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## Health care utilization, care satisfaction, and health status for Medicare Advantage and traditional Medicare beneficiaries with and without Alzheimer disease and related dementias

**Sungchul Park, PhD,**

Department of Health Management and Policy, Dornsife School of Public Health, Drexel University, Philadelphia, PA

**Lindsay White, PhD,**

RTI International, Research Triangle Park, NC

**Paul Fishman, PhD,**

Department of Health Services, School of Public Health, University of Washington, Seattle, WA

**Eric B Larson, MD MPH,**

Kaiser Permanent Washington Health Research Institute, Seattle, WA

**Norma B Coe, PhD**

Department of Medical Ethics and Health Policy, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA

### Abstract

**Importance:** Compared to traditional fee-for-service Medicare (TM), Medicare Advantage (MA) plans may provide more efficient care for beneficiaries with Alzheimer disease and related dementias (ADRD) without compromising care quality.

**Objective:** To determine differences in health care utilization, care satisfaction, and health status for MA and TM beneficiaries with ADRD and without ADRD.

**Design, Setting, and Participants:** A retrospective cohort study of MA and TM beneficiaries with ADRD and without ADRD from all publicly available years of the Medicare Current Beneficiary Survey between 2010–2016. To address advantageous selection into MA plans, county-level MA enrollment rate was used as an instrument. Data were analyzed between July 2019 and December 2019.

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**Corresponding author:** Sungchul Park, PhD, Department of Health Management and Policy, Dornsife School of Public Health, Drexel University, Philadelphia, PA, 3215 Market St Nesbitt Hall, Philadelphia, PA, 19104, Tel: 267-359-6020 / smp462@drexel.edu. Author Contributions

Dr. Park had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: All authors.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Park, Coe.

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Park, Coe.

Obtained funding: Coe.

Administrative, technical, or material support: Park, Coe.

Supervision: Larson, Coe.

**Exposures:** MA enrollment.

**Main Outcomes and Measures:** Self-reported health care utilization, care satisfaction, and health status.

**Results:** Our sample included 47100 Medicare beneficiaries (44.1% female; mean [SD] age, 72.2 [11.4] years). Compared to TM beneficiaries with ADRD, MA beneficiaries with ADRD had lower utilization across the board (−22.3 medical provider visits [95% CI, −24.9 to −19.8], −2.3 outpatient hospital visits [95% CI, −3.6 to −1.1], −0.2 inpatient hospital admissions [95% CI, −0.3 to −0.1], and −0.1 long-term care facility stays [95% CI, −0.2 to −0.1]). A similar trend was observed among beneficiaries without ADRD, but the difference was greater between MA and TM beneficiaries with ADRD than between MA and TM beneficiaries without ADRD. Overall, no or negligible differences were detected in care satisfaction and health status between MA and TM beneficiaries with ADRD and without ADRD.

**Conclusions and Relevance:** Compared to TM beneficiaries, MA beneficiaries had lower health care utilization without compromising care satisfaction and health status. This is more pronounced among beneficiaries with ADRD. These suggest that MA plans may be delivering health care more efficiently than TM, especially for beneficiaries with ADRD.

Caring for people with Alzheimer disease and related dementias (ADRD) will generate substantial costs to the U.S. health care system. Both the number of individuals with ADRD and the associated costs are projected to increase over time. As of 2010, there were 4.5 million Americans with ADRD.<sup>1</sup> The number of Americans with ADRD is expected to be 13.2 million in 2050.<sup>1</sup> Additionally, mean per-person Medicare costs for Medicare beneficiaries with ADRD were estimated to be \$23497 in 2011, more than triple the average \$7223 Medicare costs for Medicare beneficiaries without ADRD.<sup>2,4</sup> Total costs (including health care, long-term care, and hospice services) for Medicare beneficiaries with ADRD are projected to rise from \$172 billion in 2010 to \$1.1 trillion in 2050.<sup>4</sup> Such a dramatic rise in the costs of ADRD will cause a substantial burden to the federal government.

Managed care provides opportunities to reduce the growth rate of health care costs. Medicare provides a managed care option—the Medicare Advantage (MA) program—that allows beneficiaries to enroll in private insurance plans rather than in traditional fee-for-service Medicare (TM). There are several differences between MA and TM, but perhaps the most important is that MA providers are paid on a capitated basis rather than for each service performed. Capitation creates the incentive for providers to be efficient in their approach to care because their revenue is fixed prospectively.<sup>6</sup> MA plans use various techniques to control health care utilization such as restricted provider networks, prior authorization, and utilization review, as well as investing in preventive services, care coordination, and chronic disease management.<sup>7–12</sup>

There is evidence that MA plans tended to enroll beneficiaries that are healthier on average and comparisons that use beneficiaries with similar health profiles have found lower health service utilization among MA beneficiaries than TM beneficiaries.<sup>7–10,13</sup> These results have been attributed in part to improved care coordination, chronic care management, provision of low-intensity care, and transitions to less expensive care settings in MA plans. Additionally, compared to TM beneficiaries, MA beneficiaries had lower hospital

readmission rates,<sup>8,9,14</sup> better clinical quality outcomes,<sup>15,16</sup> better patient experiences<sup>15,17</sup> and lower mortality rates.<sup>8,18</sup> These findings support the role that care coordination and management strategies among MA plans have the potential to improve the efficiency of care delivery without compromising care quality.

