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Differences in health care utilization, process of diabetes care, care satisfaction, and health status in patients with diabetes in Medicare Advantage vs traditional Medicare

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Abstract

Objectives: To determine differences in health care utilization, process of diabetes care, care satisfaction, and health status for Medicare Advantage (MA) and traditional Medicare (TM) beneficiaries with and without diabetes.

Methods: Using the 2010–2016 Medicare Current Beneficiary Survey, we identified MA and TM beneficiaries with and without diabetes. To address endogenous plan choice between MA and TM, we used an instrumental variable approach. Using marginal effects, we estimated differences in the outcomes between MA and TM beneficiaries with and without diabetes.

Results: Our instrumental variable analysis showed that compared to TM beneficiaries with diabetes, MA beneficiaries with diabetes had less annual health care utilization, including –22.4 medical provider visits (95% CI: –23.6 to –21.1) and –3.4 outpatient hospital visits (95% CI: –3.8 to –3.0). A significant difference between MA and TM beneficiaries without diabetes was only observed in medical provider visits and the difference was greater among beneficiaries with diabetes than beneficiaries without diabetes (–12.5 medical provider visits [95% CI: –15.9 to

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Conflicts of Interest:

None

–9.2]). While we did not detect significant differences in five measures of process of diabetes care between MA and TM beneficiaries with diabetes, there were inconsistent results in the other three measures. There were no or marginal differences in care satisfaction and health status between MA and TM beneficiaries with and without diabetes.

Conclusions: MA enrollment was associated with lower health care utilization without compromising care satisfaction and health status, particularly for beneficiaries with diabetes. MA may have a more efficient care delivery system for beneficiaries with diabetes.

Medicare Advantage (MA) provides a managed care alternative for Medicare beneficiaries to receive Parts A and B benefits through private health plans rather than traditional fee-for-service Medicare (TM) administered by the Centers for Medicare and Medicaid Services. Over the past two decades, MA enrollment has increased dramatically, growing from 5.3 million in 2004 to 19.0 million in 2017, which now reflects about 37 percent of all Medicare beneficiaries.¹ As a result of this enrollment growth, there is increasing interest in understanding the role of MA within the Medicare program, as this can provide context for the policy debate regarding Medicare-for-all and proposals to expand Medicare to include a public option.

MA has the potential to improve the efficiency of health care delivery without compromising care quality. MA plans are paid on a capitated basis rather than for each service performed, creating the incentive for more efficient care delivery.² Prior studies have found that healthier beneficiaries were more likely to enroll in MA than TM.^{2–7} When MA beneficiaries are compared to a matched group of TM beneficiaries, MA beneficiaries tend to have more primary and preventive care services⁸ and lower health care utilization^{9–16} than TM beneficiaries. Additionally, MA beneficiaries have better clinical quality outcomes,^{17,18} better patient experiences,^{17,19} lower hospital readmission rates,^{11,12,14} and lower mortality rates^{7,11} relative to TM beneficiaries. Efficient provision of care for MA beneficiaries is attributable to MA plans' using utilization review, care coordination, disease management, provision of high-value care, and use of less expensive care settings. Indeed, MA contracts spent a relatively high proportion of revenues on activities to improve quality or outcomes.²⁰

An understudied question is whether MA enrollment leads to better outcomes and lower cost among beneficiaries with the most prevalent and costly chronic conditions. Diabetes is of high relevance and importance because it is one of the most prevalent and costly chronic conditions in the United States.^{21,22} As of 2015, diabetes prevalence is approximately 9.4 percent of the US population or 30.3 million individuals²¹ with direct and indirect costs estimates of \$327 billion in 2017.²² The burden of diabetes is particularly acute to Medicare as the average cost of medical care for individuals with diabetes over age 65 is more than double that of younger adults (\$13,239 vs \$6,675).²² Moreover, the number of Americans with diabetes is projected to increase over time with this growth concentrated among people aged 65 years or older.²³

Although there are a few studies showing that MA beneficiaries with diabetes had lower health care utilization^{10,13} and spending¹³, better clinical process for diabetes care,^{10,13,17} and lower rates of diabetes complication¹³ than TM beneficiaries with diabetes, the findings from these studies are limited in several aspects. Most importantly, the extant literature does

not account for differences in MA and TM populations that result from selection bias into the MA program. There is evidence that MA tends to attract healthier Medicare beneficiaries,^{2–7} indicating that advantageous selection would invalidate a direct comparison between MA and TM beneficiaries with diabetes. None of the studies we reviewed address this potential source of bias, thus making it difficult to assess the validity of observed differences in outcomes. Also, prior studies focused on only selected outcomes in health care utilization and quality of care. Interpreting these results is challenging as lower health care utilization may lead to poorer quality, particularly for outcomes the studies did not examine.

To address this gap, we examined differences in health care utilization, process of diabetes care, care satisfaction, and health status between MA and TM beneficiaries with diabetes by adopting an instrumental variable (IV) approach, a method to adjust for confounding by selection by achieving a pseudo-randomization within observational settings. Then, we compared our findings with those of a similar analysis among those without diabetes. Comparison of these differences can provide suggestive evidence as to whether beneficiaries with diabetes are more efficiently dealt with in MA versus TM.

METHODS

Data

We used data from the Medicare Current Beneficiary Survey (MCBS) and the Geographic Variation Public Use File. The MCBS is a nationally representative survey of Medicare beneficiaries. The data provide information collected from surveys and claims data. Since claims data for MA beneficiaries were not released, we only used the survey data. Participants were interviewed three times per year in person or by phone. Although some beneficiaries were included in the data over the course of multiple years, we treated the data for each year as an independent annual cross-sectional survey. The Geographic Variation Public Use File contains county-level MA penetration rates. We used all publicly available data from 2010–2016. The 2014 MCBS data was never released.

Study Sample

We first identified Medicare beneficiaries 65 years or older with 12 calendar months of continuous enrollment in MA or TM. We excluded those who died within the year and those whose original eligibility was attributable to end-stage renal disease or disability. We then categorized subjects into four mutually exclusive groups: MA beneficiaries with diabetes, TM beneficiaries with diabetes, MA beneficiaries without diabetes, and TM beneficiaries without diabetes. Diabetes prevalence was determined based on self-reported answer to the following question: “Has a doctor ever told you that you had diabetes?”

