HHS Public Access

Author manuscript

Curr Med Res Opin. Author manuscript; available in PMC 2023 October 01.

Published in final edited form as:

Curr Med Res Opin. 2022 October ; 38(10): 1715–1725. doi:10.1080/03007995.2022.2103962.

Racial/Ethnic Disparities in the Enrollment of Medication Therapy Management Programs among Medicare Beneficiaries with Alzheimer's Disease and Related Dementias

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Abstract

Objective: Previous analysis of policy scenarios reported potential disparities in eligibility in Medicare Medication Therapy Management (MTM) program. With recently released MTM data, this study aimed to determine if racial/ethnic disparities exist in MTM enrollment among Medicare beneficiaries with Alzheimer's disease and related dementias (ADRD).

Methods: Medicare claims/records (from 2013–2014 and 2016–2017) linked to the Area Health Resources File were examined. Included individuals were patients with ADRD and diabetes, hypertension, or hyperlipidemia. The proportions of MTM enrollment were compared between non-Hispanic White (White) patients and racial/ethnic minority groups in descriptive analysis. Racial/ethnic disparities were then examined using a logistic regression adjusting for patient and community characteristics. Disparities across study periods were compared by estimating a logistic regression model with interaction terms between dummy variables for each racial/ethnic minority group and 2016–2017.

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Authors' Contributions

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Results: In unadjusted analyses, minorities had higher enrollment proportions than Whites. In 2016–2017, for example, enrollment percentages for Whites, Blacks, Hispanics, Asian/Pacific Islanders (Asians), and Others were respectively 14.44%, 16.71%, 19.83%, 16.66%, and 17.78%. In adjusted analyses, Blacks had lower enrollment odds than Whites within all cohorts. In the entire study sample in 2016–2017, for example, Blacks with ADRD had 9% lower odds of MTM enrollment (odds ratio 0.91, 95% confidence interval [CI] =0.86–0.97) than Whites. These disparities decreased over time among the ADRD sample and all sub-groups. The interaction term between Blacks and 2016–2017, for instance, indicated that disparities were lowered by 11% (odds ratio 1.11, 95% CI=1.05–1.16) across study periods among those with ADRD.

Conclusions: Blacks with ADRD and diabetes, hypertension, or hyperlipidemia have lower likelihood of MTM enrollment than Whites. Racial disparities were reduced over time but not eliminated.

Keywords

Medication therapy management; Alzheimer's; disparities; Medicare

Introduction

Alzheimer's disease and related dementias (ADRD) affects an estimated 6.2 million individuals in the United States today, and this number is expected to increase to 13.85 million by 2060 [1,2]. Racial/ethnic minorities, compared with non-Hispanic Whites (Whites), carry a heavier burden of ADRD [1]. Blacks and Hispanics have a higher prevalence of ADRD and are approximately twice as likely to develop ADRD than Whites [1,2]. Furthermore, chronic cardiovascular health conditions, such as type 2 diabetes (diabetes), hypertension, and hyperlipidemia, are thought to be associated with an increased risk of ADRD [1]. Racial/ethnic minorities also have a higher prevalence and worse control of these chronic cardiovascular conditions than Whites [3].

Appropriate medication utilization for an individual with ADRD and comorbid cardiovascular conditions is essential to maintain a higher quality of life and avoid debilitating complications. Antidementia medications can slow the progression of ADRD [1], and medications to treat diabetes, hypertension, and hyperlipidemia can prevent secondary complications such as eye damage, kidney disease, or stroke [3]. Yet, racial/ethnic minorities, compared with Whites, are less likely to use antidementia medications [4] and less likely to adhere to antidiabetic, antihypertensive, and antihyperlipidemic [5]. Therefore, the greater burden of these conditions among racial/ethnic minorities may be partly attributed to lower appropriate medication utilization. Such a pattern is attributable to complex factors such as disparities in socioeconomic status and historical inequality in health care [4,5].