Within the literature addressing the role of MA plans in providing lower utilization with comparable quality to TM, we did not find any reference to the impact of MA plans among individuals diagnosed with ADRD. However, there is suggestive evidence of inefficient care delivery and health care utilization for TM beneficiaries with ADRD. A large proportion of health care utilization for beneficiaries with ADRD is due to transitions to high-cost settings such as an inpatient setting or skilled nursing facility,<sup>19–21</sup> some of which have been shown to be unnecessary or preventable.<sup>22–25</sup> Moreover, MA plans may make targeted improvements in the care management of beneficiaries with ADRD due to the growing volume of ADRD beneficiaries enrolled. Research found that after a new ADRD diagnosis, TM beneficiaries were more likely to switch to MA plans while MA beneficiaries were more likely to stay in MA plans.<sup>26</sup>

To address this gap, we examine health care utilization, care satisfaction, and health status among beneficiaries with ADRD in MA and TM. We compare our findings with those of a similar analysis among beneficiaries without ADRD to address the relative impact of MA enrollment.

## METHODS

### Data

We used the Medicare Current Beneficiary Survey (MCBS) and the Geographic Variation Public Use File. The MCBS provides a nationally representative sample of the Medicare population with a four-year follow-up. The data provides individual-level information on demographic, socioeconomic, health care utilization, care satisfaction, and health status characteristics. The Geographic Variation Public Use File provides county-level MA enrollment rates. Our analysis uses all publicly available data from 2010–2016.<sup>1</sup> This study was approved by the University of Pennsylvania’s institutional review board and received a waiver of informed consent and HIPPA authorization. This study follows the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline for cohort studies. Data were analyzed between between July 2019 and December 2019.

### Study Sample

We included Medicare beneficiaries 65 years or older with 12 months of continuous enrollment in MA or TM. We excluded those whose original eligibility was attributable to disability or end-stage renal disease and those who died. We then identified the following four groups: MA beneficiaries with ADRD, TM beneficiaries with ADRD, MA beneficiaries without ADRD, and TM beneficiaries without ADRD. We identified ADRD cases through

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<sup>1</sup>The 2014 MCBS data was never released.

the beneficiary or proxy survey responses to the following question: “Has a doctor ever told you that you had Alzheimer disease or dementia?”

## Variables

Our outcomes were self-reported health care utilization, care satisfaction, and health status. First, we assessed utilization for each of the following nine types of service: inpatient hospital admission, outpatient hospital visit, medical provider visit, home health visit, hospice stay, short-term facility stay (e.g., skilled nursing facility), long-term care facility stay (e.g., nursing home), prescription drug purchase measured as a single purchase of a single drug in a single container, and dental visit. Self-reported utilization for TM beneficiaries undergoes extensive validation using Medicare claims data and has generally been found to be accurate.<sup>27,28</sup> Second, we assessed the extent to which beneficiaries were satisfied with their plans in terms of care quality, out-of-pocket costs, access to specialists, follow-up after initial treatments, and physician’s concern for overall health. Satisfaction was measured in four levels: very dissatisfied, dissatisfied, satisfied, or very satisfied. Finally, we assessed self-reported general health status compared to same-age people and overall health status compared to a year ago. General health status compared to same-age people was measured in five levels: poor, fair, good, very good, or excellent. Overall health status compared to a year ago was measured in two levels: worse health or same/better health. A higher value indicates better care satisfaction or health status.

Our key independent variables were 12-months enrollment in MA, presence of ADRD, and its interaction term. To control for differences in sample characteristics among MA and TM beneficiaries, we included the following variables: age; gender; race/ethnicity; education level; income; Medicare/Medicaid dual eligibility; marital status; indicator for living with someone; residence in metro area; census region of residence; comorbidity; number of activities of daily living limitations; and year.

Research has found that healthy beneficiaries are more likely to enroll in MA than TM, suggesting advantageous selection would invalidate a direct comparison between MA and TM beneficiaries.<sup>29–32</sup> To address selection, we used an instrumental variable (IV) approach, using county-level MA enrollment rate as an instrument for the individual-level decision to enroll in MA plans. We calculated the county-level MA enrollment rate as the share of Medicare beneficiaries (aged 65 and older) enrolled in MA plans.