Outcome Measures

Our outcome variables were self-reported health care utilization, process of diabetes care, care satisfaction, and health status for a given year. First, we assessed health care utilization for the following six types of service: inpatient hospital admission, outpatient hospital visit, medical provider visit, home health visit, prescription drug purchase measured as a single

purchase of a single drug in a single container, and dental visit. Second, we assessed process of diabetes care for the following eight measures: insulin use, medication use, check for sores on feet, blood sugar (glucose) test, blood pressure check at home, comprehensive foot exam, hemoglobin A1C (HbA1C) test, and well controlled blood sugar. Process of diabetes care was assessed in two levels: yes or no. Third, we assessed care satisfaction with their health plans using the following five measures: care quality, out-of-pocket costs, access to specialists, follow-up after initial treatments, and physician's concern for overall health. Care satisfaction was assessed in four levels: very dissatisfied, dissatisfied, satisfied, or very satisfied. Finally, we assessed health status using the following two subjective measures: general health status compared with same-age people and overall health status compared with a year ago. General health status compared with same-age people was assessed in five levels: poor, fair, good, very, or excellent. Overall health status compared with a year ago was assessed in two levels: worse health or same/better health. A higher value indicates better care satisfaction or health status. The sample size varied by outcomes for three reasons. First, when comparing prescription drug utilization between MA and TM beneficiaries, we limited to those with Medicare prescription drug coverage. Second, response rates varied slightly by question. Finally, the MCBS collected data on process of diabetes care only in 2010, 2012, and 2016.

Independent Variables

Our key independent variables were MA enrollment, presence of diabetes, and the interaction of diabetes and MA enrollment. To adjust for differences in sample characteristics between MA and TM beneficiaries, we included the following control variables: age, gender, race/ethnicity, education, income, dual eligibility for Medicare and Medicaid, marital status, status of living with someone, residence in metro area, census region of residence, self-reported comorbidities, activities of daily living limitations, and year.

Instrumental Variable

Prior studies have shown that healthy beneficiaries are more likely to enroll in MA than TM,²⁻⁷ and plan choice between MA and TM varied by disease.²⁴ This indicates that advantageous selection would invalidate a direct comparison between MA and TM beneficiaries. To plausibly control for confounding by selection, we used an IV approach. We used county-level MA penetration rate as an instrument because Medicare beneficiaries in a county with higher MA penetration rate are more likely to enroll in MA. The MA penetration rate in a county is hypothesized to be positively correlated with MA enrollment and is presumed to be not directly correlated with health care utilization, process of diabetes care, care satisfaction, and health status. We calculated the county-level MA penetration rate as the proportion of Medicare beneficiaries (aged 65 and older) enrolled in MA.

The instrument must satisfy two requirements: to be statistically strong and validly excluded from the main equation. To assess instrument strength, we tested whether the instrument (county-level MA penetration) was correlated with the treatment of interest (individual MA enrollment). We found that county-level MA penetration rate was significantly and strongly predictive of the likelihood of enrolling in MA and *F* statistics were higher than ten

(Appendix Table 1). *F* statistics higher than ten indicates a strong instrument.²⁵ We cannot directly assess the relationship between the instrument and unmeasured confounders. To assess instrument validity, instead we examined the relationship between the instrument and measured confounders. We found that most individual covariates were balanced across values of the instrument. Since the instrument is valid if it is not correlated with unobserved confounders, conditional on observable confounders, we accounted for residual imbalances by controlling for them in our model.

Statistical Analysis

We estimated sample characteristics and outcomes and tested differences between MA and TM beneficiaries with and without diabetes. Next, we conducted a two-stage least squares regression (2SLS) model, in which the first stage predicted the likelihood of enrolling in MA. The second stage estimated the relationship between predicted enrollment in MA from the first stage and the outcomes of interest. Both stages adjusted for control variables described above. Since we treated beneficiaries in the data over multiple years independently, we adjusted the standard errors for clustering within individual and county. Because our analysis for process of diabetes care was limited to MA and TM beneficiaries with diabetes, we did not include presence of diabetes and its interaction term with MA enrollment as control variables. Using the marginal effects estimated from the 2SLS model, we estimated the predicted mean values of the outcomes for MA beneficiaries with diabetes, TM beneficiaries with diabetes, MA beneficiaries without diabetes, and TM beneficiaries without diabetes, respectively. We then conducted postestimation tests to estimate the differences in the outcomes between MA and TM beneficiaries with and without diabetes. We used survey weights to obtain nationally representative estimates. There are some concerns about using the county-level MA penetration rate because the MCBS data includes small sample for certain counties. Thus, we conducted a sensitivity analysis by using state-level MA penetration rate as an instrument.

RESULTS

Our study population included 4,832 MA beneficiaries with diabetes, 8,303 TM beneficiaries with diabetes, 11,069 MA beneficiaries without diabetes, and 22,963 TM beneficiaries without diabetes (Table 1). Diabetes prevalence rates were slightly lower among MA beneficiaries than TM beneficiaries (26.6% vs 30.4%). Furthermore, MA beneficiaries with diabetes had fewer comorbidities than TM beneficiaries with diabetes. There were also significant differences in comorbidities between MA and TM beneficiaries without diabetes. However, MA beneficiaries without diabetes were not necessarily sicker than TM beneficiaries without diabetes.

Our unadjusted analysis showed that MA beneficiaries with diabetes tended to have lower health care utilization than TM beneficiaries with diabetes, but there were no or negligible differences in process of diabetes care, care satisfaction, and health status (Table 2). Compared to TM beneficiaries with diabetes, MA beneficiaries with diabetes were significantly more likely to have lower inpatient hospital admissions, outpatient hospital visits, medical provider visits, home health visits, and dental visits. Compared to TM

beneficiaries with diabetes, MA beneficiaries with diabetes were less likely to have insulin use, blood sugar test, and HbA1C test and be satisfied with follow up after initial treatments and physician's concern for overall health. MA beneficiaries were more likely to have better general health status compared with same-age people and overall health status compared with a year ago. However, the differences in care satisfaction and health status were modest. No other outcomes showed statistically significant differences. Overall, a similar finding was observed among beneficiaries without diabetes.

