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WHITE PAPER

Evaluating a Healthy Aging Program's Impact on Health Outcomes in Medicare Advantage Beneficiaries



Executive Summary

Inovalon Data Solutions team conducted a retrospective observational analysis to examine differences in healthcare outcomes among Medicare beneficiaries enrolled in Medicare Advantage (MA) and participating in the SilverSneakers® healthy aging program. The goal was to assess and quantify the potential value and/or benefit to participants and providers of programs designed to promote physical activity and social engagement in seniors.

LMA encounter data, including all medical and pharmacy claims, was linked to MA members with a minimum of 12 months of participation in the fitness program and who were continuously enrolled in their MA plan during the same time period. We used a previously validated dual study design to limit the likelihood that the observed relationships between program participation and the measures of interest were confounded by differential selection into the program. Two study cohorts were constructed to examine differences in utilization, costs, and quality outcomes among: 1) MA members before and after the first date of program participation; and 2) program participants vs. comparable MA non-participants identified using a strictly applied propensity score matching approach.

Key findings demonstrated:

- MA members had significantly lower healthcare utilization after joining the program as well as when compared with similar MA non-participants, including consistently lower inpatient hospitalizations and emergency department (ED) visits.
- Participation in the fitness program was also associated with significantly lower costs, driven primarily by lower inpatient expenditures.
- Cost savings stratified by key member characteristics revealed several results that may be counterintuitive to some: the largest cost savings were among fitness program members age 80+ (not among younger, healthier Medicare beneficiaries), among those with three or more chronic conditions (versus those with one or two conditions), and members enrolled in Medicare due to disability (versus those who joined Medicare at age 65).
- Program participants had better performance on key measures of quality, including greater adherence to hypertension and cholesterol medications both after joining the program and compared to similar non-participants; lower rates of 30-day all-cause hospital readmissions compared to non-participants; and higher rates of vaccination and disease screening. Several of these results were associated with higher ratings on triple weighted measures included in the Centers for Medicare & Medicaid Services (CMS) Medicare Advantage Plan Five-Star Rating system.

Results from the pre/post and the matched-cohort analyses were largely consistent, suggesting that the study's findings reflect real-world improvement. This study's findings are also consistent with previous analyses of senior fitness programs that found decreased healthcare utilization and costs. Importantly, this study expands the evidence base by using a large national sample of program participants linked to their complete medical and pharmacy claims for a full 12 months. External validity was further increased by including a diverse set of MA plans. This study also adds new evidence related to important measures of quality and access, and examined differences by age group, chronic disease burden, and disability status.

Background and Objectives

Since the 1970s, Medicare beneficiaries have had the option to receive their benefits through private health plans as an alternative to the federally administered traditional Medicare Fee-for- Service (FFS) program. These private Medicare Advantage (MA) plans have been growing rapidly as a proportion of the Medicare population. **The number of beneficiaries enrolled in MA plans has more than quadrupled from 5.3 million in 2004 to 24.1 million in 2020, representing nearly four out of 10 (39%) Medicare beneficiaries.**[1] MA plans have flexibility to design benefit packages that include both medical and non-medical benefits to encourage a focus on preventive services and care management with the goal of improving health outcomes.[2]

Senior healthy aging programs, including fitness and wellness programs, are designed to achieve better health outside of the provider and clinical care settings and can address critical unmet needs in adults age 65 and older.[3] Many MA plans provide their members access to senior healthy aging programs as a supplemental non-medical benefit. There is ample evidence that physical activity and social engagement are keys to healthy aging, reducing morbidity and mortality and contributing to improved quality of life.[4,5,6,7] It has also been well documented that exercise and healthy eating as part of treatment plans can improve outcomes in elderly people with the most common chronic conditions, including cardiovascular disease, diabetes, rheumatoid arthritis, osteoporosis, depression, and obesity.[8]

Senior fitness programs provide Medicare enrollees with access to fitness centers which can improve physical well-being, but they also provide access to community events, group classes, online resources, and virtual experiences that foster opportunities for social engagement which can impact both physical and mental health. Loneliness has been identified as one of the most important social determinants of health. Studies have demonstrated that people who are lonely are more likely to develop dementia and have increased risk of coronary artery disease, stroke, and all-cause mortality.[9]

While healthy aging programs track valuable data on the participation of their members, these programs and the MA plans that offer them have limited or no access to healthcare outcomes data for participating members. This information is essential to understand the impact and value of the program to Medicare beneficiaries.

Prior research suggests that senior fitness programs have a positive impact. In 2008, Nguyen and colleagues compared eligible MA members participating and not participating in a fitness program.[10] They found that participants had lower total healthcare costs in the second year of participation compared to matched non-participants. Similar results were found in a subpopulation of MA enrollees with diabetes.[11] Cost savings have been observed in other studies using different research designs and investigating different fitness programs, including a case-control study in which total cost increases for program participants were significantly lower than for non-participants and two matched-cohort studies reporting lower costs in program participants vs. controls.[12,13,14] These studies also found dose-response relationships; those members who participated more frequently tended to have greater cost savings. Other matched-cohort and survey studies have reported improved self-rated physical and emotional health, reports of fewer unhealthy days, increased physical activity, a decreased feeling of isolation, better performance of activities of daily living, and lower risk of falls.[15,16,17,18]

The existing evidence, however, is limited in significant ways. The previous studies were restricted to a single health plan in a specific geographic area or did not use population data at all. The designs were subject to confounding of program participation with the measures of interest. Finally, outcomes related to quality of care have not been previously addressed.

In an effort to update and expand upon the limited findings on utilization and cost savings and address the lack of evidence related to impact on quality and access, Inovalon developed a two-pronged approach that: 1) compared pre- and post-program results among participating MA members; and 2) compared participating members to non-participating MA beneficiaries using a large propensity score matched sample.

Specific aims:

1. Integrate program participant data from a large senior fitness program with MA plan claims data and create longitudinal and matched participant and non-participant study cohorts.
2. Describe the demographic, enrollment, and clinical characteristics of the two cohorts.
3. Use the longitudinal cohort to conduct pre/post program participation comparisons on measures of healthcare utilization, cost, and quality outcomes.
4. Use the matched study cohort to compare program participants with similar non-participants on measures of healthcare utilization, cost, and quality outcomes.
5. Convey insights from the two sets of analyses concerning the value of the program to Medicare beneficiaries and to MA plans that offer a fitness benefit.