The Centers for Medicare & Medicaid Services (CMS) is a U.S. government agency responsible for the Medicare and Medicaid health insurance programs. Medicare is a federal program for individuals aged 65 years or older or with certain disabilities [6]. The CMS recognizes the negative health impact of inappropriate medication utilization in the Medicare population and has formulated strategies to combat these issues. In 2006,

for example, the CMS began requiring that Medicare prescription drug plan (Part D) sponsors, i.e., organizations that contracted with Medicare to provide beneficiaries with Part D benefits, implement a Medication Therapy Management (MTM) program [6]. The goal of the MTM program is to optimize therapeutic outcomes by promoting appropriate medication utilization, such as reducing adverse drug events and increasing medication adherence [6]. Initially, the CMS allowed each Part D sponsor to determine the types of services offered with these programs [6]. Since 2010, the CMS has required MTM programs to at least include annual comprehensive medication reviews (CMRs) and quarterly targeted medication reviews [7]. MTM services are provided by qualified health care professionals, primarily pharmacists [7].

MTM services have been proven valuable on several fronts. For example, these services have successfully reduced rates of medication non-adherence, hospital admissions, and emergency department visits [8]. Among Medicare beneficiaries with Alzheimer's disease, annual CMRs are also associated with improved adherence to medications for diabetes, hypertension, and hyperlipidemia [9]. As previously noted, racial/ethnic minorities disproportionately represent the population with ADRD and some associated cardiovascular conditions. Thus, MTM programs could be beneficial to racial/ethnic minorities with ADRD.

Since its initial implementation, the Medicare MTM program has undergone several changes to increase enrollment. Initially, the CMS required sponsors to target Medicare beneficiaries that met the following criteria: had multiple chronic conditions, took multiple Part D drugs, and identified as likely to incur a pre-specified annual Part D drug cost [6]. Sponsors were given the flexibility to choose how many and which specific chronic conditions and medications may be required for the eligibility criteria [6]. In 2010, the CMS required that MTM programs include individuals with at least three chronic conditions and eight covered medications [7]. Besides annual updates to the Part D drug cost thresholds, there have not been substantial changes to the eligibility criteria since 2010.

Previous studies have reported potential racial/ethnic disparities in eligibility for the Medicare MTM program [10,11]. Specifically, racial/ethnic minorities would be less likely than Whites to meet the MTM eligibility criteria based on analyses of policy [10,11]. Such policy scenario analyses were conducted due to the unavailability of MTM enrollment data to the research community. Now that MTM enrollment data from 2013 is accessible, the objective of this study was to determine if there are racial/ethnic disparities in MTM enrollment among Medicare beneficiaries with ADRD and coexisting conditions of diabetes, hypertension, or hyperlipidemia.

Methods

Data Sources

This was a retrospective repeated cross-sectional study of Medicare beneficiaries with ADRD in 2013–2014 and 2016–2017. The study was conducted using administrative claims from Medicare Parts A/B/D linked to the Master Beneficiary Summary File (MBSF) and Area Health Resource Files (AHRF). These administrative claims were collected by the

CMS and derived from reimbursement information or the payment of bills [12]. Medical claims from Medicare Parts A (hospital services) and B (outpatient/physician services) supplied patient diagnostic records and service dates offered by institutional and non-institutional providers. The Part D MTM File was used to derive information concerning individuals' enrollment in MTM programs. Information on demographics, enrollment in various plans, and date of death for Medicare beneficiaries were obtained from the MBSF. The AHRF provided community-level data regarding health care resources and socioeconomic characteristics of population for individuals' county of residence [13].

Study Sample

The study sample for each measurement year was based upon Medicare beneficiaries who satisfied the following inclusion criteria: (1) diagnosed with ADRD; (2) aged 65 years or older; (3) alive during the study years; and (4) had continuous Parts A, B, and D coverage. Individuals with ADRD were defined as those with at least one medical claim with ADRD diagnosis during the three years prior to the study year based on the CMS Chronic Condition Warehouse (CCW) algorithm for ADRD [14]. ADRD diagnoses were identified using the International Classification of Diseases, Ninth and Tenth Revisions, Clinical Modification (ICD-9-CM and ICD-10-CM) codes specified in CCW algorithm for ADRD [14]. From 2017, select plans participated in a demonstration program aimed to improve the MTM program, called Enhanced MTM. The MTM program information for these plans are not included in MTM Data file. Therefore, patients in these participating plans were excluded from the 2017 data.