Our IV analysis showed that MA beneficiaries with diabetes had lower levels of health care utilization than TM beneficiaries with diabetes (Table 3). Compared to TM beneficiaries, MA beneficiaries had significantly less health care utilization (−22.4 medical provider visits, −3.4 outpatient hospital visits, −0.2 dental visits, and −0.1 inpatient hospital admissions) over the course of a year. However, no significant differences were detected in all the other outcomes for health care utilization. There were several differences in health care utilization between beneficiaries with diabetes and without diabetes. First, MA beneficiaries without diabetes had significantly fewer medical provider visits than TM beneficiaries without diabetes, but the magnitude of the difference in medical provider visits was greater between MA and TM beneficiaries with diabetes than between MA and TM beneficiaries without diabetes (−12.5 medical provider visits). Second, we found no significant differences in outpatient hospital visits, dental visits, and inpatient hospital admissions between MA and TM beneficiaries without diabetes. Finally, MA beneficiaries without diabetes had 27.6 more prescription drug purchases than TM beneficiaries without diabetes.

Our IV analysis showed no significant differences in five measures of process of diabetes care between MA and TM beneficiaries, but there were inconsistent results in the other three measures (Table 4). Compared to TM beneficiaries with diabetes, MA beneficiaries with diabetes were significantly more likely to have medication use (62.5% vs 72.7%), but they were significantly less likely to have a blood sugar test and HbA1C test (79.7% vs 70.3% for blood sugar test and 93.9% vs 86.6% for HbA1C test, respectively).

Our IV analysis showed that there were few significant differences in care satisfaction and health status between MA and TM beneficiaries with diabetes and without diabetes and even these differences were modest (Table 5). We detected significant differences in outcomes for care satisfaction (follow up after initial treatments and physician's concern for overall health) and health status (general health status compared to same-age people) between MA and TM beneficiaries with diabetes and outcomes for care satisfaction (out-of-pocket costs and follow up after initial treatments) and health status (general health status compared with same-age people and overall health status compared with a year ago) between MA and TM beneficiaries without diabetes. Except for overall health status compared with a year ago between MA and TM beneficiaries with diabetes, MA beneficiaries had lower outcomes than TM beneficiaries. However, the differences seem to be modest. No significant differences were found in any of the other outcomes.

Results are robust to using state-level MA penetration rates as an instrument (Appendix Tables 2–4).

CONCLUSIONS

Using a nationally representative sample of the Medicare population, we found that MA beneficiaries tended to have lower health care utilization than TM beneficiaries, especially for beneficiaries with diabetes. While we did not detect significant differences in five measures of process of diabetes care between MA and TM beneficiaries with diabetes, there were inconsistent results in the other three measures. Overall, there were no or negligible differences in care satisfaction and health status between MA and TM beneficiaries with and without diabetes. These findings were derived after controlling for confounding by selection bias that healthy beneficiaries were more likely to enroll in MA, potentially suggesting that MA may deliver care more efficiently for beneficiaries with diabetes than TM.

We found that MA beneficiaries with diabetes had fewer medical provider visits, outpatient hospital visits, dental visits, and inpatient hospital admissions than TM beneficiaries with diabetes. A significant difference between MA and TM beneficiaries without diabetes was observed only in medical provider visits, but the difference was more pronounced among beneficiaries with diabetes than beneficiaries without diabetes. A similar finding was shown in prior research.^{10,13} However, their findings are limited in comprehensively understanding how MA deliver care for beneficiaries with diabetes as they focused on certain outcomes. On the other hand, findings from this study help us to understand a potential mechanism through which MA reduces health care utilization for beneficiaries with diabetes. Lower health care utilization may be attributable to decreased care intensity as a result of changes in clinical practice driven by MA. Research showed that MA beneficiaries had lower likelihoods of having intense care¹¹ and specialist visits¹⁵ relative to TM beneficiaries. We found the largest decrease in medical provider visits. Medical provider visits are of interest as they measure individual events for various medical services, equipment, and supplies, probably reflecting a high intensity of care.

There were no significant differences in five measures of process of diabetes care between MA and TM beneficiaries with diabetes, and inconsistent results in the other three measures. This result is in contrast to findings from prior research showing that MA had better clinical quality for diabetes care than TM.^{10,13,17} There may be multiple explanations for this phenomenon. One possibility is that changes in clinical practice driven by MA may have led to changes in how providers care for all of their other patients, including TM beneficiaries. A spillover effect of MA on TM is more likely to occur with higher MA penetration rates.^{26,27} This suggests that differences in clinical quality performance between MA and TM may have been narrowed down as enrollment in MA has increased dramatically. It is worth noting that MA beneficiaries with diabetes were less likely to have blood sugar test and HbA1C test than TM beneficiaries with diabetes. One interpretation for this finding is that relatively lower adherence rate among MA beneficiaries with diabetes relative to TM beneficiaries with diabetes may be attributable to cost pressure from capitation payment, potentially leading to non-adherence to evidence-based and/or cost-effective care.²⁸ A similar finding was observed in prior research that compared to TM beneficiaries, MA beneficiaries received lower use of low-value, but they also received lower use of high-value care.¹⁵

We detected no or negligible differences in care satisfaction between MA and TM beneficiaries with or without diabetes. Particularly, care satisfaction with out-of-pocket costs is of interest. MA beneficiaries without diabetes were less satisfied with out-of-pocket costs than TM beneficiaries without diabetes. However, we did not detect a significant difference in care satisfaction with out-of-pocket costs between MA and TM beneficiaries with diabetes. Increasing out-of-pocket costs would likely be an effective way to effectuate favorable selection, as quantitative studies found that cost was an important consideration most MA beneficiaries switching to TM.^{29,30} This finding provides suggestive evidence that MA may not tailor benefit packages to discourage beneficiaries with diabetes from enrolling in MA. However, we examined only several aspects of care satisfaction, and thus there is the possibility that MA used other strategies of distorting benefit structures to avoid beneficiaries with diabetes.