Methods

Data sources

Inovalon constructed two related study cohorts using our Medical Outcomes Research for Effectiveness and Economics Registry (MORE^2 Registry®) in combination with program participant data from a large national senior fitness program – SilverSneakers – that has been in operation since the early 1990's and is offered to more than half of all MA plan enrollees.[19]

The MORE$^{2®}$ is a warehouse of healthcare administrative claims data sourced from more than 150 health plans across the nation that utilize Inovalon's data analytic services. At the time this study was conducted, it included data pertaining to over one million physicians, 565,000 clinical facilities, 324 million unique patients, and more than 48 billion medical events. The MORE^2 Registry MA plan data encompassed approximately 25% of all MA enrollees nationally.

To support linkage to the MORE^2 Registry MA data, SilverSneakers program membership data were provided for MA members participating in the program from 2006 to 2019. This included personally identifiable information (member first and last name, date of birth, program start date, program end date, and ZIP code) sufficient to match to Medicare beneficiaries' full enrollment, diagnosis, and care histories from the MORE$^{2®}$. The data linkage was performed on secure servers and all analytic files were statistically de-identified consistent with best practices for management of Protected Health Information and following HIPAA-compliant processes.[20]

Cohort construction

The cohort for the pre/post program analysis was constructed by extracting participants' claims data for those members whose first program activity date aligned with available enrollment and claims data in the MORE^2 Registry. Participants were required to have continuous enrollment, with both medical and pharmacy coverage, as well as overlapping participation in the fitness program for a minimum of six months before and six months after their first program activity date.

A comparison group of MA members not participating in the program was created as a control cohort using propensity-score matching to ensure comparability with the program participants. Propensity scores were estimated using age, gender, race/ethnicity, participant enrollment year, census region, rural/urban location, Medicare/Medicaid dual-eligibility status, original reason for Medicare entitlement (age, disability/ESRD), and Charlson Comorbidity Index scores.[21] A 1:5 (participant : non-participant) matching strategy was used and post-match comparisons were conducted to confirm the comparability of the two groups on baseline characteristics as well as on the most prevalent chronic conditions and total costs during the six-month baseline period.

The two complementary study design approaches were selected to limit the likelihood that the observed relationships between program participation and the measures of interest were confounded by differential selection into the program.[22] These methods apply two different lenses to the research questions; consistency in results between the two analyses increases the confidence in the study's overall findings and conclusions.

Each participant's program enrollment date was designated as their index date and their healthcare utilization, costs, and quality outcomes were calculated for the six-month lookback period and the six-month post-index period. Matched non-participants were required to be enrolled during the same year as the matched program participant and their index date was defined as the mid-point of their 12 month continuous enrollment period.

Outcome measures

Utilization and cost metrics were calculated overall for the cohorts, and stratified by age group, number of chronic conditions, disability/ESRD vs. age 65+, and dual vs. non-dual eligibility.

- **Utilization:** outpatient visits, hospitalizations and length of stay, emergency department (ED) visits, observation stays, and post-acute care services (PAC) (including skilled nursing facility, home health agency, inpatient rehabilitation, and long-term care hospital stays and length of stay/episode).
- **Costs:** total overall (medical + pharmacy), total medical, total pharmacy, and medical costs by spending category: acute inpatient, outpatient, physician services and tests, emergency department, post-acute care, and durable medical equipment (DME).
- **Quality/access:**
  - 30-day all-cause readmissions
  - Adherence to hypertension, diabetes, and cholesterol medications
  - Receipt of screening services for fall prevention, depression, cholesterol, and breast/colon/prostate cancer
  - Receipt of pneumonia and influenza vaccinations
  - Diabetes-specific screening: hemoglobin A1c testing and retinal exams
  - Post-acute care: office visit within 14 days following hospital discharge

Analysis plan

Rates for visit/stay measures were calculated as events per 100 member-years and means were computed for length-of-stay measures. Costs were annualized and reported as per patient per year (PPPY). Pre/post and participant/control group comparisons were performed using statistical tests appropriate to the within-member and matched-member cohort designs. Adjustments to significance tests were applied to reduce error rates associated with multiple comparisons.

Results

Study cohorts

The program participant data included 168,821 members with overlapping MA enrollment and claims data in the MORE^2 Registry. A subset of 8,267 members had continuous MA plan enrollment with both medical and pharmacy coverage that overlapped their program participation in the six months before and after their first program activity date. After excluding 72 members who did not match to non-participant MA beneficiaries, a total of **8,555 program participants** were included in the final study sample.

The propensity score-matched control cohort included **42,775 non-participant MA members.** Standardized differences between the two cohorts on the variables used for the matching were all less than the conventional cutoff of 0.10%.

Demographic and clinical characteristics

Program participants' mean age (standard deviation) was 67.5 (8.5) years, with 63.6% female, 10.8% dual eligible for Medicaid, and 21.0% enrolled in Medicare due to disability/ESRD. The average Charlson Comorbidity Index (CCI) score was 0.8 (1.4). The control group of non-participants was highly similar to the participant group in terms of baseline characteristics after matching (mean age 68.1 [8.6], 63.9% female, 10.8% dual eligible, and 21.0% eligible due to disability, and mean CCI score of 0.8 [1.4]).

The matched cohort had similar prevalence of the most frequent chronic conditions at baseline (i.e., one group was not healthier or more chronically ill than the other) (Table 1).

Table 1:
Prevalence of chronic conditions among program participants and non-participants

	Program participants	MA non-participants
N	8,555	42,775
Hypertension	41.4%	41.1%
Hyperlipidemia	39.0%	36.5%
Rheumatoid Arthritis/Osteoarthritis	20.0%	16.0%
Cataract	16.1%	13.5%
Diabetes	14.6%	16.4%
Hypothyroidism	12.3%	10.4%
Depression	11.6%	9.2%

Healthcare resource utilization

Fitness program participants experienced lower healthcare utilization after joining the program. The rate of hospitalizations decreased a significant 21.3% (p=0.0006; Figure 1). Rates of ED visits and observation stays remained comparable.

