg. # Visits	5.5	5.6	5.3	4.3	1.1*	0.3	0.4	1.7
		% with a Visit	38.9%	38.9%	35.4%	29.6%	5.8%*	1.6%	2.6%	9.0%
	Occupational Therapy	Avg. # Visits	0.7	0.6	0.4	0.6	-0.3*	0.1	-0.5	0.0
		% with a Visit	6.5%	6.5%	6.8%	6.9%	-0.1%	0.9%	-1.8%	1.6%

*Significant at the p=.05 level

a. EF= EnhanceFitness, AFTCP= Arthritis Foundation Tai Chi Program, AFAP= Arthritis Foundation Aquatics Program, AFEP= Arthritis Foundation Exercise Program.

b. Physical Therapy = Physical therapy claims in the HH, OP, and PB settings. Occupational Therapy = Occupational therapy claims in the HH, OP and PB settings.

c. The pre-enrollment period is the 12 months before each participant's program start date.

d. The outcome period is the 12 months after each participant's program start date.

e. The differences-in-differences estimator (DiD) measures the difference between the participant and comparison groups' change in the average # of visits and the % with a visit from the pre-enrollment period to the outcome period. The DiD averaged # of visits for all individuals, including individuals who had no healthcare visits for a particular healthcare service category

Acumen also investigated changes in the incidence of falls or fall-related fractures among physical activity program participants and matched controls from the pre-enrollment period to the outcome period. This analysis did not find statistically significant associations between physical activity program participation and the incidence of medically-attended falls or fall-related fractures (Table 25).

Table 25: Physical Activity Program Medically-attended Falls or Fall Related Fracture Analyses

Program [a]	Pre-enrollment Period Falls [b]		Outcome Period Falls [c]		Differences–in-Differences Estimator[d],	Standard Error	Confidence Interval	
	Participants	Controls	Participants	Controls				
EF	5.61%	5.61%	6.52%	6.94%	-0.42%	0.43%	-1.27%	0.43%
AFEP	10.12%	10.12%	11.84%	11.51%	0.33%	0.68%	-1.00%	1.65%
AFAP	7.79%	7.79%	8.21%	9.13%	-0.92%	0.52%	-1.94%	0.10%
AFTCP	7.25%	7.25%	8.76%	9.60%	-0.84%	1.00%	-2.79%	1.11%

***Significant at the p=.05 level**

a. EF = EnhanceFitness, AFTCP = Arthritis Foundation Tai Chi Program, AFAP = Arthritis Foundation Aquatics Program, AFEP = Arthritis Foundation Exercise Program.

b. The pre-enrollment period is the 12 months before each participant's program start date.

c. The outcome period is the 12 months after each participant's program start date.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in average incidence of falls and fall-related fractures from the pre-enrollment period to the outcome period.

As was the case with the chronic disease self-management programs, the mortality rate among physical activity program participants was lower than that of matched controls (e.g., 1.4% among EF participants vs. 2.9% among controls). While program participation may have had an effect on mortality, it is also possible that the observed difference in mortality rates may have been the result of healthier beneficiaries self-selecting into the physical activity programs. To investigate whether the results of the analyses were robust to the differences in mortality, Acumen performed the cost and utilization comparisons on a subset of participants and controls that survived through the entire outcome period.

While the key results for EF was robust to the observed differences in mortality, several results for the AF programs were not. As in the full cohort analysis, EF participants surviving through the outcome

period experienced statistically significant total medical savings. However, total medical cost savings found for AFEP and AFTCP participants in the full cohort analysis were no longer statistically significant in the survivors' analysis. The reductions in unplanned IP costs and utilization remained statistically significant for the cohort of survivors participating in EF, AFEP, and AFAP but not for survivors participating in AFTCP. The magnitude of the savings estimates for both total medical costs and unplanned IP costs was smaller in the analysis on survivors for all programs, which is detailed in Acumen's final evaluation report.[114]

Falls Prevention

MOB participation was associated with total medical cost savings, and cost savings in the unplanned IP, skilled nursing facility (SNF), and home health (HH) settings. MOB participation was associated with a $938 decrease in total medical costs per year (CI: -$1,498, -$379). This finding was driven by a $517 reduction in unplanned hospitalization costs, a $234 reduction in skilled nursing facility costs, and an $81 reduction in home health costs (Table 26).