Finally, there were no or negligible differences in health status between MA and TM beneficiaries with or without diabetes. This finding suggests that lower health care utilization among MA beneficiaries may not come at the cost of poorer care quality. This adds to the growing literature showing that TM delivers health care less efficiently due to a lack of direct financial incentives to control utilization, which could lead to excess care provision that does not improve patient outcomes.^{11,12,31} Prior research showed that inpatient utilization and total charges among MA beneficiaries increased 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 decrease in hospital quality or patient health outcomes.³⁸

Limitations

Our study has several limitations. First, our findings may be subject to self-reporting errors. Health care utilization for TM beneficiaries was validated using claims data and has been shown to be accurate.^{32,33} Although health care utilization for MA beneficiaries cannot be validated, it is unlikely to reverse our findings unless the reporting errors were larger among MA beneficiaries than TM beneficiaries. Second, we could not quantify the intensity of care, especially during medical provider visits. However, the same intensity of care in fewer visits may still indicate improvements in efficiency of care, in part because of patient direct costs of visits. Third, no significant difference in care satisfaction may be attributable to insensitive measure bias and/or small sample size. Our power analysis suggests that we could detect significant differences in care satisfaction by 15–62%, depending on outcome. Fourth, we found that MA beneficiaries with diabetes had fewer comorbidities than TM beneficiaries with diabetes. However, comorbidities might not be equal across MA and TM due to aggressive diagnostic coding in MA.^{34,35} Fourth, our instrument was shown to be empirically valid and strong, but we could not test the assumption that the instrument and the error term in the outcome equation were not correlated. Thus, our IV analysis may not fully address unobserved confounding. Finally, we did not assess objective quality measures such as mortality and readmission, and thus our interpretation that lower health care utilization among MA beneficiaries may not come at the cost of poor care quality may be limited.

Conclusion

MA enrollment may lead to reductions in health care utilization for beneficiaries without compromising care satisfaction and health status, particularly for beneficiaries with diabetes. These suggest that MA may be more efficient at delivering health care for beneficiaries with diabetes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. The Henry J Kaiser Family Foundation. Medicare Advantage [Internet].c In. Melro Park, CA: The Henry J. Kaiser Family Foundation.
2. Newhouse JP, McGuire TG. How successful is Medicare Advantage? *Milbank Q.* 2014;92(2):351–394. [PubMed: 24890251]
3. Medicare Payment Advisory Commission. Report to the Congress: Medicare and the Health Care Delivery System [Internet]. In. Washington, DC: MedPAC; 2012.
4. Meyers DJ, Belanger E, Joyce N, McHugh J, Rahman M, Mor V. Analysis of drivers of disenrollment and plan switching among Medicare Advantage beneficiaries. *JAMA Intern Med.* 2019;179(4):524–532. [PubMed: 30801625]
5. Goldberg EM, Trivedi AN, Mor V, Jung H, Rahman M. Favorable risk selection in Medicare Advantage: trends in mortality and plan exits among nursing home beneficiaries. *Med Care Res Rev.* 2005;74(6):736–749.
6. Park S, Basu A, Coe NB, Khalil F. Service-level selection: strategic risk selection in Medicare Advantage in response to risk adjustment. *National Bureau of Economic Research.* 2017;Working Paper No 24038.
7. Newhouse JP, Price M, McWilliams JM, Hsu J, Souza J, Landon BE. Adjusted mortality rates are lower for Medicare Advantage than traditional Medicare, but the rates converge over time. *Health Aff (Millwood).* 2019;38(4):554–560. [PubMed: 30933606]
8. Park S, Figueroa JF, Fishman P, Coe NB. Primary care utilization and expenditures in Medicare Advantage and Traditional Medicare, 2007–2016. *J Gen Intern Med.* Forthcoming.
9. Landon BE, Zaslavsky AM, Saunders RC, Pawlson LG, Newhouse JP, Ayanian JZ. Analysis of Medicare Advantage HMOs compared with traditional Medicare shows lower use of many services during 2003–09. *Health Aff (Millwood).* 2012;31(12):2609–2617. [PubMed: 23213144]
10. Landon BE, Zaslavsky AM, Saunders RC, Pawlson LG, Newhouse JP, Ayanian JZ. A comparison of relative resource use and quality in Medicare Advantage health plans versus traditional Medicare. *Am J Manag Care.* 2015;21(8):559–566. [PubMed: 26295355]
11. Huckfeldt PJ, Escarce JJ, Rabideau B, Karaca-Mandic P, Sood N. Less intense postacute care, better outcomes for enrollees in Medicare Advantage than those in fee-for-service. *Health Aff (Millwood).* 2017;36(1):91–100. [PubMed: 28069851]
12. Kumar A, Rahman M, Trivedi AN, Resnik L, Gozalo P, Mor V. Comparing post-acute rehabilitation use, length of stay, and outcomes experienced by Medicare fee-for-service and Medicare Advantage beneficiaries with hip fracture in the United States: a secondary analysis of administrative data. *PLOS Medicine.* 2018;15(6):e1002592. [PubMed: 29944655]
13. Health Avalere. Medicare Advantage achieves cost-effective care and better outcomes for beneficiaries with chronic conditions relative to fee-for-service Medicare. Washington, DC: Avalere Health;2018.