Program participants also experienced lower healthcare utilization compared with the matched control group of MA beneficiaries. Program participants had 7.3 fewer hospitalizations (p<0.0001) and 7.6 fewer ED visits (p<0.0001) than comparable non-participants (Figure 1); participants also had shorter inpatient lengths-of-stay (4.4 vs. 5.8 days, p<0.0001; not shown). The difference in number of observation stays was not significant.

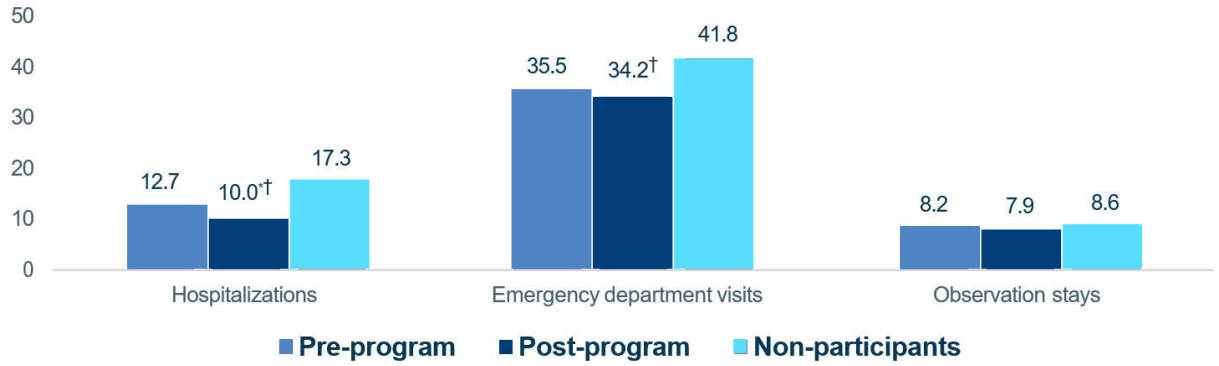


Figure 1. Healthcare resource utilization pre/post program initiation and program participants vs. non-participants per 100 patient years

*Pre/post difference is statistically significant
† Participant/non-participant difference is statistically significant

Healthcare expenditures

Fitness program participants experienced a significant decline in PPPY costs following initiation in the program. Total costs declined by 16.3% ($871, p=0.0003) and medical costs declined by 18.4% ($631, p=0.0005). Pharmacy costs also declined but the difference was not statistically significant (p=0.1165; Figure 2).

Participants also had 15.9% lower total costs ($841, p<0.0001) and 25.7% lower medical costs ($968, p<0.0001) over the same time-period compared to the matched cohort of non-participants (Figure 2). There was no significant difference in pharmacy costs incurred by the intervention and control groups (p=0.3266).

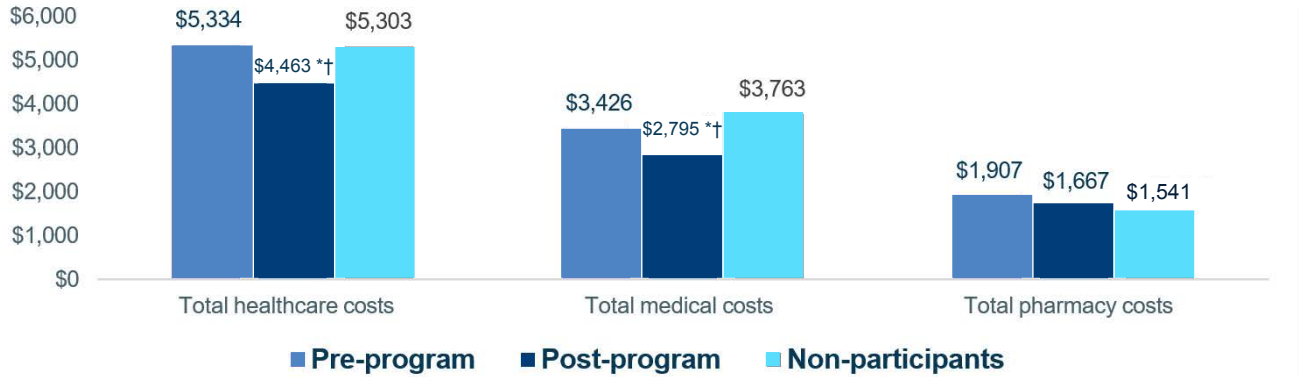


Figure 2. Average healthcare expenditures pre/post program initiation and program participants vs. non-participants per patient per year

*Pre/post difference is statistically significant
† Participant/non-participant difference is statistically significant

Medical Costs by Member Characteristics

Age group

Costs were consistently lower after the start of program involvement and lower compared to non-participants (Figure 3). A key finding was that the greatest cost savings were observed in those age 80 and older, whose annual costs declined by 49% after joining the program (p=0.0046) and whose costs were 58% ($3,101) lower compared to matched non-participants during the same time period (p<0.0001). The lower costs were primarily attributed to lower inpatient costs. There was also a significant reduction in costs among program participants age 65-79 of 18.7% ($560, p=0.0048), and costs were 24% ($771, p<0.0001) lower compared to non-participants age 65-79.

Costs among beneficiaries under age 65 were highest compared to older Medicare beneficiaries across all study cohorts (Figure 3). This group experienced a cost reduction of 12% ($648) after joining the program, but the decline was not statistically significant (p=0.2131), but costs among program participants compared to non-participants under age 65 were significantly lower by 23.3% (p=0.0038).