Table 26: Matter of Balance Cost Analyses

Setting [a]	Pre-Enrollment Period [b] Costs		Outcome Period [c] Costs		Differences–in-Differences Estimator [d]	Standard Error	95% Confidence Interval	
	Participants	Controls	Participants	Controls				
Total	$9,835	$9,646	$11,747	$12,496	-$938*	$285	-$1,498	-$379
IP Planned	$963	$970	$1,005	$1,130	-$117	$96	-$305	$71
IP Unplanned	$1,795	$1,839	$2,651	$3,212	-$517*	$129	-$769	-$265
ER OP	$250	$229	$312	$267	$23	$12	-$1	$47
Non ER OP	$1,593	$1,294	$1,666	$1,381	-$15	$51	-$114	$85
PB	$3,576	$3,684	$3,873	$3,974	$8	$58	-$106	$121
HH	$535	$669	$591	$807	-$81*	$31	-$141	-$20
SNF	$745	$591	$1,285	$1,365	-$234*	$91	-$413	-$55
DME	$378	$368	$364	$359	-$5	$38	-$79	$68

***Significant at the p=.05 level**

a. IP = Inpatient, ER OP = Outpatient Emergency Room, Non ER OP = Outpatient, Non-Emergency Room setting, PB = services furnished by non-institutional providers in all settings, including office visits, some surgical procedures, diagnostic and therapeutic services, etc., HH= Home Health, SNF = Skilled Nursing Facility, DME = Durable Medical Equipment.

b. The pre-enrollment period is the 12 months before each individual's program start date. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

c. The outcome period is the 12 months after each individual's program start date. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in total and category costs from the pre-enrollment period to the outcome period. Costs were adjusted to January 2012 U.S. dollars using the BLS CPI index for Medical Care Services.

MOB participation was also associated with significant changes in health services utilization in the inpatient and physician office settings (Table 27). MOB participation was associated with a reduction in unplanned hospitalizations of 0.05 per person per year, which implies that one unplanned hospitalization was prevented for every 20 MOB participants in the outcome period. MOB participation was also associated with an increase in physician office visits of 0.43 per person per year, or one additional physician office visit per year for every 2.3 participants.

Table 27: Matter of Balance Utilization Analyses

	Pre-enrollment Period Visits [b]		Outcome Period Visits [c]		Differences-in-Differences Estimator[d]	Standard Error	95% Confidence Interval	
Setting [a]	Participants	Controls	Participants	Controls				
IP Planned	0.06	0.06	0.06	0.06	-0.01	0.00	-0.02	0.00
IP Unplanned	0.20	0.21	0.28	0.33	-0.05*	0.01	-0.07	-0.03
ER OP	0.40	0.38	0.46	0.42	0.02	0.01	-0.01	0.05
Physician Office	9.51	9.28	9.87	9.21	0.43*	0.07	0.29	0.56

***Significant at the p=.05 level**

a. IP = Inpatient, ER OP = Outpatient Emergency Room, Non ER OP = Outpatient, Non-Emergency Room setting, PB = Non-institutional Part , HH= Home Health, SNF = Skilled Nursing Facility, DME = Durable Medical Equipment.

b. The pre-enrollment period is the 12 months before each individual's program start date.

c. The outcome period is the 12 months after each individual's program start date.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in the average number of visits from the pre-enrollment period to the outcome period.