## Statistical Analysis

We estimated sample characteristics and outcomes and tested unadjusted differences between MA and TM beneficiaries with and without ADRD. We used chi-square tests for categorical variables and analysis of variance for continuous variables. Next, we performed a two-stage least squares regression model. In the first stage, we obtained the predicted likelihood of enrolling in MA plans while accounting for advantageous selection into MA plans based on the country-level MA enrollment rates. In the second stage, we estimated the association between predicted enrollment in MA plans from the first stage and the outcomes of interest. To assess whether the instrument was strong, we tested the relationship with MA enrollment and then examined *F* statistics, where greater than ten traditionally indicates a

strong instrument.<sup>33</sup> To assess whether the instrument was valid, we examined the association between the instrument and measured confounders because we cannot directly assess the association between the instrument and unmeasured confounders. Both stages adjusted for control variables described above and adjusted the standard errors for clustering within county.

Using the predictive marginal effects estimated from the two-stage least squares regression model, we estimated the predicted mean values of the outcomes for MA beneficiaries with ADRD, TM beneficiaries with ADRD, MA beneficiaries without ADRD, and TM beneficiaries without ADRD, respectively. We then performed post-estimation tests to estimate the differences in the outcomes between MA and TM beneficiaries with and without ADRD, respectively. We conducted several sensitivity analyses. First, we re-examined our analysis by using state-level MA enrollment rates because there may be some concern about the validity of the county-level MA enrollment rate as an instrument. Second, we adjusted the standard errors for clustering within individual and county. In our primary analysis, we treated the MBCS data for each year as an independent annual cross-sectional survey even though some beneficiaries were in the data over multiple years. We used survey weights to adjust sample characteristics to be representative of the Medicare population. All *P* values were from 2-sided tests and results were deemed statistically significant at  $p < 0.05$ .

## RESULTS

Our sample included 47100 Medicare beneficiaries (44.1% female; mean [SD] age, 72.2 [11.4] years) (Table 1). We identified 1006 MA beneficiaries with ADRD, 1841 TM beneficiaries with ADRD, 14880 MA beneficiaries without ADRD, and 29373 TM beneficiaries without ADRD. MA and TM beneficiaries with ADRD had similar sample characteristics. However, there were significant differences in sample characteristics between MA and TM beneficiaries without ADRD in terms of comorbidities. While there are statistical differences in the co-morbid conditions, MA beneficiaries without ADRD were not necessarily healthier than TM beneficiaries without ADRD.

Our unadjusted analysis showed that MA beneficiaries with ADRD tended to have lower health care utilization than TM beneficiaries with ADRD, but there were no significant differences in care satisfaction and health status (Table 2). Compared to TM beneficiaries with ADRD, MA beneficiaries with ADRD were more likely to have lower inpatient hospital admissions, outpatient hospital visits, medical provider visits, and long-term care facility stays, but they were more likely to have higher prescription drug purchases. A similar result was found among beneficiaries without ADRD. However, we observed no significant differences in care satisfaction and health status between MA and TM beneficiaries with ADRD. Significant differences in care satisfaction and health status were found between MA and TM beneficiaries without ADRD, but the differences were modest.

We found that the county-level MA enrollment rate was a strong and valid instrument. Greater MA enrollment was associated with a higher likelihood of enrolling in MA plans and *F* statistics were greater than ten (Table 3). Also, most individual-level control variables were balanced across values of the instrument.

Our IV analysis showed that MA beneficiaries with ADRD had lower levels of health care utilization than TM beneficiaries with ADRD (Table 4). Compared to TM beneficiaries with ADRD, MA beneficiaries with ADRD had lower utilization (–22.3 medical provider visits [95% CI, –24.9 to –19.8], –2.3 outpatient hospital visits [95% CI, –3.6 to –1.1], –0.2 inpatient hospital admissions [95% CI, –0.3 to –0.1], and –0.1 long-term care facility stays [95% CI, –0.2 to –0.1]). There were no significant differences in home health visits, short-term facility stays, prescription drug purchases, and dental visits. Similar trends were observed among beneficiaries without ADRD, in that MA beneficiaries had fewer medical provider visits, outpatient hospital visits, and inpatient hospital admissions than TM beneficiaries. However, there were several differences between beneficiaries with and without ADRD. First, the magnitude of the differences in medical provider visits, outpatient hospital visits, and inpatient hospital admissions was greater between beneficiaries with ADRD than between beneficiaries without ADRD (–15.0 medical provider visits [95% CI, –18.7 to –11.3], –1.7 outpatient hospital visits [95% CI, –3.0 to –0.3], and –0.1 inpatient hospital admissions [95% CI, –1.0 to 0.0]). Additionally, MA beneficiaries without ADRD had 19.4 more prescription drug purchases [95% CI, 10.4 to 28.5] than TM beneficiaries without ADRD.

Our IV analysis also showed that, overall, there were no significant differences in care satisfaction and health status between MA and TM beneficiaries with ADRD (except for satisfaction on physician’s concern for overall health) and without ADRD (except for general health status compared to same-age people) (Table 5).

Results are robust to using state-level MA enrollment rates as an instrument (Appendix Table 1) and clustering within individual and county (Appendix Tables 2 and 3).