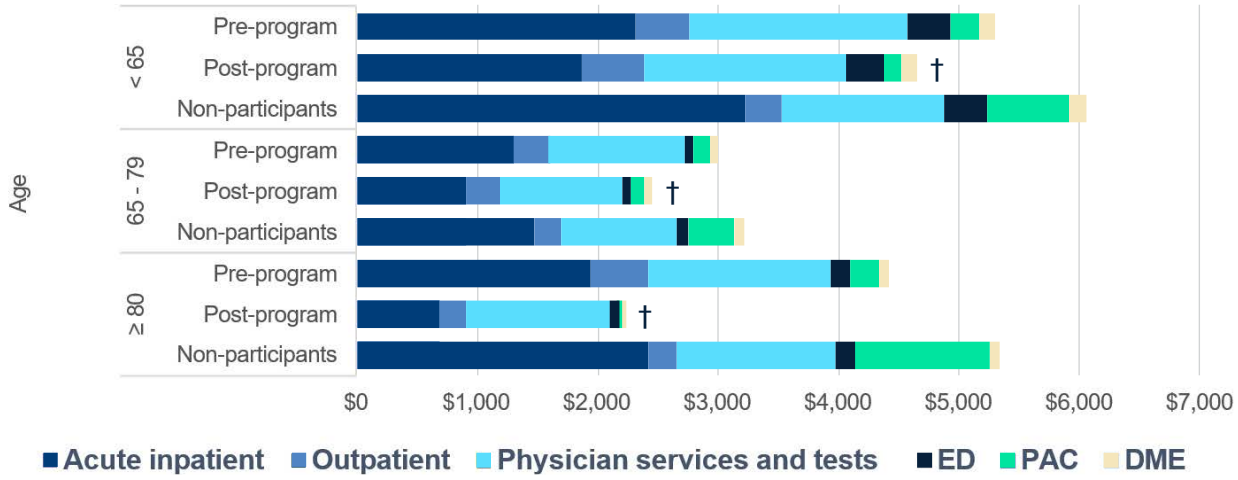


Figure 3. Pre/post program initiation and program participants vs. non-participants component medical costs by age category, per patient per year

† Participant/non-participant difference is statistically significant

Number of chronic conditions

Chronic conditions were identified based on the six-month baseline period. Costs increased with number of chronic conditions per patient. Medical costs for members with three or more conditions decreased significantly in the post-program period by 33.6% ($2,329, p<0.0001; Figure 4). Medical costs for participants with no chronic conditions increased by $564 (p<0.0001) and costs remained stable for patients with one to two chronic conditions.

Program participants had lower costs than non-participants regardless of number of chronic conditions, but costs were significantly lower by $777 (p=0.0003) among participants with one to two chronic conditions and $2,228 (p<0.0001) lower among participants with three or more chronic conditions (Figure 4). Inpatient costs and ED use were the main drivers of this difference, but costs for post-acute care were also lower among participants, particularly in members with three or more chronic conditions. Outpatient costs were higher for participants regardless of the number of conditions.

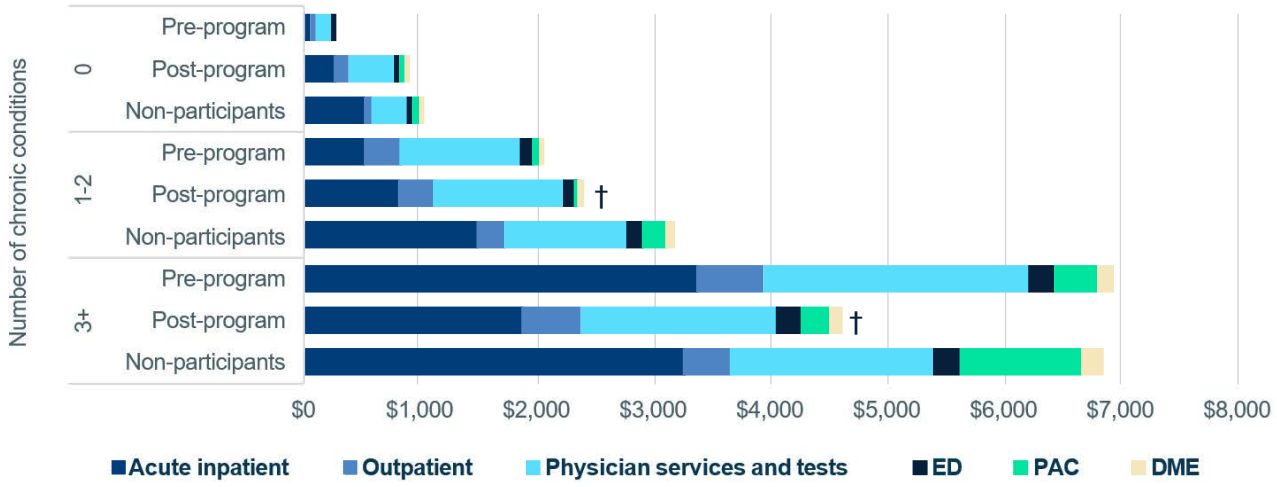


Figure 4. Pre/post-program initiation and program participants vs. non-participants component medical costs by number of chronic conditions, per patient per year

Note: The chronic condition categories were based on the Centers for Medicare & Medicaid (CMS) Chronic Conditions Warehouse (CCW)
† Participant/non-participant difference is statistically significant

Disability status

Medical costs were highest among members eligible for Medicare due to disability/ESRD status rather than reaching age 65 across all cohorts (Figure 5). Total costs among those with disability declined only slightly (p=0.5601) post-program initiation, but a significant cost reduction of $646 was observed in the post-program period among members age 65+ (p<0.0001).

Total medical costs were $1,457 lower among disabled program participants (p=0.0109) and $816 lower among age 65+ participants (p<0.0001) compared to similar non-participants (Figure 5). Regardless of eligibility, costs were lower for program participants for inpatient and PAC stays and higher for outpatient visits and physician services and tests.