MOB participation was associated with increased use of physical therapy (PT) and occupational therapy (OT) services in the outcome period (Table 28). MOB participation was associated with an average increase in physical therapy visits of 0.5 per person, which implies one additional physical therapy visit for every two participants. The number of MOB participants who had any physical therapy

visit increased by 5.2% compared with controls in the outcome period. The number of participants who had any occupational therapy visit also increased by 1.3% compared with controls.

Table 28: Matter of Balance Physical and Occupational Therapy Utilization Analyses

Program [a]	Setting [b]	Measure	Physical or Occupational Therapy				Differences–in-Differences Estimator [e]	Standard Error	95% Confidence Interval	
			Pre-enrollment Period [c]		Outcome Period [d]					
			Participants	Controls	Participants	Controls				
MOB	Physical Therapy	Avg. # Visits	4.3	4.4	4.3	3.9	0.5*	0.1	0.2	0.8
		% with a Visit	30.6%	30.6%	31.9%	26.8%	5.2%*	0.7%	3.8%	6.6%
	Occupational Therapy	Avg. # Visits	0.6	0.6	0.7	0.7	0.0	0.1	-0.1	0.1
		% with a Visit	8.1%	8.1%	9.3%	8.0%	1.3%*	0.5%	0.4%	2.2%

***Significant at the p=.05 level**

a. MOB=Matter of Balance

b. Physical Therapy = Physical therapy claims in the HH, OP, and PB settings. Occupational Therapy = Occupational therapy claims in the HH, OP and PB settings.

c. The pre-enrollment period is the 12 months before each participant's program start date.

d. The outcome period is the 12 months after each participant's program start date.

e. The differences-in-differences estimator (DiD) measures the difference between the participant and comparison groups' change in the average # of visits and the % with a visit from the pre-enrollment period to the outcome period. The DiD averaged # of visits for all individuals, including individuals who had no healthcare visits for a particular healthcare service category

Acumen also investigated changes in the incidence of falls or fall-related fractures among falls prevention program participants and matched controls from the pre-enrollment period to the outcome period. This analysis did not find a statistically significant association between MOB participation and the incidence of falls or fall-related fractures (Table 29).

Table 29: Matter of Balance Medically-Attended Falls or Fractures Analysis

Program [a]	Pre-enrollment Period Falls [b]		Outcome Period Falls [c]		Differences–in-Differences Estimator[d],	Standard Error	Confidence Interval	
	Participants	Controls	Participants	Controls				
MOB	10.57%	10.57%	11.48%	11.13%	0.35%	0.52%	-0.67%	1.38%

***Significant at the p=.05 level**

a. MOB=Matter of Balance

b. The pre-enrollment period is the 12 months before each participant's program start date.

c. The outcome period is the 12 months after each participant's program start date.

d. The differences-in-differences estimator measures the difference between the participant and comparison groups' change in average incidence of falls and fall-related fractures from the pre-enrollment period to the outcome period.

Acumen observed a notably lower mortality rate among MOB participants compared with matched controls in the outcome period; only 2.4% of MOB participants died during the one-year period following program enrollment compared with 4.2% of individuals in the comparison group. While the Matter of Balance program may have had an effect on mortality, the magnitude of the mortality difference between participants and controls during the outcome period could indicate selection bias in the participant population. To investigate whether the results of the analyses were robust to the differences in mortality, Acumen performed the cost and utilization comparisons on the subset of MOB participants and controls that survived through the entire outcome period.

After eliminating individuals who died during the outcome period, total medical cost savings as well as savings in the unplanned IP, HH, and SNF settings remained statistically significant. The magnitude of savings estimates in the unplanned IP and HH settings were attenuated, while the magnitude of the savings estimate in the SNF setting was slightly larger in the cohort of survivors. The decrease in unplanned hospitalizations and increase in physician office visits also remained statistically significant but slightly attenuated in magnitude for the cohort of survivors. However, the increase in ER OP costs, which was not statistically significant in the analyses on the full cohort, became significant when restricting the cohort to survivors. The analysis results on survivors are detailed in Acumen's final evaluation report.[114]