Medicare beneficiaries who satisfied the inclusion criteria in each measurement year according to a 10% systematic random sampling scheme were further selected to create cross-sectional samples. Next, individuals with ADRD included for each measurement year were grouped into cohorts with a particular comorbid chronic condition by utilizing their diagnostic records. Since cardiovascular conditions are commonly associated with ADRD as mentioned above, the comorbid chronic conditions, diabetes, hypertension, and hyperlipidemia, were analyzed in this study [14]. They were identified based on the ICD-9-CM and ICD-10-CM codes [14].

Racial and Ethnic Groups

Five racial and ethnic groups were analyzed in this study using the Research Triangle Institute (RTI) race code: non-Hispanic Whites (Whites), Blacks, Hispanics, Asians/Pacific Islanders (Asians), and Others (American Indians, Alaska Natives, unknown, and other races/ethnicities). American Indians and Alaska Natives were combined with "unknown" and other races/ethnicities due to lower accuracy of the RTI race code in identifying these racial/ethnic minorities [15].

Outcome

The outcome measure evaluated in this study was a binary variable that measured the MTM enrollment. Individuals were coded as one if they were enrolled in an MTM program and met the CMS eligibility criteria but zero otherwise. The outcome was examined for the total ADRD sample and each comorbid disease-specific group.

Covariates

The Gelberg-Andersen's Behavioral Model for Vulnerable Populations was utilized as the conceptual framework for determining the empirical model specification because the outcome measure was associated with the utilization of a health care service [16]. This framework includes three domains associated with health care services use: (1) factors that *predispose* individuals to access services; (2) factors that *enable* the use of services; and (3) factors that influence the *need* for services. Following the conceptual framework, the subsequent variables were employed as covariates in regression models. *Predisposing* factors included race/ethnicity (Whites, Blacks, Hispanics, Asians, and Others), age, gender (male and female), the proportion of married-couple families, the proportion of individuals with at least high school education, per capita income, and the proportion of individuals without health insurance. *Enabling* factors consisted of indicators for metropolitan statistical area (MSA), Health Professional Shortage Area (HPSA), and census regions (Northeast, Midwest, South, and West). The *need* factor comprised a CMS risk adjustment summary score calculated based on an individuals' demographics and diagnostic records in the prior year [17]. This prospective score served as a proxy for clinical risk, with higher scores indicating worse health status and greater expected health care costs. Race/ethnicity, age, gender, and risk adjustment summary scores were individual-level confounders, while all other variables were community-level confounders based on Medicare beneficiaries' county of residence.

Statistical Analysis

The empirical approach for analyzing racial/ethnic disparities in MTM enrollment involved two steps. First, it was tested whether racial/ethnic minorities were less likely to be enrolled in MTM programs than Whites in the two study periods (2013–2014 and 2016–2017). For descriptive analysis, chi-square test was used to compare the proportion of individuals enrolled in MTM programs between Whites and each racial/ethnic minority group. For multivariable analysis, a regression model using a logistic model was estimated for each study period. All covariates in the Gelberg-Andersen's model were included in the regression, with Whites being the reference group for race/ethnicity. While age and gender entered the calculation of risk adjustment summary score, potential multicollinearity between the three variables did not affect study findings because the risk score was mainly determined by patient diagnosis records. If the odds ratio (OR) for a minority group dummy variable was significantly less than one, it would indicate that the minority group was less likely than Whites to be enrolled in MTM programs, adjusted for all other characteristics. Next, racial/ethnic disparities in MTM enrollment across the two time periods were compared. This was conducted by estimating a pooled logistic regression model, with interaction terms between dummy variables for each racial/ethnic minority group and period two (2016–2017) incorporated, using all four years of data. If the OR for an interaction term between a minority group and period two was significantly greater than one, it would indicate the disparities in the likelihood of MTM enrollment between Whites and the minority group was reduced across the study periods. All analyses were conducted for the total ADRD sample and each comorbid disease-specific group. Standard errors were clustered at the county level in all regression models to account for potential within-county correlation of the errors.