## DISCUSSION

In an analysis of a nationally representative sample of the Medicare population, we found that compared to TM beneficiaries with ADRD, MA beneficiaries with ADRD had lower health care utilization, particularly for medical provider visits. A similar trend was observed among beneficiaries without ADRD, but the magnitude of the difference in health care utilization was larger between beneficiaries with ADRD than between beneficiaries without ADRD. On the other hand, no or marginal differences were detected in care satisfaction and health status between MA and TM beneficiaries with and without ADRD.

We observed that MA and TM beneficiaries with ADRD had similar demographic and health characteristics. We also found that there were differences in sample characteristics between MA and TM beneficiaries without ADRD, but this does not necessarily indicate that healthier beneficiaries were more likely to enroll in MA than TM. These results are consistent with the more recent literature, which suggests that there is little evidence to suggest that MA plans still enroll healthier beneficiaries than TM.<sup>8</sup> Similar sample characteristics of beneficiaries with ADRD is of particular interest because research found that beneficiaries have increasingly enrolled in MA plans when newly diagnosed with ADRD.<sup>26</sup> This may reflect preference of beneficiaries with ADRD for MA plans because MA plans have flexibility to provide enhanced services for complex and high-need patients

through coordinated care that addresses the medical, behavioral, and social aspects of the disease.

We also found that MA beneficiaries had fewer medical provider visits, outpatient hospital visits, and inpatient hospital admissions than TM beneficiaries, and these differences were more pronounced among beneficiaries with ADRD than beneficiaries without ADRD. The largest decrease was in medical provider visits. Medical provider visits are of particular interest because they measure individual events for a variety of medical services, equipment, and supplies, possibly reflecting a high intensity of care. Hence, higher medical provider visits among TM beneficiaries relative to MA beneficiaries may indicate inefficient care delivery in TM due to a lack of incentive to control utilization and coordinate care. Furthermore, the fee-for-service payment system under the TM system may incentivize more face-to-face visits, but MA plans have greater flexibility in the methods for delivering the care. For example, MA plans have provided additional telehealth services as a supplemental benefit, enabling MA enrollees to access to care without going to their providers. Further decreases in medical provider visits among MA enrollees are expected starting in 2020, when MA plans will be able to include telehealth as a basic government-funded benefit.<sup>35</sup> This is particularly relevant to beneficiaries with ADRD, who tend to have more frequent transitions and require care coordination.<sup>36,37</sup> Another notable finding is that MA beneficiaries with ADRD had lower inpatient hospital admissions than TM beneficiaries with ADRD. Although the magnitude of the difference in inpatient hospital admissions between MA and TM beneficiaries with ADRD was modest, lower inpatient hospital admissions among MA beneficiaries with ADRD are notable because hospitalizations may adversely affect the health status of beneficiaries with ADRD by increasing the risk of nosocomial infections, falls, and cognitive decline.<sup>38,39</sup>

We detected no differences in care satisfaction between MA and TM beneficiaries with or without ADRD. This finding provides suggestive evidence that MA plans may not tailor benefit packages to selectively attract healthy beneficiaries, leading to decreased advantageous selection over time.<sup>8,40,41</sup> However, there is evidence showing that advantageous selection has decreased, but not eliminated. Specifically, 11% and 2% of MA beneficiaries voluntarily switched to another MA plan or TM, respectively.<sup>42</sup> Particularly, switching to TM was high among MA beneficiaries with high-need, high-cost.<sup>30–32,42–44</sup> High disenrollment rates were partly attributable to poor patient experience.<sup>45</sup>

There were no or negligible differences in health status between MA and TM beneficiaries with or without ADRD. This result suggests that lower health care utilization among MA beneficiaries may not be attributable to under-provision of care and thus not come at the cost of poorer care quality. Rather, MA plans may achieve lower health care utilization through high efficiency of care. This contributes to the growing literature showing that TM lacks a direct financial incentive to control utilization which could lead to excess care provision that does not improve patient outcomes.<sup>8,14,46</sup> Research found that MA beneficiaries had increased inpatient utilization and total charges by 60% and 50%, respectively, when they were forced out of MA plans due to plan exit. However, the increases in utilization and charges were not associated with any measurable reduction in hospital quality or patient mortality.<sup>38</sup>

## Limitations

Our study has several limitations. First, our variables may be subject to self-reporting errors. Although self-reported utilization for MA beneficiaries was not validated, this is less likely to affect our findings because self-reported utilization for TM beneficiaries has been found to be accurate based on validation using Medicare claims data. Second, our findings for beneficiaries with ADRD may be confounded by proxy response since about 55% of them relied on proxy response, although there is not a differential proxy response rate by MA versus TM. Third, we did not detect differences in patient satisfaction, and this could be due to sample size. Our power analysis suggests that we could detect significant differences in patient satisfaction by 5–57%, depending on outcome. Fourth, we found that MA and TM beneficiaries had similar comorbidities characteristics. However, comorbidities might not be equal across MA and TM due to aggressive diagnostic coding in MA plans.<sup>47,48</sup> Fifth, research found that MA beneficiaries disenrolled from their plans following health shocks.<sup>31</sup> Requiring 12-months continuous enrollment in MA or TM to ensure accurate health plan attribution may lead to some selection on care satisfaction. Finally, due to the coarse measurements available, we could not account for the severity of ADRD.