Additional Subgroup Analyses

Acumen did additional subgroup analysis to determine which participants in the wellness programs had the highest yield in terms of cost and utilization outcomes, as well as whether or not the intensity of the interventions modified effects. They found that top responders to wellness programs were characterized by much higher medical costs and higher rates of health service utilization in the pre-enrollment period, and higher incidence of most observed chronic conditions compared with other

participants across programs. Additionally, enrollees with the highest frequency of participation generally had higher estimates of cost saving in CDSMP, MOB and EF; the programs for which attendance data was available. For example, an additional sub-analysis of the relationship between the class attendance and cost savings in the CDSMP program showed beneficiaries attending all 6 class sessions experienced a statistically significant cost savings of $944. These results, however, should be interpreted cautiously as beneficiaries in worse and declining health may be both less able to complete the course and more likely to incur higher spending in the outcome period. These findings offer insight into how to target wellness programs to beneficiaries that would benefit most, as well as the importance of encouraging regular attendance.

Discussion

Acumen's analysis found evidence of total cost savings for four of the seven wellness programs that were examined using the differences-in-differences estimation method. EF, AFEP, AFTCP, and MOB were associated with total medical cost savings; primarily driven by reductions in unplanned inpatient admissions and costs. Participation in the CDSMP and AFAP, while not associated with savings in total medical costs, was associated with inpatient cost savings.

Acumen also found evidence of program effects on health service utilization. Participation in EF, AFEP, AFAP, AFTCP, and MOB was associated with reductions in unplanned hospitalizations. Participation in the CDSMP, EW, AFEP, AFAP, AFTCP, and MOB, on the other hand, was associated with increases in physician office visits, possibly owing to increased levels of patient activation and a shift toward more primary care based services resulting from the interventions.

Acumen did not find that participation in CDSMP affected most medication adherence outcomes in patients with congestive heart failure (CHF), diabetes mellitus (DM), hypertension, and chronic

obstructive pulmonary disease (COPD). CDSMP participation was only associated with increased adherence to one of the six medication regimens that were assessed, a combined regimen for COPD.

While there was no evidence that any physical activity or falls prevention program reduced the incidence of falls or fall-related fractures, all physical activity and falls prevention programs were associated with increases in the use of physical therapy services, and with mixed effects on the use of occupational therapy services. Participation in EF, AFEP, AFAP, AFTCP, and MOB was associated with increased physical therapy use. One explanation for the increase in physical therapy use may be that that increases in levels of physical activity resulting from program participation may increase beneficiary demand for physical therapy services as they attempt to acclimate themselves to a more active lifestyle. Participation in AFAP and MOB was also associated with increased occupational therapy use, while participation in EF and AFTCP was associated with decreased occupational therapy use.

This research has some key limitations worth noting. First, in spite of efforts to match program participants with appropriate controls, there were key differences in baseline demographics and health service utilization between the two intervention and comparison groups. While the differences-in-differences approach minimized this concern, it is possible that the differences between participants and controls could have introduced bias into the analyses. Beneficiaries who self-selected into programs may also have been different from control populations in their motivations or behaviors, which are hard to capture using administrative data, and these differences may have influenced the study outcomes. To the degree that such differences existed, we may find positive (or negative) effects attributed to program participation, which were actually related to behavioral characteristics or other confounding factors differing between populations. For example, the difficulty in matching controls to program participants on mortality during the outcome period that Acumen experienced may have been indicative of such a selection bias. Most of the key results for the physical activity and falls prevention

programs, however, were robust to these observed differences in mortality while a few were not. For example, the finding of total medical cost savings remained statistically significant for EF and MOB but not for AFEP and AFTCP.