14. Henke RM, Karaca Z, Gibson TB, et al. Medicare Advantage and traditional Medicare hospitalization intensity and readmissions. *Med Care Res Rev*. 2018;75(4):434–453. [PubMed: 29148332]
15. Curto V, Einav L, Finkelstein A, Levin J, Bhattacharya J. Health care spending and utilization in public and private Medicare. *Am Econ J Appl Econ* 2019;11(2):302–332.
16. Park S, White L, Fishman P, Larson EB, Coe NB. Health Care Utilization, Care Satisfaction, and Health Status for Medicare Advantage and Traditional Medicare Beneficiaries With and Without Alzheimer Disease and Related Dementias. *JAMA Netw Open*. 2020;3(3):e201809. [PubMed: 32227181]
17. Timbie JW, Bogart A, Damberg CL, et al. Medicare Advantage and Fee-for-Service Performance on Clinical Quality and Patient Experience Measures: Comparisons from Three Large States. *Health Serv Res*. 2017;52(6):2038–2060. [PubMed: 29130269]
18. Figueroa JF, Blumenthal DM, Feyman Y, et al. Differences in Management of Coronary Artery Disease in Patients With Medicare Advantage vs Traditional Fee-for-Service Medicare Among Cardiology Practices. *JAMA Cardiol*. 2019;4(3):265–271. [PubMed: 30785590]
19. Elliott MN, Landon BE, Zaslavsky AM, et al. Medicare Prescription Drug Plan Enrollees Report Less Positive Experiences Than Their Medicare Advantage Counterparts. *Health Aff (Millwood)*. 2016;35(3):456–463. [PubMed: 26953300]
20. Langellier BA, Park S. Financial Performance of Medicare Advantage Contracts in 2014 and Plan Renewal, Consolidation, and Termination Rates in the Subsequent Year. *Med Care*. 2020.
21. Centers for Disease Control and Prevention. National Diabetes Statistics Report [Internet]. <https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf>. Published 2017 Accessed October 6, 2019.
22. American Diabetes Association. Economic Costs of Diabetes in the U.S. in 2017. *Diabetes Care*. 2018;41(5):917–928. [PubMed: 29567642]
23. Lin J, Thompson TJ, Cheng YJ, et al. Projection of the future diabetes burden in the United States through 2060. *Popul Health Metr*. 2018;16(1):9. [PubMed: 29903012]
24. Park S, Fishman P, White L, Larson EB, Coe NB. Disease-Specific Plan Switching Between Traditional Medicare and Medicare Advantage. *Perm J*. 2020;24.
25. Staiger D, Stock JH. Instrumental variables regression with weak instruments. *Econometrica*. 1997;65(3):557–586.
26. Johnson G, Figueroa JF, Zhou X, Orav EJ, Jha AK. Recent growth In Medicare Advantage enrollment associated with decreased Fee-For-Service spending In certain US counties. *Health Aff (Millwood)*. 2016;35(9):1707–1715. [PubMed: 27605654]
27. Baicker K, Robbins JA. Medicare payments and system-level health-care use: the spillover effects of Medicare managed care. *Am J Health Econ*. 2015;1(4):399–431. [PubMed: 27042687]
28. Krop JS, Powe NR, Weller WE, Shaffer TJ, Saudek CD, Anderson GF. Patterns of expenditures and use of services among older adults with diabetes. Implications for the transition to capitated managed care. *Diabetes Care*. 1998;21(5):747–752. [PubMed: 9589235]
29. Government Accountability Office. CMS should use data on disenrollment and beneficiary health status to strengthen oversight. Washington, DC: Government Accountability Office;2017.
30. McCormack L, Squire C, Morton J, Lynch J, Mobley L, Salib P. Disenrollment from Medicare Advantage health plans: a qualitative assessment. Research Triangle Park, NC: RTI International;2005.
31. Duggan M, Gruber AJ, Vabson AB. The consequences of health care privatization: evidence from Medicare Advantage exits. *Am Econ J Appl Econ* 2018;10(1):153–186.
32. Centers for Medicare and Medicaid Services. Data user's guide: cost supplement file In. Baltimore, MD: Centers for Medicare and Medicaid Services; 2017.
33. Centers for Medicare and Medicaid Services. MCBS Methodology report In. Baltimore, MD: Centers for Medicare and Medicaid Services; 2017.
34. Kronick R, Welch WP. Measuring coding intensity in the Medicare Advantage program. *Medicare Medicaid Res Rev*. 2014;4(2).

35. Geroso M, Layton T. Upcoding: evidence from Medicare on squishky risk adjustment. J Political Econ. 2019.

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Table 1.

Sample characteristics of traditional Medicare and Medicare Advantage beneficiaries with and without diabetes.