All statistical analyses were conducted with SAS Enterprise 7.1 (Cary, NC) at the CMS Virtual Research Data Center. The Institutional Review Board at the corresponding author's institution approved this study (approval number: #20–07197-XM).

Results

Descriptive statistics were conducted to compare the demographic and socioeconomic characteristics of the total ADRD sample in 2016–2017 by race/ethnicity (Table 1). The 381,485-person study sample consisted of 80.43% Whites, 9.43% Blacks, 5.91% Hispanics, 2.90% Asians, and 1.33% Others. Some characteristics were statistically different between Whites and racial/ethnic minority groups ($p < .05$). Concerning predisposing factors, Whites were older than Blacks, Hispanics, and Others. Whites also had a higher proportion of male than Blacks. Generally, a larger proportion of Whites, compared with racial/ethnic minorities, resided in communities with higher proportions of married-couple families and individuals with at least a high school education. A greater percentage of Whites also lived in communities with a lower proportion of uninsured individuals compared with Blacks, Hispanics, and Others. Among enabling factors, a larger percentage of Blacks, Hispanics, and Asians, compared to Whites, resided in MSA and HPSA. Geographic distributions of racial/ethnic groups also differed. Regarding the need factor, Whites had a significantly lower risk adjustment summary score compared with Blacks and Hispanics, suggesting lower health status among Blacks and Hispanics than Whites. The comparison between racial and ethnic groups in descriptive statistics was similar in the ADRD sample in 2013–2014 and patients with each of three co-occurring chronic conditions of interest (results not shown).

Percentages of MTM enrollment during the study periods were compared across racial/ethnic groups (Table 2). The following comparisons were statistically different across Whites and racial/ethnic minority groups ($p < .05$). For the total sample, all racial/ethnic minorities except "others" had higher MTM enrollment percentages than Whites in both time periods. For example, in period two (2016–2017), compared to 14.44% for Whites, the enrollment percentages for Blacks, Hispanics, Asians, and Others were respectively 16.71%, 19.83%, 16.66%, and 17.78%. The patterns are similar among patients with hypertension and hyperlipidemia. Among the sub-group with diabetes, Blacks had lower percentages of enrollment in MTM programs in both time periods than Whites. The differences in the enrollment percentages between Whites and Blacks were 3.73 percentage points in period one and 2.72 percentage points in period two. Additionally, lower enrollment proportions among all groups were evident in 2016–2017 than 2013–2014.

Patterns of racial/ethnic disparities in MTM enrollment were indicated by the results of the multivariable regression (Tables 3–1 and 3–2). Significant disparities between Whites and Blacks were found within all study cohorts in both study periods. After adjusting for all other individual characteristics, Blacks had significantly lower odds of enrolling in MTM programs compared with Whites. For instance, among the total ADRD sample and sub-groups with diabetes, hypertension, and hyperlipidemia in time period two, odds for MTM enrollment were respectively 0.91 (95% confidence interval [CI]=0.86–0.97), 0.75 (95% CI=0.71–0.80), 0.87 (95% CI=0.82–0.92), and 0.93 (95% CI=0.88–0.99). In contrast,

Hispanics and Asians were consistently more likely or similarly likely to be enrolled in MTM programs among the total sample and sub-groups compared to Whites.