Second, Acumen's efforts to detect effects of wellness program participation on outcomes were hindered by small sample sizes. Sample sizes were diminished by difficulties in linking program participants to claims data, lack of Medicare eligibility during the full pre-participation period, and a lack of claims-based evidence of specific chronic conditions (e.g., arthritis) among participants receiving disease-specific interventions. Ultimately, only 7 of the 10 interventions that Acumen originally sought to evaluate had sufficient sample sizes to support analyses.

Additionally, the retrospective cohort design of the analysis was limited in its ability to control and account for unobserved variables (confounders) that also could affect the outcomes. While Acumen attempted to control for observable differences in important medical conditions, demographic factors, and preceding health care utilization levels and trends, it is possible that additional variables, if available, may have influenced the results.

Finally, the one-year outcome period for assessing effects of program participation may not correspond to the actual time horizon in which many of the wellness programs would be expected to influence outcomes. For example, initiating a sustained exercise or improved chronic disease self-management program could be expected to influence patient health trajectories more towards the end of life as chronic illness and debility are often delayed, and may occur many years after program enrollment as opposed to the initial year. As such, the outcome period for this research project may have been too short to detect the full range of program benefits.

The broader research question of wellness program effects on cost and resource utilization would benefit from additional methods of analysis. Prospective analysis, if carefully done, would allow for a richer set of potential explanatory variables to be collected on participants choosing to enroll in these programs. These new variables could be developed with involvement from wellness program experts and would serve to better capture attributes differing between participants and controls in important ways. Prospective analyses could also include additional variables facilitating the investigation of specific program interventions or operational aspects; and the frequency, durability, or intensity of specific interventions on outcomes.

Acumen's analyses found some initial evidence that that EF, AFEP, AFTC, and MOB participation may have been associated with medical cost savings and decreased use of health care services at least for one year following program enrollment. Additionally, the finding of total medical cost savings and unplanned inpatient hospital cost savings for EF and MOB remained robust even after restricting the cohort to outcome period survivors. One commonality of these programs is that they encourage patients to engage in sustained physical activity over time, which may play an important role in achieving positive results. Other avenues whereby these programs exert their positive effects should be considered, researched, and disseminated. This research further suggested that participation in CDSMP, and AFAP, while not associated with total savings, was associated inpatient cost savings. The reason for the lack of overall medical savings for these programs is unclear and may warrant further exploration.

Section 4: Global Conclusions, Future Directions, and Policy Recommendations

Summary of Results

Both the published literature examined in CMS's evidence review and CMS's initial evaluations of potential program effects indicate that some community-based wellness and prevention programs may have the potential to improve beneficiary health outcomes and reduce healthcare costs.

CMS's review of the literature found several established wellness and prevention programs with a firm evidence base. These programs typically demonstrated improvements in health behaviors and proximate health outcomes. Results for chronic disease self-management and physical activity programs were especially promising.

Evidence in the literature surrounding program impacts on healthcare utilization and costs however was much more limited. Only a handful of published studies evaluated these outcomes. [115, 116, 117,118,119, 120, 121, 122] Among studies that specifically examined utilization and cost outcomes, analyses of impacts were often based on self-reports.

CMS's initial evaluation of program impacts, described in Section 3, examined claims-based measures of utilization and costs for a select group of wellness and prevention programs where there was sufficient participant level information to match to CMS administrative data. These analyses found some promising evidence suggesting that four nationally disseminated programs (EnhanceFitness (EF), Arthritis Foundation Exercise Program (AFEP), Arthritis Foundation Tai Chi Program (AFTCP), and Matter of Balance (MOB)) may have driven down total healthcare costs for participating beneficiaries. The Chronic Disease Self-Management Program (CDSMP) and several physical activity programs also demonstrated reductions in unplanned hospital utilization and costs, which may suggest a potential for future long-term savings.