## CONCLUSIONS

Compared to TM beneficiaries, MA beneficiaries had lower health care utilization without compromising care satisfaction and health status, particularly among beneficiaries with ADRD. These suggest that MA plans may be more efficient at delivering health care for beneficiaries with ADRD.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## ACKNOWLEDGEMENT

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### Key Points

**Question:**

Are there differences in health care utilization, care satisfaction, and health status among Medicare beneficiaries with Alzheimer disease and related dementias (ADRD) enrolled in Medicare Advantage (MA) versus traditional Medicare (TM)?

**Findings:**

In a retrospective cohort study using the Medicare Current Beneficiary Survey, we found that MA beneficiaries with ADRD had significantly less health care utilization than TM beneficiaries with ADRD, especially for medical provider visits. Overall, there were no differences in care satisfaction and health status.

**Meaning:**

These suggest that MA plans may achieve lower health care utilization through high efficiency of care rather than under-provision of care.

**Table 1.**

Sample characteristics of traditional Medicare and Medicare Advantage beneficiaries with and without Alzheimer disease and related dementias.

Characteristics	With ADRD			Without ADRD		
	TM beneficiaries (n = 1841)	MA beneficiaries (n = 1006)	P value	TM beneficiaries (n = 29373)	MA beneficiaries (n = 14880)	P value
Age, Mean (SD)	77.56 (12.0)	77.14 (11.0)	0.271	71.56 (11.9)	72.54 (9.8)	<.0001
Female, N (%)	1089 (59.2)	610 (60.6)	0.440	15966 (54.4)	8235 (55.3)	0.049
Race/ethnicity, N (%)			<.0001			<.0001
Non-Latino white	1376 (74.7)	680 (67.6)		24002 (81.7)	10753 (72.3)	
Non-Latino black	235 (12.8)	119 (11.8)		2790 (9.5)	1649 (11.1)	
Non-Latino Asian	51 (2.8)	12 (1.2)		384 (1.3)	253 (1.7)	
Latino	154 (8.4)	178 (17.7)		1801 (6.1)	2019 (13.6)	
Others	69 (3.7)	40 (4.0)		973 (3.3)	402 (2.7)	
Education, N (%)			0.078			<.0001
Less than high school	578 (31.4)	363 (36.1)		6055 (20.6)	3500 (23.5)	
High school completion	636 (34.5)	325 (32.3)		10786 (36.7)	5574 (37.5)	
Some college or associate's degree	279 (15.2)	154 (15.3)		6166 (21.0)	2912 (19.6)	
Bachelor's degree	167 (9.1)	88 (8.7)		3466 (11.8)	1584 (10.6)	
Advanced degree	156 (8.5)	66 (6.6)		2800 (9.5)	1270 (8.5)	
Income, N (%)			0.003			<.0001
Less than \$25000	974 (52.9)	607 (60.3)		12639 (43.0)	6937 (46.6)	
\$25000-\$50000	745 (40.5)	355 (35.3)		15121 (51.5)	7296 (49.0)	
More than \$50000	36 (2.0)	15 (1.5)		561 (1.9)	216 (1.5)	
Dual eligibility for Medicare and Medicaid, N (%)	465 (25.3)	232 (23.1)	0.580	5876 (20.0)	2349 (15.8)	<.0001
Married, N (%)	811 (44.1)	454 (45.1)	0.193	14121 (48.1)	7691 (51.7)	<.0001
Living with others, N (%)			0.405			
Living alone	451 (24.5)	221 (22.0)		9421 (32.1)	4570 (30.7)	
Living with spouse	764 (41.5)	424 (42.1)		13472 (45.9)	7282 (48.9)	
Living with non-spouse family	568 (30.9)	323 (32.1)		5368 (18.3)	2521 (16.9)	
Living with non-relatives	58 (3.2)	38 (3.8)		1112 (3.8)	507 (3.4)	
Residence in metro area, N (%)	1259 (68.4)	864 (85.9)	<.0001	19954 (67.9)	12504 (84.0)	<.0001
Census region of residence, N (%)			<.0001			<.0001
New England	53 (2.9)	19 (1.9)		1014 (3.5)	314 (2.1)	
Middle Atlantic	203 (11.0)	158 (15.7)		3593 (12.2)	2343 (15.7)	
East North Atlantic	311 (16.9)	151 (15.0)		5350 (18.2)	2448 (16.5)	
West North Atlantic	110 (6.0)	60 (6.0)		2256 (7.7)	989 (6.6)	
South Atlantic	430 (23.4)	190 (18.9)		6537 (22.3)	2843 (19.1)	
East South Central	213 (11.6)	55 (5.5)		2847 (9.7)	792 (5.3)	
West South Central	228 (12.4)	91 (9.0)		2999 (10.2)	1281 (8.6)	
Mountain	113 (6.1)	87 (8.6)		2152 (7.3)	1331 (8.9)	