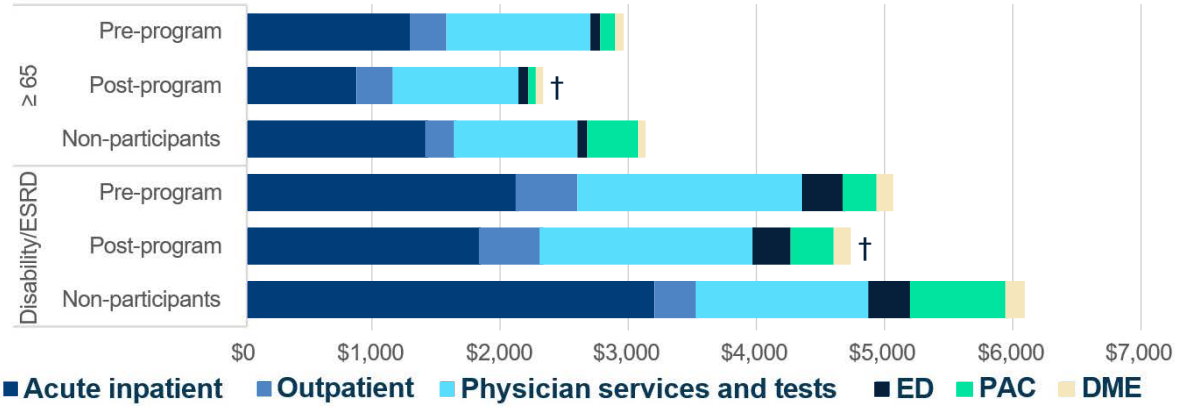


Figure 5. Pre/post program initiation and program participants vs. non-participants component medical costs by Medicare eligibility, per patient per year

† Participant/non-participant difference is statistically significant

Dual eligible status

MA plan members dually eligible for Medicaid, an indication of low income, incurred higher medical costs than non-dual members in both the pre- and post-program periods and their costs increased slightly after joining the program (p=0.4300; Figure 6). A 22% decrease in costs was observed for non-dual eligible members (p<0.0001), driven primarily by lower inpatient and physician services costs.

Medical costs were lower among program participants compared with non-participants for both dual and non-dual members. Costs for duals were not significantly different (p=0.0579; Figure 6), but costs for non-dual participants were significantly lower compared to similar non- participants by 23.8% ($793, p<0.0001). This reflected lower inpatient, emergency department, and post-acute care costs, but higher outpatient and physician services costs.

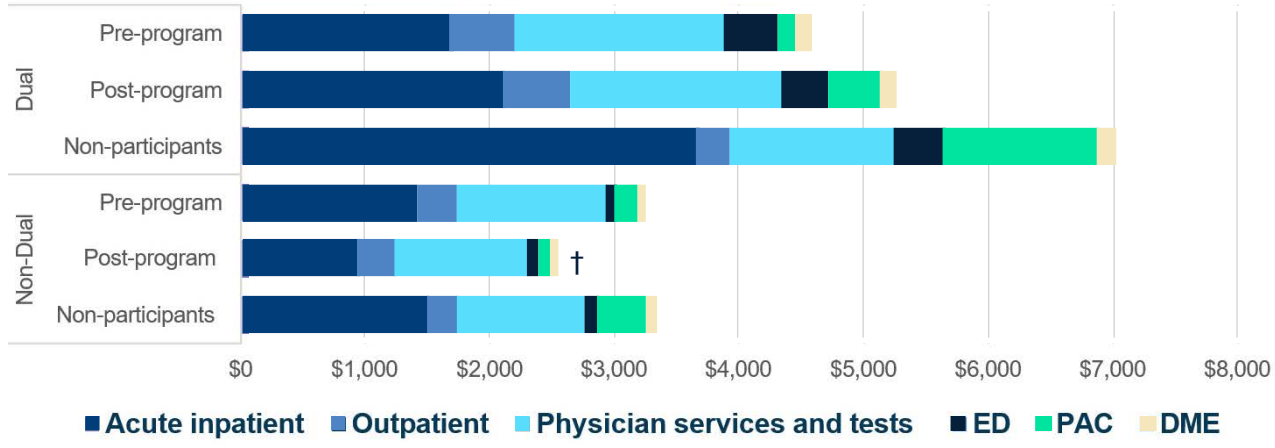


Figure 6. Pre/post program initiation and program participants vs. non-participants component medical costs by dual eligibility status, per patient per year

† Participant/non-participant difference is statistically significant

Quality Measures

All-cause 30-day hospital readmissions

Readmission within 30 days of discharge is often avoidable and can lead to adverse patient outcomes, increased mortality, and higher costs. Readmissions are triple weighted in the MA Five-Star Rating System, highlighting the importance of this measure. Readmission rates did not change significantly for program participants after joining (Figure 7), but both rates were consistent with a 5-Star rating on the measure using the Centers for Medicare & Medicaid Services (CMS) Medicare Advantage Prescription Drug (MAPD) plan 2019 cut points.

Readmission rates were significantly lower among program participants than in the comparison group during the same timeframe (p=0.0015; Figure 7). The 9.1% rate among non-participants represents a 3-Star rating compared to 5 Stars for participants (4.7%).

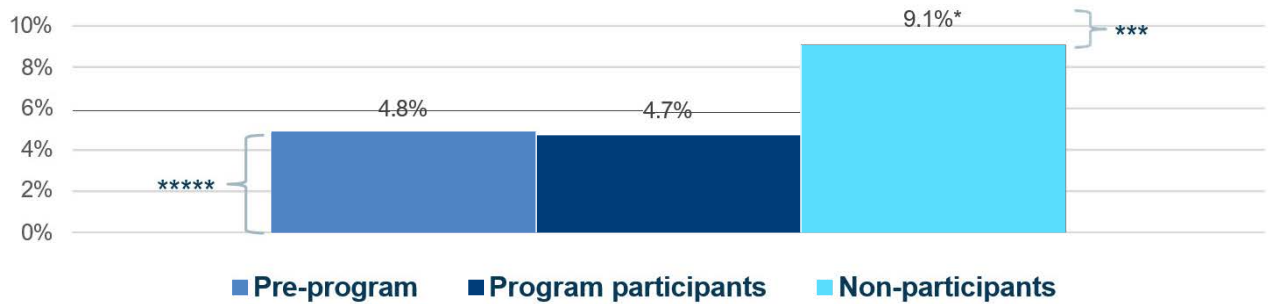


Figure 7. Pre/post program participants and participants vs. non-participants performance on plan all-cause 30-day readmissions quality measure

MAPD cut points 2019. 30-Day All Cause Readmissions measure: 5* ≤5%; 4* >5% - ≤8%, 3* >8% - ≤10%

Medication adherence

Adherence to prescribed medications has been shown to improve health outcomes and lower healthcare costs. CMS includes three measures of adherence (hypertension, diabetes, and cholesterol) in the MA Plan Five-Star Rating System and these measures receive triple weight in calculating overall plan ratings. Adherence measures assess the percentage of patients covered by prescription claims for at least 80% of the measurement period, the level above which the medication has a reasonable likelihood of achieving the most benefit based on clinical evidence.