Gaps in the Evidence

Taken together, these results are promising in that they demonstrate that evidence-based community wellness and prevention programs can improve outcomes and in some cases reduce costs for Medicare beneficiaries. However, there are some gaps in the established evidence that make more widespread implementation of programs challenging. First, while CMS's retrospective analysis of program effects found some evidence of cost savings for select programs, the overall evidence of program effects on cost and utilization outcomes is still somewhat limited. To date, there have only been a handful of studies that have directly addressed cost and utilization outcomes. Further, even when these outcomes were examined, results were rarely framed in context with program costs. As such, there is little direct evidence suggesting that the benefits of these programs would exceed their costs on a population level.

Second, most of the effort in promoting community-based wellness and prevention programs (both in the public and private sphere) has been focused on testing specific interventions and building program capacity. Very little attention however has been paid to examining the demand for these kinds of programs in the general beneficiary population. Most of the evaluation studies to date have examined relatively small populations of participants and controls that were specifically recruited for research purposes. It is unclear whether these individuals are representative of the larger communities from which they are drawn in terms of their willingness to engage with and participate in community-based prevention efforts. As such, it is difficult to estimate the scale to which potential benefits could accrue in a national implementation of a program.

Finally, assuming that a compelling business case for the direct funding of community-based wellness and prevention programs could eventually be established, it is unclear how to best implement a payment model to finance the delivery of these services. Community-based interventions are often, by design, delivered by lay practitioners in community settings. While this framework is critical to

keeping program costs low, it is not clear that such a delivery system could support the quality, regulatory, and financial controls necessary to maintain program integrity without sacrificing some of its efficiency. More research is needed to develop a sustainable framework for supporting a healthy ecosystem of community-based providers while not exposing the Medicare program to undue risk.

Research Agenda

Moving forward, HHS, through CMS and other agencies, will attempt to both fill these gaps in the evidence and round out understating of how these programs can benefit Medicare beneficiaries through ongoing research efforts mandated under the Affordable Care Act. Specifically, HHS anticipates conducting studies geared towards establishing a firm business case for the direct financing of programs, complete with formal cost-benefit and cost effectiveness analyses, studies designed to estimate beneficiary demand for community-based preventive services, and studies and pilot programs designed to both develop new wellness and prevention interventions tailored to the Medicare population and to test viable payment models for these programs. Additionally, HHS will explore fielding new studies to examine the impact of community-based programs on vulnerable subpopulations within the Medicare population, including young disabled, dually eligible, and End Stage Renal Disease beneficiaries. The following research efforts are currently underway at CMS to meet these objectives.

Prospective Study of Program Effects

In early June 2013, CMS awarded a contract to Acumen to perform a large-scale prospective evaluation of community-based wellness and prevention programs. The overall objective of this research effort is to analyze the overall interest of Medicare beneficiaries in participating in community-based wellness and prevention programs and to assess the impact of beneficiary participation in these programs on subsequent health behaviors, self-reported health outcomes, and health service utilization

rates and costs. CMS envisions this research effort consisting of 6 inter-related components with work spanning 4 years.

The first component of this research project will consist of recruiting and partnering with established community-based wellness and prevention programs. CMS intends to invite applications from promising programs with sufficient infrastructure and beneficiary enrollments to be part of the evaluation study. CMS has set a goal of partnering with at least 10 large-scale community-based programs.

The second component of this research project will consist of a population-based survey of beneficiary readiness to engage with community-based wellness and prevention programs. This beneficiary population-based survey will serve the dual purposes of 1) providing national estimates of beneficiary interest and readiness to engage in community-based wellness and prevention activities, and 2) providing a comparison group for the participants entering the wellness and prevention programs that will be examined in this study.

The third component of this research will consist of a survey-based evaluation of program impacts on self-reported health behaviors and outcomes. The goal of this analysis is to identify and test for improvements over baseline values in relevant self-reported beneficiary outcomes at 6 months and 1 year following program participation.

The fourth component of this research project will consist of a claims-based evaluation of program impacts on Medicare utilization and cost outcomes. These claims-based analyses will identify and test for changes in pre-and-post beneficiary participation utilization and costs.