Characteristics	With ADRD			Without ADRD		
	TM beneficiaries (n = 1841)	MA beneficiaries (n = 1006)	P value	TM beneficiaries (n = 29373)	MA beneficiaries (n = 14880)	P value
Pacific	168 (9.1)	139 (13.8)		2531 (8.6)	1938 (13.0)	
Puerto Rico	12 (0.7)	56 (5.6)		94 (0.3)	601 (4.0)	
Comorbidity, N (%)						
Hardening of arteries	320 (17.4)	147 (14.6)	0.056	2923 (10.0)	1333 (9.0)	0.001
Hypertension	1382 (75.1)	775 (77.0)	0.241	19919 (67.8)	10519 (70.7)	<.0001
Heart attack	332 (18.0)	181 (18.0)	0.978	3651 (12.4)	1871 (12.6)	0.661
Stroke	467 (25.4)	272 (27.0)	0.331	3041 (10.4)	1535 (10.3)	0.909
Coronary heart disease	312 (16.9)	147 (14.7)	0.113	3272 (11.1)	1584 (10.7)	0.119
Cancer	705 (38.3)	357 (35.5)	0.139	10797 (36.8)	5043 (33.9)	<.0001
Rheumatoid arthritis	447 (24.3)	228 (22.7)	0.329	4424 (15.1)	2445 (16.4)	<.0001
Osteoporosis	589 (32.0)	316 (31.4)	0.750	6333 (21.6)	3381 (22.7)	0.005
Asthma/COPD	411 (22.3)	257 (25.5)	0.052	6234 (21.2)	2929 (19.7)	<.0001
Diabetes	542 (29.4)	330 (32.8)	0.063	7760 (26.4)	4502 (30.3)	<.0001
Mental illness	371 (20.2)	191 (19.0)	0.455	2977 (10.1)	1052 (7.1)	<.0001
Depression	940 (51.1)	501 (49.8)	0.521	8168 (27.8)	3813 (25.6)	<.0001
Number of ADLs limitations, N (%)			0.010			<.0001
0	245 (13.3)	174 (17.3)		13871 (47.3)	7691 (51.7)	
1–2	254 (13.8)	120 (12.0)		5855 (19.9)	2927 (19.7)	
3+	1339 (72.9)	709 (70.7)		9627 (32.8)	4251 (28.6)	
Year, N (%)			<.0001			<.0001
2010	333 (18.1)	142 (14.1)		5471 (18.6)	2106 (14.2)	
2011	365 (19.8)	155 (15.4)		5460 (18.6)	2325 (15.6)	
2012	356 (19.3)	169 (16.8)		5454 (18.6)	2630 (17.7)	
2013	355 (19.3)	190 (18.9)		5210 (17.7)	2603 (17.5)	
2015	229 (12.4)	193 (19.2)		4272 (14.5)	2848 (19.1)	
2016	203 (11.0)	157 (15.6)		3506 (11.9)	2368 (15.9)	

Abbreviations: ADRD, Alzheimer disease and related dementias; TM, traditional Medicare; MA Medicare Advantage, SD; standard deviation; COPD, chronic obstructive pulmonary disease; ADLs, Activities of daily living.

Table 2.

Health care utilization, care satisfaction, and health status of traditional Medicare and Medicare Advantage beneficiaries with and without Alzheimer disease and related dementias.