	With diabetes			Without diabetes		
	TM beneficiaries (N=8303)	MA beneficiaries (N=4832)	P value	TM beneficiaries (N=22963)	MA beneficiaries (N=11069)	P value
Age, Mean (SD)	71.3 (10.8)	72.1 (9.2)	0.053	72.1 (12.4)	73.1 (10.3)	<.0001
Female, N (%)	4297 (51.8)	2585 (53.5)	<.0001	12782 (55.7)	6266 (56.6)	<.0001
Race/ethnicity, N (%)			<.0001			<.0001
Non-Latino white	6306 (75.9)	3038 (62.9)		19107 (83.2)	8403 (75.9)	
Non-Latino black	1032 (12.4)	715 (14.8)		1999 (8.7)	1056 (9.5)	
Non-Latino Asian	148 (1.8)	96 (2.0)		289 (1.3)	172 (1.6)	
Latino	653 (7.9)	901 (18.6)		1310 (5.7)	1297 (11.7)	
Others	395 (4.8)	182 (3.8)		650 (2.8)	260 (2.3)	
Education, N (%)			<.0001			<.0001
Less than high school	2053 (24.7)	1422 (29.4)		4594 (20.0)	2445 (22.1)	
High school completion	3059 (36.8)	1732 (35.8)		8381 (36.5)	4172 (37.7)	
Some college or associate's degree	1699 (20.5)	912 (18.9)		4756 (20.7)	2157 (19.5)	
Bachelor's degree	836 (10.1)	437 (9.0)		2801 (12.2)	1237 (11.2)	
Advanced degree	625 (7.5)	310 (6.4)		2337 (10.2)	1027 (9.3)	
Income, N (%)			<.0001			<.0001
Less than \$25000	3853 (46.4)	2549 (52.8)		9789 (42.6)	5002 (45.2)	
\$25000-\$50000	3259 (39.3)	1694 (35.1)		9994 (43.5)	4519 (40.8)	
More than \$50000	880 (10.6)	467 (9.7)		2351 (10.2)	1208 (10.9)	
Dual eligibility for Medicare and Medicaid, N (%)	1969 (23.7)	957 (19.8)	<.0001	4392 (19.1)	1626 (14.7)	<.0001
Married, N (%)	4068 (49.0)	2475 (51.2)	0.014	10888 (47.4)	5678 (51.3)	<.0001
Living with others, N (%)			0.003			
Living alone	2521 (30.4)	1374 (28.4)		7364 (32.1)	3423 (30.9)	
Living with spouse	3858 (46.5)	2325 (48.1)		10398 (45.3)	5389 (48.7)	
Living with non-spouse family	1594 (19.2)	983 (20.3)		4357 (19.0)	1862 (16.8)	
Living with non-relatives	330 (4.0)	150 (3.1)		844 (3.7)	395 (3.6)	
Residence in metro area, N (%)	5474 (65.9)	4081 (84.5)	<.0001	15780 (68.7)	9300 (84.0)	<.0001
Census region of residence, N (%)			<.0001			<.0001
New England	253 (3.0)	81 (1.7)		815 (3.5)	252 (2.3)	
Middle Atlantic	943 (11.4)	699 (14.5)		2880 (12.5)	1806 (16.3)	
East North Atlantic	1548 (18.6)	775 (16.0)		4117 (17.9)	1826 (16.5)	
West North Atlantic	646 (7.8)	267 (5.5)		1721 (7.5)	782 (7.1)	
South Atlantic	1973 (23.8)	949 (19.6)		5000 (21.8)	2084 (18.8)	
East South Central	828 (10.0)	279 (5.8)		2234 (9.7)	569 (5.1)	
West South Central	864 (10.4)	433 (9.0)		2364 (10.3)	941 (8.5)	
Mountain	557 (6.7)	404 (8.4)		1713 (7.5)	1018 (9.2)	
Pacific	667 (8.0)	700 (14.5)		2037 (8.9)	1378 (12.4)	

	With diabetes			Without diabetes		
	TM beneficiaries (N=8303)	MA beneficiaries (N=4832)	P value	TM beneficiaries (N=22963)	MA beneficiaries (N=11069)	P value
Puerto Rico	24 (0.3)	245 (5.1)		82 (0.4)	413 (3.7)	
Comorbidity, N (%)						
Hardening of arteries	1248 (15.0)	622 (12.9)	0.001	2000 (8.7)	862 (7.8)	0.004
Hypertension	6979 (84.1)	4124 (85.3)	0.112	14355 (62.5)	7179 (64.9)	<.0001
Heart attack	1587 (19.1)	831 (17.2)	0.006	2400 (10.5)	1223 (11.1)	0.093
Stroke	1209 (14.6)	667 (13.8)	0.231	2304 (10.0)	1142 (10.3)	0.441
Coronary heart disease	1459 (17.6)	719 (14.9)	<.0001	2134 (9.3)	1016 (9.2)	0.742
Cancer	3004 (36.2)	1538 (31.8)	<.0001	8514 (37.1)	3868 (34.9)	<.0001
Rheumatoid arthritis	1637 (19.7)	998 (20.7)	0.197	3238 (14.1)	1677 (15.2)	0.010
Osteoporosis	1672 (20.1)	1001 (20.7)	0.429	5260 (22.9)	2701 (24.4)	0.002
Asthma/COPD	2223 (26.8)	1121 (23.2)	<.0001	4433 (19.3)	2066 (18.7)	0.162
Alzheimer's disease/dementia	542 (6.5)	330 (6.8)	0.503	1301 (5.7)	678 (6.1)	0.090
Mental illness	899 (10.8)	373 (7.7)	<.0001	2457 (10.7)	871 (7.9)	<.0001
Depression	2840 (34.2)	1489 (30.8)	<.0001	6285 (27.4)	2829 (25.6)	<.0001
Number of ADLs limitations, N (%)			<.0001			<.0001
0	3078 (37.1)	2023 (41.9)		11043 (48.1)	5843 (52.8)	
1–2	1827 (22.0)	1050 (21.7)		4287 (18.7)	1998 (18.1)	
3+	3396 (40.9)	1752 (36.3)		7584 (33.0)	3215 (29.0)	
Year, N (%)			<.0001			<.0001
2010	1338 (16.1)	627 (13.0)		4490 (19.6)	1626 (14.7)	
2011	1424 (17.2)	634 (13.1)		4412 (19.2)	1848 (16.7)	
2012	1522 (18.3)	825 (17.1)		4297 (18.7)	1979 (17.9)	
2013	1497 (18.0)	863 (17.9)		4076 (17.8)	1933 (17.5)	
2015	1370 (16.5)	1032 (21.4)		3131 (13.6)	2009 (18.1)	
2016	1152 (13.9)	851 (17.6)		2557 (11.1)	1674 (15.1)	

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

Health care utilization, process of diabetes care, care satisfaction, and health status of traditional Medicare and Medicare Advantage beneficiaries with and without diabetes.

Table 2.