Members' adherence to their hypertension medications increased significantly after joining the program, increasing the rating from 4 to 5 Stars based on 2019 CMS cut points (Figure 8). Adherence to diabetes and cholesterol medications was unchanged.

Program participants had better adherence to hypertension and cholesterol medications compared to non-participants (Figure 9). For hypertension, this represents the difference between a 3-Star and 5-Star rating and for cholesterol a 3-Star and 4-Star rating. Adherence to diabetes medications met the 4-Star threshold for both groups.

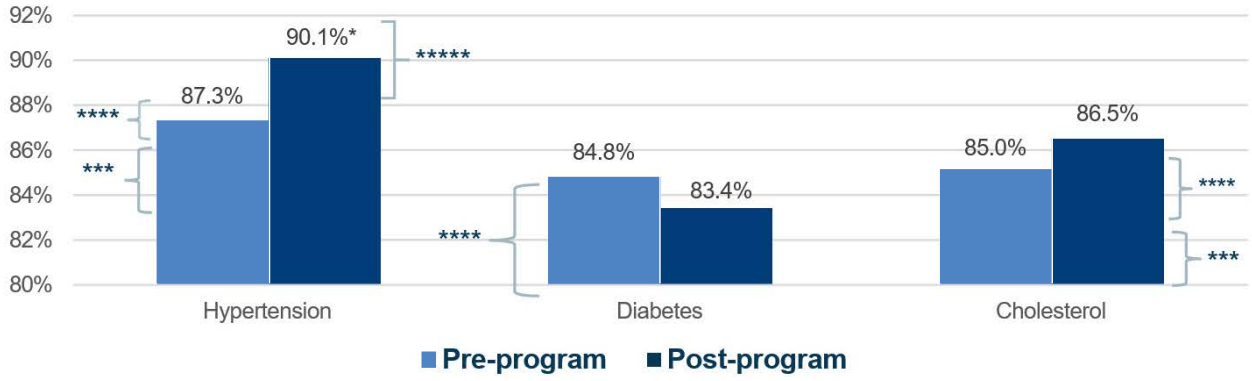


Figure 8. Pre/post program participants performance on medication adherence quality measures

MAPD cut points 2019. Hypertension: 5* ≥88%; 4* ≥86% - <88%, 3* ≥83% - <86;
Diabetes: 5* ≥85%; 4* ≥81% - <85%, 3* ≥78% - <81%; Cholesterol: 5* ≥87%; 4* ≥83% - <87%, 3* ≥77% - <83%

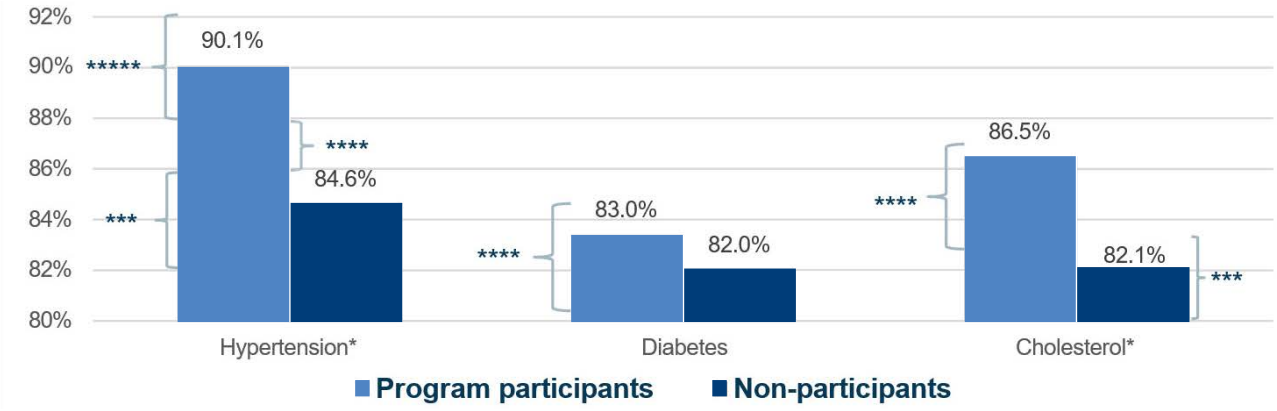


Figure 9. Program participants and MA non-participants performance on medication adherence quality measures

MAPD cut points 2019. Hypertension: 5* ≥88%; 4* ≥86% - <88%, 3* ≥83% - <86;
Diabetes: 5* ≥85%; 4* ≥81% - <85%, 3* ≥78% - <81%; Cholesterol: 5* ≥87%; 4* ≥83% - <87%, 3* ≥77% - <83%

Access to care - Preventive screenings and vaccinations

Preventive screenings are an important aspect of coordinated care and can lead to better outcomes, more efficient healthcare utilization, and lower cost of care for vulnerable Medicare beneficiaries. For example, mammograms are the best method to detect breast cancer early[30] which can lead to a greater range of treatment options and reduce the risk of dying by 20%.[31] After joining the fitness program, members were more likely to receive breast cancer screening (71.5% to 77.7%, p<.0001; Figure 10). The breast cancer screening rate of 78% represents a rating improvement from 3 to 4 Stars based on 2019 cut points.

Program participants were also more likely to receive colonoscopy screening after joining the program (16.0% to 21.1%, p<0.0001). Moreover, participants were more likely to receive preventive screenings than non-participants, including colonoscopy (21.1% vs. 16.4%; p<0.0001), breast cancer (77.7%

vs. 66.5%; p<0.0001), prostate cancer (25.3% vs. 20.9%; p=0.0217), depression (92.8% vs. 85.6%; p=0.0120), and cholesterol screening (53.1% vs. 49.7%; p=0.0258; Figure 11). (Note that, of these measures, only breast cancer screening is included in the CMS Five-Star Rating System for MA plans.)