Across-time changes of racial/ethnic disparities in MTM enrollment were discovered (Table 4). Over time, racial disparities between Whites and Blacks were reduced among the total sample and all sub-groups. Among the entire ADRD sample, after all other characteristics were adjusted, the ORs of the interaction terms between dummy variables for Blacks and time period two indicated that disparities in the likelihood of MTM enrollment between Whites and Blacks were lowered across the study periods by 11% (OR=1.11, 95% CI=1.05–1.16). These disparities were reduced by 6% (OR=1.06, 95% CI=1.01–1.12) among the diabetes cohort, 11% (OR=1.11, 95% CI=1.05–1.16) among the hypertension cohort, and 10% (OR=1.10, 95% CI=1.04–1.16) among the hyperlipidemia cohort.

Some patient and community characteristics demonstrated associations with MTM enrollment across all study cohorts (Tables 3–1, 3–2, & 4). For instance, among the total sample, the following factors were associated with a decreased odds of MTM enrollment: increasing age (OR=0.961, 95% CI=0.960–0.962), being male (OR=0.85, 95% CI=0.84–0.87), living within a county with a higher proportion of individuals with at least a high school education (OR=0.27, 95% CI=0.13–0.56), higher per capita income (OR=0.998, 95% CI=0.997–0.999), and a higher proportion of individuals without health insurance (OR=0.36, 95% CI=0.19–0.71), and living in an HPSA (OR=0.9588, 95% CI=0.9194–0.9999) were significantly associated with a decreased likelihood of MTM enrollment. Compared to Medicare beneficiaries residing in the Northeast census region, those who resided in the Midwest (OR=1.16, 95% CI=1.07–1.25) and South (OR=1.14, 95% CI=1.07–1.21) were more likely to be enrolled in MTM programs. Having a higher risk adjustment summary score (OR=1.34, 95% CI=1.33–1.35) was significantly associated with a greater likelihood of MTM enrollment. Effects of these variables are similar across cohorts and analyses.

Discussion

This study used Medicare data to examine MTM enrollment among individuals with ADRD and comorbid diabetes, hypertension, and hyperlipidemia across racial/ethnic groups. In both 2013–2014 and 2016–2017, Blacks had lower odds of enrollment in MTM programs compared with their White counterparts among patients with diabetes, hypertension, and hyperlipidemia. Similar finding was also observed among the entire ADRD population. Such disparity patterns were not detected for other racial/ethnic groups, as each of them had a consistently higher or similar relative likelihood of enrollment in MTM programs compared to White patients among all study samples and time periods.

In 2016–2017, compared to 2013–2014, lower racial disparities were found among individuals with ADRD and concomitant diabetes, hypertension, or hyperlipidemia. The findings of this study highlight the presence of racial disparities in Part D MTM enrollment among Medicare beneficiaries with ADRD and those with comorbid diabetes, hypertension, or hyperlipidemia. While racial disparities in MTM enrollment between Blacks and Whites were reduced over time in this study sample, the reduction was not large enough to eliminate disparities.

These findings are consistent with previous literature that analyzed policy scenarios on MTM eligibility. For example, a previous study found that Blacks and Hispanics among the general Medicare population would be less likely to be eligible for MTM programs based on the 2006 and 2010 eligibility criteria [10]. Other studies by the same group of researchers examined eligibility for MTM programs with different policy scenarios and found similar results [11,18]. The findings of this study slightly differ in that only disparities between Whites and Blacks were found and these disparities only were identified among patients with ADRD and diabetes.

An important distinction between previous studies and the present study is that the earlier studies examined policy scenarios. In contrast, the present study examined actual enrollment in MTM programs. Only one previous study has analyzed actual MTM enrollment, which revealed that Blacks, Hispanics, and North American Natives had odds of enrollment 1.43, 1.25, and 1.09 times as high as Whites [19]. However, the previous study examined the general Medicare population while the present study examined the ADRD population and various comorbidity sub-groups. Thus, these may be the reasons for differing findings between the two studies.