	With diabetes			Without diabetes		
	TM beneficiaries (N=8303)	MA beneficiaries (N=4832)	P value	TM beneficiaries (N=22963)	MA beneficiaries (N=11069)	P value
Health care utilization, Mean (SD)						
Inpatient hospital admission (n = 47508)	0.4 (0.9)	0.2 (0.6)	<0.001	0.2 (0.7)	0.1 (0.5)	<0.001
Outpatient hospital visit (n = 47508)	7.0 (10.4)	3.0 (7.0)	<0.001	5.1 (9.0)	2.5 (6.3)	<0.001
Medical provider visit [*] (n = 47508)	40.4 (37.8)	16.9 (21.7)	<0.001	29.1 (30.9)	13.2 (19.5)	<0.001
Home health visit (n = 47508)	21.2 (97.8)	15.3 (73.5)	<0.001	15.7 (88.8)	13.4 (76.2)	0.018
Prescription drug purchase [†] (n = 33701)	62.0 (57.9)	62.8 (59.6)	0.408	35.2 (39.9)	37.4 (40.0)	<0.001
Dental visit (n = 47508)	1.3 (2.1)	1.1 (2.0)	<0.001	1.5 (2.2)	1.4 (2.1)	0.003
Process of diabetes care, N (%)						
Insulin use (n = 5946)	977 (25.9)	513 (23.6)	0.028	-	-	-
Medication use (n = 5938)	2479 (65.7)	1441 (66.4)	0.797	-	-	-
Check for sores on feet (n = 5940)	2682 (71.0)	1514 (69.8)	0.138	-	-	-
Blood for sugar (glucose) test (n = 5948)	2901 (76.7)	1628 (74.9)	0.004	-	-	-
Blood pressure check at home (n = 5946)	1909 (50.5)	1084 (49.9)	0.998	-	-	-
Comprehensive food exam (n = 5918)	2516 (67.0)	1453 (67.1)	0.730	-	-	-
HbA1C test (n = 5672)	3268 (91.7)	1852 (89.5)	0.001	-	-	-
Blood sugar well control (n = 5702)	2957 (81.6)	1725 (82.8)	0.743	-	-	-
Care satisfaction [‡] , Mean (SD)						
Quality of medical care (n = 25556)	3.9 (0.5)	3.9 (0.5)	0.825	3.7 (0.8)	3.8 (0.7)	<0.001
OOP costs for medical care (n = 34296)	3.6 (0.7)	3.6 (0.7)	0.814	3.6 (0.8)	3.6 (0.8)	0.010
Available care by specialists (n = 32801)	3.7 (0.9)	3.7 (0.9)	0.705	3.4 (1.1)	3.5 (1.1)	0.007
Follow up after initial treatments (n = 33415)	3.6 (1.0)	3.5 (1.1)	<0.001	3.3 (1.2)	3.2 (1.3)	<0.001
Physician's concern for overall health (n = 31447)	3.9 (0.5)	3.9 (0.4)	0.010	3.7 (0.8)	3.8 (0.7)	<0.001
Health status ^c , Mean (SD)						
General health status compared with same-age people (n = 46893)	2.8 (1.0)	3.0 (0.9)	<0.001	3.3 (0.9)	3.3 (0.9)	<0.001

	With diabetes			Without diabetes		
	TM beneficiaries (N=8303)	MA beneficiaries (N=4832)	P value	TM beneficiaries (N=22963)	MA beneficiaries (N=11069)	P value
Overall health status compared with 1 year ago (n = 47006)	0.7 (0.4)	0.8 (0.4)	<0.001	0.8 (0.4)	0.8 (0.4)	0.108

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

* The unit of measurement is a separate visit, procedure, service, or a supplied item.

† The unit of measurement is a single purchase of a single drug in a single container.

‡ A higher value indicates better care satisfaction or health status

Table 3.
Differences in health care utilization between traditional Medicare and Medicare Advantage beneficiaries with and without diabetes.

	Adjusted predictions, mean (95% CI) *					
	With diabetes			Without diabetes		
	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 = 47508)	0.3 (0.3 to 0.4)	0.2 (0.2 to 0.3)	-0.1 (-0.1 to -0.1)	0.2 (0.2 to 0.2)	0.2 (0.1 to 0.2)	-0.1 (-0.1 to 0.0)
Outpatient hospital visit (n = 47508)	6.8 (6.5 to 7.1)	3.4 (3.2 to 3.7)	-3.4 (-3.8 to -3.0)	4.6 (4.2 to 5.0)	3.6 (2.8 to 4.3)	-1.0 (-2.1 to 0.1)
Medical provider visit [‡] (n = 47508)	40.0 (38.9 to 41)	17.6 (16.9 to 18.4)	-22.4 (-23.6 to -21.1)	27.9 (26.7 to 29.1)	15.4 (13.1 to 17.6)	-12.5 (-15.9 to -9.2)
Home health visit (n = 47508)	20.3 (17.5 to 23.2)	16.7 (14.1 to 19.2)	-3.7 (-7.6 to 0.2)	12.8 (9.7 to 16.0)	19.0 (12.9 to 25.1)	6.2 (-2.9 to 15.2)
Prescription drug purchase [§] (n = 33701)	71.8 (69.6 to 74.1)	69.0 (66.6 to 71.5)	-2.8 (-6.3 to 0.6)	29.5 (26.2 to 32.8)	57.1 (53.0 to 61.2)	27.6 (20.3 to 34.8)
Dental visit (n = 47508)	1.3 (1.2 to 1.4)	1.1 (1.1 to 1.2)	-0.2 (-0.3 to -0.1)	1.4 (1.3 to 1.5)	1.5 (1.4 to 1.7)	0.1 (-0.1 to 0.4)

Abbreviations: TM, traditional Medicare; MA, Medicare Advantage.

* We performed a two-stage least-squares regression model. In the first stage, we obtained the estimated likelihood of enrolling in MA plans while accounting for advantageous selection into MA plans according to the county-level MA enrollment rates. In the second stage, we estimated the association between estimated enrollment in MA plans from the first stage and the outcomes of interest. Both stages adjusted for age, gender, race/ethnicity, education, income, dual eligibility for Medicare and Medicaid, marital status, status of living with someone, residence in metro area, census region of residence, self-reported comorbidities, activities of daily living limitations, and year. We also adjusted the standard errors for clustering within individual and county. Using the marginal effects estimated from the two-stage least-squares regression model, we estimated the mean values of the outcomes for TM beneficiaries with diabetes, MA beneficiaries with diabetes, TM beneficiaries without diabetes, and MA beneficiaries without diabetes, respectively. We then performed postestimation tests to estimate the differences in the outcomes between TM and MA beneficiaries with and without diabetes, respectively.

[‡]The unit of measurement is a separate visit, procedure, service, or a supplied item.

[§]The unit of measurement is a single purchase of a single drug in a single container.

Table 4.

Differences in process of diabetes care between traditional Medicare and Medicare Advantage beneficiaries with diabetes.