Outcomes	With ADRD			Without ADRD		
	TM beneficiaries	MA beneficiaries	P value	TM beneficiaries	MA beneficiaries	P value
Health care utilization, Mean (SD)						
Inpatient hospital admission (n = 47100)	0.5 (1.0)	0.3 (0.6)	<0.001	0.2 (0.7)	0.2 (0.5)	<0.001
Outpatient hospital visit (n = 47100)	6.1 (10.2)	3.5 (9.6)	<0.001	5.6 (9.4)	2.6 (6.3)	<0.001
Medical provider visit <sup>a</sup> (n = 47100)	39.7 (39.0)	17.3 (19.0)	<0.001	31.7 (32.8)	14.2 (20.4)	<0.001
Home health visit (n = 47100)	67.0 (159.3)	67.4 (176.5)	0.950	14.3 (85.0)	10.8 (63.0)	<0.001
Hospice stay (n = 47100)	0.0 (0.2)	0.0 (0.2)	0.111	0.0 (0.1)	0.0 (0.1)	0.326
Short-term facility stay (n = 47100)	0.3 (1.1)	0.1 (0.4)	<0.001	0.1 (0.4)	0.0 (0.3)	<0.001
Long-term facility stay (n = 47100)	0.0 (0.1)	0.0 (0.1)	0.646	0.0 (0.0)	0.0 (0.0)	0.595
Prescription drug purchase <sup>b</sup> (n = 33671)	58.5 (52.4)	65.5 (54.9)	<0.001	41.5 (46.5)	44.2 (47.8)	<0.001
Dental visit (n = 47100)	1.0 (2.2)	0.9 (1.6)	0.211	1.5 (2.2)	1.3 (2.1)	<0.001
Care satisfaction <sup>c</sup> , Mean (SD)						
Quality of medical care (n = 25533)	3.8 (0.6)	3.9 (0.5)	0.097	3.8 (0.7)	3.8 (0.7)	<0.001
OOP costs for medical care (n = 34274)	3.7 (0.7)	3.6 (0.8)	0.288	3.6 (0.8)	3.6 (0.7)	0.023
Available care by specialists (n = 32777)	3.6 (1.0)	3.6 (0.9)	0.196	3.5 (1.1)	3.5 (1.0)	0.006
Follow-up after initial treatments (n = 33389)	3.5 (1.1)	3.5 (1.1)	0.891	3.4 (1.2)	3.3 (1.2)	<0.001
Physician's concern for overall health (n = 31423)	3.8 (0.6)	3.9 (0.5)	0.090	3.8 (0.7)	3.8 (0.7)	<0.001
Health status <sup>c</sup> , Mean (SD)						
General health status compared to same-age people (n = 46859)	2.7 (1.0)	2.7 (1.0)	0.587	3.2 (0.9)	3.2 (0.9)	<0.001
Overall health status compared to a year ago (n = 46970)	0.6 (0.5)	0.6 (0.5)	0.078	0.8 (0.4)	0.8 (0.4)	0.003

Abbreviations: ADRD, Alzheimer disease and related dementias; TM, traditional Medicare; MA, Medicare Advantage; SD, standard deviation, OOP, out-of-pocket.

<sup>a</sup>The unit of measurement is a separate visit, procedure, service, or a supplied item.

<sup>b</sup>The unit of measurement is a single purchase of a single drug in a single container.

<sup>c</sup>A higher value indicates better care satisfaction or health status.

**Table 3.** Results from first-stage regression of county-level Medicare Advantage enrollment on Medicare Advantage enrollment

	MA enrollment									
	Health care utilization except for prescription drug purchase	Prescription drug purchase	Quality of medical care	OOP costs for medical care	Available care by specialists	Follow-up after initial treatments	Physician's concern for overall health	General health status compared to same-age people	Overall health status compared to a year ago	
County-level MA enrollment <sup>a</sup>	0.009 (0.008 to 0.010)	0.010 (0.009 to 0.011)	0.009 (0.008 to 0.011)	0.009 (0.008 to 0.010)	0.009 (0.008 to 0.010)	0.009 (0.008 to 0.010)	0.008 (0.009 to 0.011)	0.009 (0.008 to 0.011)	0.009 (0.008 to 0.010)	
Observations	47100	33671	25533	34274	32777	33389	31423	46859	46970	
R-Squared	0.159	0.187	0.161	0.156	0.161	0.159	0.161	0.159	0.159	
F-statistics	289.35	184.56	289.20	341.04	287.27	335.76	287.15	288.64	278.22	

Abbreviations: MA, Medicare Advantage; OOP, out-of-pocket.

<sup>a</sup>The unit of measurement is the share of Medicare beneficiaries (aged 65 and older) enrolled in MA plans at the country level.



**Table 4.**

Differences in health care utilization between traditional Medicare and Medicare Advantage beneficiaries with and without Alzheimer disease and related dementias.