It is concerning that while MTM programs improve medication utilization, Blacks with ADRD and comorbid diabetes may have fewer opportunities to use this service. Since 2010, MTM programs have been required to enroll eligible Medicare beneficiaries automatically, but enrollees may choose to decline enrollment.[7] Stuart et al. reported that the opt-out rate in 2012 was only 2.2% [20]. Thus, it is unlikely that the racial disparities found in this study were due to declined MTM enrollments. A more likely explanation for the racial disparities may trace back to how an individual becomes eligible for enrollment. For each year examined in this study, over 81% of plans set the minimum number of chronic conditions to three, which is the maximum the CMS currently allows [21–24]. Furthermore, minorities often experience missed or delayed diagnoses of medical conditions due to utilizing less and receiving lower quality health care services than Whites although they experience higher prevalence of some conditions [25]. The eligibility criteria based on the number of chronic conditions may be one reason for lower MTM enrollment among Blacks.

Besides the number of chronic conditions, the other two MTM eligibility criteria are solely based on medication utilization. In each year of this study, over half of the MTM programs set the minimum number of drugs at eight [21–24]. Additionally, over 65% of the MTM programs based the expected drug costs on the last quarter of the previous year [21–24]. Blacks have been reported to use fewer prescription medications and spend less on prescription medications than Whites [26]. Even among Blacks with ADRD, lower medication utilization than Whites has been noted [4]. Therefore, eligibility criteria based on medication utilization may also be a reason Blacks are less likely to be enrolled in MTM programs. Previous studies have also reasoned that eligibility criteria based primarily on prescription medication utilization may lead to racial/ethnic disparities [10,27].

Several studies have suggested using alternative eligibility criteria to target individuals with medication utilization issues [27–29]. However, examination of these alternative criteria has shown limited effectiveness in reducing disparities. For example, MTM eligibility

contingent upon medication utilization measures in Part D Star Ratings may reduce overall disparities, but disparities may persist with some individual measures [28]. Furthermore, potential disparities between Whites and Hispanics endured with eligibility criteria based on some demonstration programs for MTM services [29]. While these suggested alternative criteria may resolve some racial/ethnic disparities in MTM eligibility, none offer a complete resolution.

In 2017, to improve the MTM program, the CMS began a 5-year pilot Enhanced MTM model. This program allows sponsors to select their eligibility criteria and provides incentives to high-performing MTM programs [30]. Additional goals of the Enhanced MTM model were to reduce Medicare expenditures and improve health outcomes [30]. Reports from this model have shown an increase in enrollment, improvement in some health outcomes, and reduction in some health care costs [31]. However, Medicare experienced a net loss due to the incentive payments [31]. Thus, the Enhanced MTM model may not expand beyond the pilot phase projected to end December 2021. Furthermore, it is unknown if racial/ethnic disparities were reduced with this model. Regardless of whether the Enhanced MTM model will be implemented in the future, examining racial/ethnic disparities in this model is warranted since it may offer insight into reforming the MTM eligibility criteria.

Limitations

This study has a few limitations. Firstly, the patient-level variables included were limited to those available in Medicare data, which restricted the investigators' ability to account for some individual-level characteristics. Instead, county-level information was utilized as proxies, but such information may not represent each individual's characteristics accurately. Secondly, patients residing in a health care facility and the community were not distinguished. Number of chronic conditions, medication utilization, and medication expenditure may differ systematically between the settings, potentially affecting MTM eligibility. Thirdly, individuals without year-round Medicare coverage were excluded. Consequently, disparities may be underestimated if lack of coverage was due to socioeconomic or cultural factors, such as lower health care knowledge. Fourth, due to the nature of cross-sectional design, this study was not able to establish a causal relationship. Fifth, the method for ADRD identification in this study has limitation because the look-back period for patients in period one experienced a change in ADRD diagnosis criteria published in 2011 [32]. However, findings of disparities are robust based on the analyses of the two time periods. Seventh, ADRD diagnosis is difficult, patients from racial/ethnic minority groups may be diagnosed later than White patients, which may affect treatment strategies health care providers are willing to experiment with for the patients. Thus, findings from this study represent the effects of many factors on disparities. Lastly, only Medicare beneficiaries with ADRD and certain comorbid chronic conditions were analyzed; thus, findings may not generalize to other conditions or non-Medicare populations. Despite these limitations, this study is among the first to utilize the MTM data to examine MTM enrollment among Medicare beneficiaries with ADRD. It fills a literature gap in racial/ethnic disparities in actual MTM enrollment.