The fifth component of this research will consist of a qualitative description of the various programs' operations and costs with an eye toward determining best practices and how to better spread the

various programs and interventions. A critical aspect of this component will be to cost out the various labor and technical inputs required to implement and operate each of the prevention programs' operations and interventions, both to provide a basis for estimating the cost-benefit and cost-effectiveness of the various prevention activities and to provide a roadmap to others seeking to implement similar programs.

The results of the analyses performed under Components 2-5 of this research will be integrated with one another in the sixth study component to provide a global synthesis of the various programs' operations and impacts. This analysis will include both formal cost-benefit and cost-effectiveness analyses and projections of savings that could be achieved through national dissemination of programs.

CMS Center for Medicare and Medicaid Innovation Initiatives

In addition to the ongoing evaluation work to evaluate existing community-based wellness and prevention programs, CMS is also testing a variety of new payment and service delivery models at the Center for Medicare and Medicaid Innovation (Innovation Center). Some of these models include community-based wellness and prevention activities, such as the Community-Based Care Transitions Program[123], Health Care Innovation Awards[124], and the State Innovation Models Initiative.[125]

The Community-Based Care Transitions Program focuses on improving care transitions and requires the participation of community-based organizations to help improve quality of care for high-risk Medicare beneficiaries. Under this program, the community-based organizations, or acute care hospitals that partner with community-based organizations, provide care transition services across the continuum of care, which may include patient-centered self-management support specific to the beneficiary's condition and comprehensive medication review and management.

Examples of Health Care Innovation Awards focusing on community-based prevention efforts include cooperative agreements with the National Council of Young Men's Christian Associations of the United States of America (YMCA) and Finity Communications, Inc. YMCA received a Health Care Innovation Award for a national diabetes prevention lifestyle change program to prevent the progression of pre-diabetes to diabetes at community centers across the country. Finity Communications received a Health Care Innovation Award to develop health information technology to track and monitor over 120,000 at-risk patients, create a participant engagement program, develop integrated health profiles and care management plans, and evaluate and reassess treatment on a continuing basis.

Examples of community-based wellness and prevention activities under the State Innovation Models program include initiatives in Arkansas and Minnesota. Under the model, Arkansas will partner with CMS to test a sustainable, patient-centered health care system. Under provisions of the plan, by 2016, a majority of Arkansans will have access to a patient-centered medical home, which will provide comprehensive, team-based care with a focus on chronic care management and preventive services. Under the State Innovation Models, CMS is also partnering with the State of Minnesota to better integrate care and services for the whole person across the continuum of care. The Minnesota model for health system transformation will emphasize community health, preventive services, behavioral health, and other support services.

Conclusion: Ongoing Efforts to Promote Wellness and Prevention

The Department of Health and Human Services (HHS), through CMS and other agencies within the Department, will continue to help build the evidence base establishing the effectiveness of wellness and prevention programs in reducing healthcare utilization and costs, through both the ongoing research activities highlighted in this report and future research and evaluation work. Critical aspects of this

research and development work will be to both further develop a business case for direct financing of these programs and to devise and test a viable payment model for community-based wellness and prevention services that will support a healthy ecosystem of programs and providers. In conclusion, HHS recommends maintaining existing support for community-based wellness and prevention activities, consistent with the emphasis on bolstering effective prevention in the President's FY2014 budget, while HHS, CMS, and other public and private partners work to fill the gaps in the evidence through additional studies and pilot programs. Community-based wellness and prevention programs currently depend on limited grant dollars from various Federal funding streams, and thus their reach is limited. Designing and implementing direct payment mechanisms for these programs and incentives for other healthcare stakeholders, including managed care plans and health systems participating in shared savings programs, to partner with and finance programs could substantially increase the number of Americans that can benefit. Research to date indicates that these programs have the potential to improve health outcomes for Medicare beneficiaries and reduce costs. More research, development, and implementation work however is needed before these benefits can be fully leveraged in the healthcare system.

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