Outcomes	Adjusted predictions, mean (95% CI) <sup>a</sup>					
	With ADRD			Without ADRD		
	TM beneficiaries	MA beneficiaries	Differences among MA beneficiaries relative to TM beneficiaries	TM beneficiaries	MA beneficiaries	Differences among MA beneficiaries relative to TM beneficiaries
Number of health care utilization						
Inpatient hospital admission (n = 47100)	0.47 (0.4 to 0.5)	0.3 (0.2 to 0.3)	-0.2 (-0.3 to -0.1)	0.2 (0.2 to 0.3)	0.2 (0.1 to 0.2)	-0.1 (-0.1 to -0.0)
Outpatient hospital visit (n = 47100)	6.0 (5.3 to 6.7)	3.7 (2.7 to 4.7)	-2.3 (-3.6 to -1.1)	5.2 (4.6 to 5.7)	3.5 (2.6 to 4.3)	-1.7 (-3.0 to -0.3)
Medical provider visit <sup>b</sup> (n = 47100)	39.7 (37.5 to 41.9)	17.4 (16.0 to 18.8)	-22.3 (-24.9 to -19.8)	30.8 (29.4 to 32.2)	15.8 (13.3 to 18.2)	-15.0 (-18.7 to -11.3)
Home health visit (n = 47100)	66.4 (57.3 to 75.6)	69.3 (55.5 to 83.0)	2.8 (-12.7 to 18.4)	11.9 (9.1 to 14.8)	15.2 (9.6 to 20.8)	3.3 (-4.9 to 11.4)
Hospice stay (n = 47108)	0.0 (0.0 to 0.1)	0.0 (0.0 to 0.0)	-0.0 (-0.0 to 0.0)	0.0 (0.0 to 0.0)	0.0 (0.0 to 0.0)	0.0 (0.0 to 0.0)
Short-term facility stay (n = 47100)	0.3 (0.2 to 0.3)	0.1 (0.1 to 0.1)	-0.1 (-0.2 to -0.1)	0.1 (0.1 to 0.1)	0.0 (-0.0 to 0.1)	-0.0 (-0.1 to 0.0)
Long-term facility stay (n = 47100)	0.0 (0.0 to 0.0)	0.0 (0.0 to 0.0)	0.0 (-0.0 to 0.0)	0.0 (0.0 to 0.0)	0.0 (0.0 to 0.0)	0.0 (-0.0 to 0.0)
Prescription drug purchase <sup>c</sup> (n = 33671)	67.5 (63.0 to 72.0)	71.9 (67.8 to 76.0)	4.4 (-1.6 to 10.5)	40.5 (36.3 to 44.6)	59.9 (54.6 to 65.2)	19.4 (10.4 to 28.5)
Dental visit (n = 47100)	1.0 (0.9 to 1.1)	0.9 (0.8 to 1.0)	-0.1 (-0.3 to 0.1)	1.4 (1.3 to 1.5)	1.5 (1.3 to 1.6)	0.1 (-0.2 to 0.3)

Abbreviations: ADRD, Alzheimer disease and related dementias; TM, traditional Medicare; MA, Medicare Advantage.

<sup>a</sup>A two-stage least square regression model was used and county-level MA penetration was used as an instrument. Both stages adjusted the standard errors for clustering within county.

<sup>b</sup>The unit of measurement is a separate visit, procedure, service, or a supplied item.

<sup>c</sup>The unit of measurement is a single purchase of a single drug in a single container.

**Table 5.**

Differences in care satisfaction and health status between traditional Medicare and Medicare Advantage beneficiaries with and without Alzheimer disease and related dementias.

Outcomes	Adjusted predictions, mean (95% CI) <sup>d</sup>					
	With ADRD		Without ADRD		Differences among MA beneficiaries relative to TM beneficiaries	
	TM beneficiaries	MA beneficiaries	TM beneficiaries	MA beneficiaries	MA beneficiaries	MA beneficiaries
<i>Care satisfaction<sup>b</sup></i>						
Quality of medical care (n = 25533)	3.8 (3.8 to 3.7)	3.9 (3.8 to 3.9)	3.8 (3.7 to 3.8)	3.8 (3.7 to 3.8)	3.8 (3.7 to 3.8)	-0.0 (-0.1 to 0.1)
OOP costs for medical care (n = 34274)	3.7 (3.6 to 3.7)	3.6 (3.6 to 3.7)	3.7 (3.6 to 3.7)	3.5 (3.4 to 3.7)	3.5 (3.4 to 3.7)	-0.1 (-0.4 to 0.1)
Available care by specialists (n = 32777)	3.5 (3.5 to 3.6)	3.6 (3.6 to 3.7)	3.5 (-0.0 to 0.2)	3.5 (3.4 to 3.6)	3.6 (3.5 to 3.7)	0.1 (-0.1 to 0.3)
Follow-up after initial treatments (n = 33389)	3.5 (3.4 to 3.5)	3.5 (3.4 to 3.6)	3.4 (3.3 to 3.5)	3.2 (3.1 to 3.4)	3.2 (3.1 to 3.4)	-0.2 (-0.4 to 0.0)
Physician's concern for overall health (n = 31423)	3.8 (3.8 to 3.8)	3.9 (3.8 to 3.9)	3.8 (3.7 to 3.8)	3.8 (3.7 to 3.8)	3.8 (3.7 to 3.8)	0.0 (-0.1 to 0.1)
<i>Health status<sup>b</sup></i>						
General health status compared to same-age people (n = 46859)	2.7 (2.6 to 2.7)	2.7 (2.6 to 2.8)	3.2 (3.2 to 3.3)	3.1 (3.0 to 3.2)	3.1 (3.0 to 3.2)	-0.1 (-0.2 to -0.1)
Overall health status compared to a year ago (n = 46970)	0.6 (0.6 to 0.6)	0.6 (0.6 to 0.7)	0.8 (0.8 to 0.8)	0.8 (0.8 to 0.8)	0.8 (0.8 to 0.8)	-0.0 (-0.1 to 0.0)

Abbreviations: ADRD, Alzheimer disease and related dementias; TM, traditional Medicare; MA, Medicare Advantage; OOP, out-of-pocket.

<sup>a</sup> A two-stage least square regression model was used and county-level MA penetration was used as an instrument. Both stages adjusted the standard errors for clustering within county.

<sup>b</sup> A higher value indicates better care satisfaction or health status.