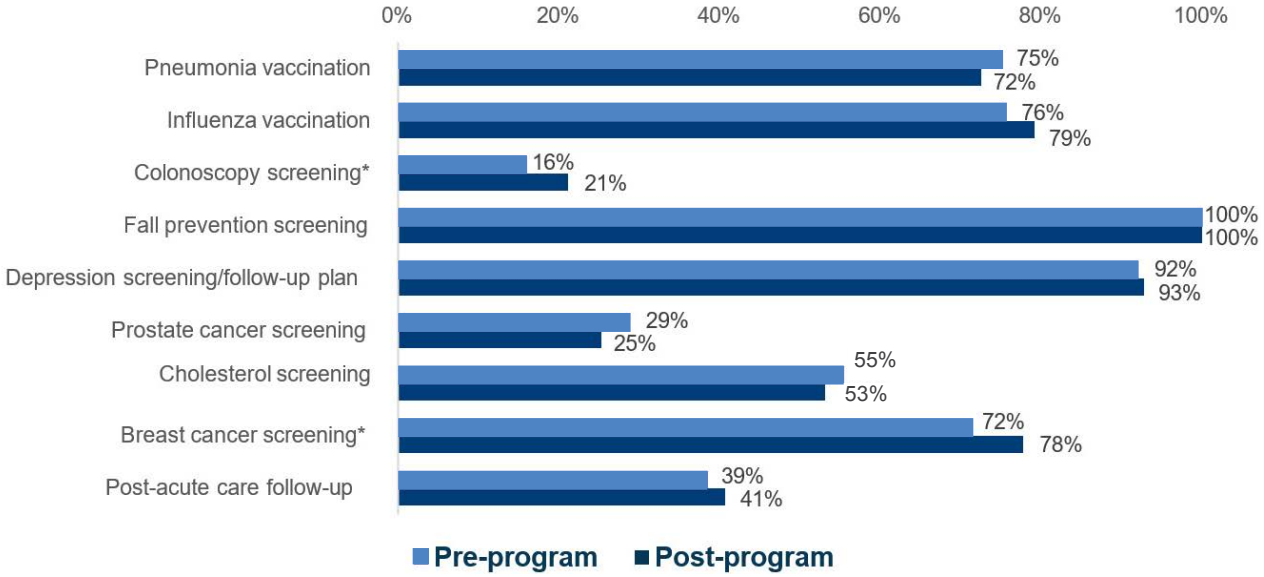


Figure 10. Pre/post program participants performance on vaccination and preventive screening quality measures

MAPD cut points 2019. Breast Cancer Screening: 5* ≥82%; 4* ≥76% - <82%, 3* ≥68% - <76%; differences in colonoscopy screening rates were significant but are not included in the MA Five-Star Rating System.

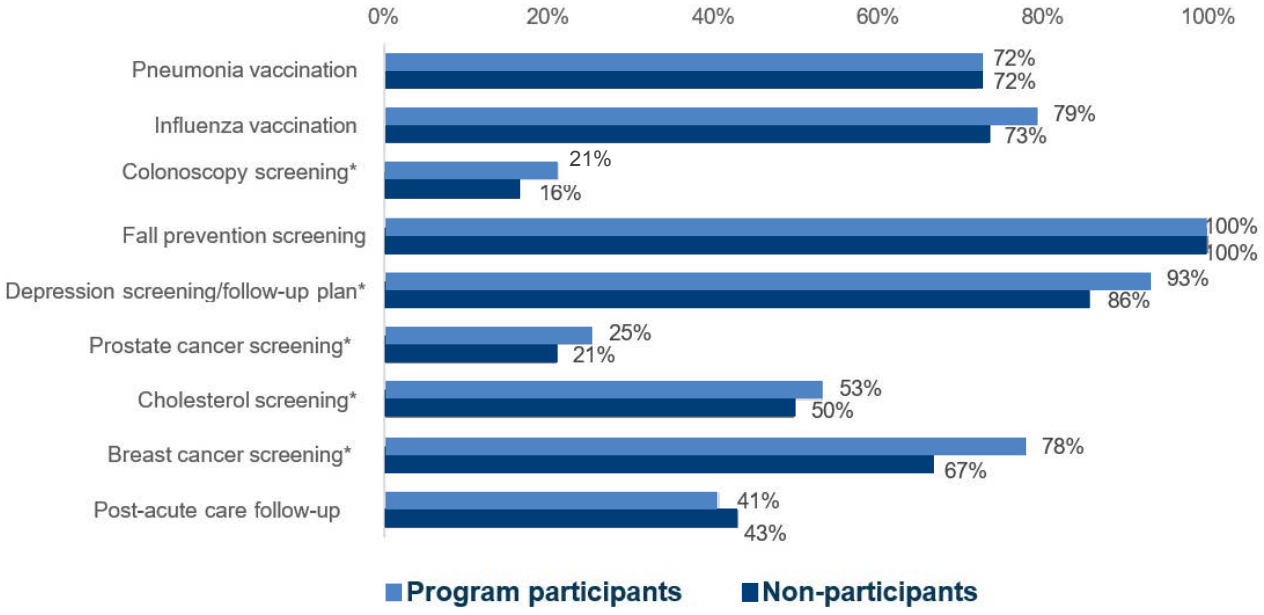


Figure 11. Program participants vs. non-participants performance on vaccination and preventive screening quality measures

MAPD cut points 2019. Breast Cancer Screening: 5* ≥82%; 4* ≥76% - <82%, 3* ≥68% - <76%; colonoscopy, depression, prostate, and cholesterol screening rates were significantly different but are not included in the MA FiveStar Rating System.

Access to care – Evidence-based screening in members with diabetes

Two quality measures evaluating key elements of recommended health screening among patients with diabetes were evaluated: hemoglobin A1c testing and eye (retinal) exams. The percentage of members receiving an HbA1c test increased significantly in the post-program period (92.0% to 95.0%, p=0.0176), but met the 5-Star threshold in both periods (Figure 12). Despite improved performance on the eye exam measure (46.0% to 54.2%, p=0.0011), the percentage of patients receiving screening for diabetic retinal disease in the six-month observation period was quite low, falling far short of the 3-Star threshold of 64%.