	Adjusted predictions, mean % (95% CI) *		
	With diabetes		Differences among MA beneficiaries relative to TM beneficiaries
	TM beneficiaries	MA beneficiaries	
Process of diabetes care			
Insulin use (n = 5946)	26.6 (22.8 to 30.4)	23.8 (17.9 to 29.7)	-2.8 (-12.2 to 6.5)
Medication use (n = 5938)	62.5 (58.5 to 66.6)	72.7 (66.4 to 79.1)	10.2 (0.3 to 20.1)
Check for sores on feet (n = 5940)	71.1 (67.3 to 74.9)	71.8 (65.8 to 77.8)	0.7 (-8.8 to 10.1)
Blood for sugar (glucose) test (n = 5948)	79.7 (76.1 to 83.4)	70.3 (64.3 to 76.3)	-9.4 (-18.7 to -0.1)
Blood pressure check at home (n = 5946)	51.0 (46.9 to 55.1)	49.2 (42.7 to 55.7)	-1.8 (-12.0 to 8.4)
Comprehensive food exam (n = 5918)	69.7 (65.7 to 73.6)	62.7 (56.4 to 69.0)	-7.0 (-16.8 to 2.9)
HbA1C test (n = 5672)	93.9 (91.6 to 96.3)	86.6 (82.8 to 90.4)	-7.4 (-13.3 to -1.5)
Blood sugar well control (n = 5702)	82.2 (78.7 to 85.6)	80.6 (75.0 to 86.2)	1.5 (-10.3 to 7.2)

Abbreviations: TM, traditional Medicare; MA, Medicare Advantage.

*

We performed a two-stage least-squares regression model. In the first stage, we obtained the estimated likelihood of enrolling in MA plans while accounting for advantageous selection into MA plans according to the county-level MA enrollment rates. In the second stage, we estimated the association between estimated enrollment in MA plans from the first stage and the outcomes of interest. Both stages adjusted for age, gender, race/ethnicity, education, income, dual eligibility for Medicare and Medicaid, marital status, status of living with someone, residence in metro area, census region of residence, self-reported comorbidities, activities of daily living limitations, and year. We also adjusted the standard errors for clustering within individual and county. Using the marginal effects estimated from the two-stage least-squares regression model, we estimated the mean values of the outcomes for TM beneficiaries with diabetes, MA beneficiaries with diabetes, TM beneficiaries without diabetes, and MA beneficiaries without diabetes, respectively. We then performed postestimation tests to estimate the differences in the outcomes between TM and MA beneficiaries with and without diabetes, respectively.

Table 5.

Differences in care satisfaction and health status between traditional Medicare and Medicare Advantage beneficiaries with and without diabetes.

	Adjusted predictions, mean (95% CI) *					
	With diabetes			Without diabetes		
	TM beneficiaries	MA beneficiaries	Differences among MA beneficiaries relative to TM beneficiaries	TM beneficiaries	MA beneficiaries	Differences among MA beneficiaries relative to TM beneficiaries
Care satisfaction ^b						
Quality of medical care (n = 25556)	3.9 (3.9 to 3.9)	3.9 (3.9 to 3.9)	0.0 (0.0 to 0.1)	3.7 (3.7 to 3.8)	3.7 (3.6 to 3.8)	0.0 (−0.1 to 0.1)
OOP costs for medical care (n = 34296)	3.6 (3.6 to 3.6)	3.6 (3.6 to 3.7)	0.0 (0.0 to 0.0)	3.7 (3.7 to 3.7)	3.5 (3.4 to 3.6)	−0.2 (−0.3 to −0.1)
Available care by specialists (n = 32801)	3.6 (3.6 to 3.7)	3.7 (3.6 to 3.7)	0.0 (0.0 to 0.1)	3.4 (3.4 to 3.5)	3.5 (3.4 to 3.6)	0.1 (−0.1 to 0.2)
Follow up after initial treatments (n = 33415)	3.6 (3.5 to 3.6)	3.5 (3.4 to 3.5)	−0.1 (−0.1 to 0.0)	3.3 (3.3 to 3.4)	3.1 (3.0 to 3.2)	−0.2 (−0.4 to −0.1)
Physician's concern for overall health (n = 31447)	3.9 (3.8 to 3.9)	3.9 (3.9 to 3.9)	0.0 (0.0 to 0.1)	3.7 (3.7 to 3.8)	3.7 (3.6 to 3.8)	0.0 (−0.1 to 0.1)
Health status [†]						
General health status compared with same-age people (n = 46893)	2.9 (2.8 to 2.9)	2.9 (2.9 to 3.0)	0.1 (0.0 to 0.1)	3.3 (3.3 to 3.4)	3.1 (3.1 to 3.2)	−0.2 (−0.3 to −0.1)
Overall health status compared with 1 year ago (n = 47006)	0.7 (0.7 to 0.8)	0.8 (0.7 to 0.8)	0.0 (0.0 to 0.0)	0.8 (0.8 to 0.8)	0.8 (0.7 to 0.8)	−0.1 (−0.1 to 0.0)

Abbreviations: TM, traditional Medicare; MA, Medicare Advantage.

* We performed a two-stage least-squares regression model. In the first stage, we obtained the estimated likelihood of enrolling in MA plans while accounting for advantageous selection into MA plans according to the county-level MA enrollment rates. In the second stage, we estimated the association between estimated enrollment in MA plans from the first stage and the outcomes of interest. Both stages adjusted for age, gender, race/ethnicity, education, income, dual eligibility for Medicare and Medicaid, marital status, status of living with someone, residence in metro area, census region of residence, self-reported comorbidities, activities of daily living limitations, and year. We also adjusted the standard errors for clustering within individual and county. Using the marginal effects estimated from the two-stage least-squares regression model, we estimated the mean values of the outcomes for TM beneficiaries with diabetes, MA beneficiaries with diabetes, TM beneficiaries without diabetes, and MA beneficiaries without diabetes, respectively. We then performed postestimation tests to estimate the differences in the outcomes between TM and MA beneficiaries with and without diabetes, respectively.

[†] A higher value indicates better care satisfaction or health status.