On both measures, the level of diabetes-related screening was significantly higher in program participants compared with non-participants; 95.0% of participants received HbA1c testing compared to 91.2% of non-participants (p<0.0001) and 54.2% of participants had a retinal exam compared to 47.7% of non-participants (p=0.0007; Figure 12).

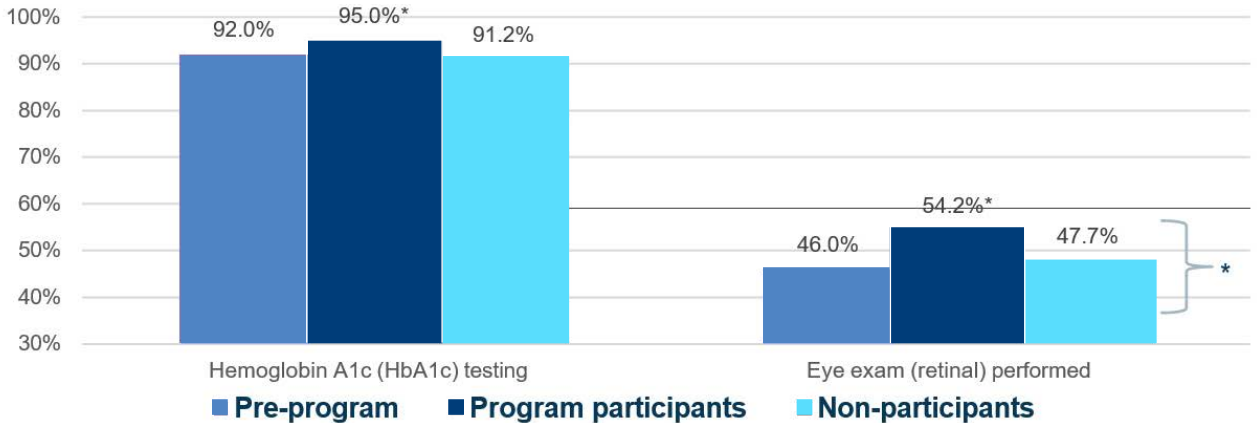


Figure 12. Pre/post program participants and non-participants performance on care for diabetics quality measures

MAPD cut points 2019. Diabetes Care Eye Exam: 5*≥78%, 4* ≥73% to <78%, 3* ≥69% to <73%. HbA1c testing is no longer a Five-Star measure.

Conclusions and Discussion

Inovalon Data Solutions' dual-design study, pre/post and matched-control, yielded consistent results regarding healthcare utilization, cost, and quality outcomes among program participants after the start of their involvement in the program and compared to matched non-participants. The results, based on a large national sample of members in multiple MA plans, strengthened findings of previously published studies and added to the evidence by evaluating key quality measure outcomes. The key findings show that Medicare beneficiaries who participated in the SilverSneakers senior fitness program had lower healthcare utilization, particularly inpatient hospitalizations and emergency department visits, after joining the program and compared to a propensity matched group of non-participants. Program participants also incurred lower total medical costs, driven mainly by lower spending on inpatient hospitalizations, but also lower use of post-acute care such skilled nursing facility stays, home health, and inpatient rehabilitation. Program participation was also associated with higher expenditures on outpatient visits and physician services and tests, but the higher spending in these areas did not offset the overall lower costs.

Cost savings stratified by key member characteristics revealed several results that may be counterintuitive to some: the largest cost savings were among fitness program members age 80+ (not among younger, healthier Medicare beneficiaries), among those with three or more chronic conditions (versus those with one or two conditions), and members enrolled in Medicare due to disability (versus those who joined Medicare at age 65).

Program participants had better performance on key measures of quality, including greater adherence to hypertension and cholesterol medications both after joining the program and compared to similar non-participants; lower rates of 30-day all-cause hospital readmissions compared to non-participants; and higher rates of vaccination and disease screening. Several of these results were associated with higher ratings on triple weighted measures included in the Centers for Medicare & Medicaid Services (CMS) Medicare Advantage Plan Five-Star Rating system.

Results from the pre/post and the matched-cohort analyses were largely consistent, suggesting that the study's findings reflect real-word improvement. This study's findings are also consistent with previous analyses of senior fitness programs that found decreased healthcare utilization and costs. Importantly, this study expands the evidence base by using a large national sample of program participants linked to their complete medical and pharmacy claims for a full 12 months and increases external validity by including a diverse set of MA plans. This study also added new evidence related to important measures of quality and access, and examined differences by age group, chronic disease burden, and disability status.

In general, the findings from the matched-control analyses were stronger – in terms of the number of measures with better performance and/or the strength of the relationships – than those from the pre/post analysis. Due to limitations inherent in using claims data, which are created

primarily for billing purposes, it is possible that the matched-cohort design may not be controlling completely for self-selection of members who join the fitness program. However, given the magnitude of significant differences in the metrics evaluated and the rigor of the propensity score matching approach (including the large number of member characteristics used in the matching process and the strong balance achieved between groups) the results clearly indicate a strong positive impact of the program on member outcomes. Indeed, it is possible that factors that might have attenuated the results in this study may, if addressed in future designs, reveal even stronger evidence in favor of the program.

Potential future design features might include extending the length of the observation period (some prior studies found bigger cost savings in the second year of participation), including social determinants of health factors to evaluate access and health equity among participants versus non-participants, and factoring in intensity of participation (i.e., number of fitness program visits or encounters) to further characterize the effects of different patterns of program participation on utilization, cost, and outcomes. A longer observation period might reveal stronger results for measures that require an extended observation period, such as receipt of retinal exams in patients with diabetes.

This study's pre/post design and inclusion of quality measures offers insights beyond what has previously been reported about SilverSneakers and similar fitness programs. Moreover, the inclusion of members in multiple MA plans throughout the U.S. indicate that the program's effects are not limited to a specific geographic area or a single health plan.

The results from this study suggest there is value and benefit of the fitness program approach to increasing physical and socialization activity among MA members. Participants were more likely to adhere to the medications they were taking for common chronic diseases and they appeared to utilize more lower-cost ambulatory care and less high-cost hospitalization, emergency department use, and post-acute services.

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