Conclusions

This study found disparities between Whites and Blacks in MTM enrollment among Medicare beneficiaries with ADRD and diabetes, hypertension, and hyperlipidemia. While lower racial disparities over time were discovered, racial disparities in MTM enrollment persisted. The findings of this study suggest that modifying the eligibility criteria for MTM programs may be further considered to improve the enrollment of Blacks in the program. While reducing the number of medications and chronic conditions required for MTM eligibility exert only limited effectiveness in reducing disparities as demonstated in past studies, any reduction in disparities would be an improvement for the MTM program. Moreover, examining the effectiveness of the Enhanced MTM model in reducing disparities may help to uncover further effective strategies in adjusting MTM eligibility criteria. Future research should also examine if there are current disparities in various aspects of MTM services such as timeliness and intensity among the population enrolled in MTM. This is of particular interest for patients with conditions prevalent among minorities, such as ADRD and cardiovascular conditions.

Acknowledgments

The authors would like to acknowledge assistance with the formatting of the final manuscript from Lorraine Todor and Hannah Foster, Doctor of Pharmacy Students at the University of Tennessee Health Science Center College of Pharmacy.

Transparency Section

Declaration of funding

Research reported in this publication was supported by the National Institute on Aging of the National Institutes of Health under Award Number R01AG040146. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Declaration of financial/other relationships

Marie A. Chisholm-Burns: Received funding from Carlos and Marguerite Mason Trust. Junling Wang: Received funding from AbbVie, Curo, Bristol Myers Squibb, Pfizer, and Pharmaceutical Research and Manufacturers of America (PhRMA) and serves on Health Outcomes Research Advisor Committee of the PhRMA Foundation. Jamie A. Browning, Chi Chun Steve Tsang, Rose Zeng, Xiaobei Dong, Joseph Garuccio, Jim Y. Wan, Christopher K. Finch, and Jack W. Tsao: None.

Data availability statement

The Medicare data were accessed through virtual access to the CMS Virtual Research Data Center.

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Table 1.

Characteristics of Patients with Alzheimer's Disease and Related Dementias across Racial/Ethnic Groups in Years 2016 and 2017

Characteristics	Total Sample (n = 381,485) n (%)	Non-Hispanic White (n = 306,817) n (%)	Black (n = 35,981) n (%)	Hispanic (n = 22,532) n (%)	Asian/Pacific Islander (n = 11,081) n (%)	Other (n = 5,074) n (%)
Predisposing Factors						
Age, mean (SD)	82.57 (7.99)	82.83 (7.93)	81.10 * (8.36)	81.63 * (7.83)	83.35 * (7.62)	79.13 * (8.25)
Male	126,227 (33.09)	101,067 (32.94)	11,551 * (32.10)	7,657 (33.98)	3,865 * (34.88)	2,087 * (41.13)
Proportion of Married-Couple Families, mean (SD) [a]	0.73 (0.07)	0.74 (0.06)	0.67 * (0.08)	0.70 * (0.07)	0.71 * (0.06)	0.71 * (0.08)
Proportion with Education ≥ High School, mean (SD) [a]	0.87 (0.06)	0.88 (0.05)	0.86 * (0.05)	0.82 * (0.09)	0.86 (0.06)	0.86 * (0.06)
Per Capita Income (in $1000), mean (SD) [a]	50.24 (17.32)	49.82 (16.47)	49.40 (17.30)	50.42 (21.62)	63.30 * (23.12)	51.98 * (19.80)
Proportion with No Health Insurance, mean (SD) [a]	0.10 (0.05)	0.10 (0.05)	0.11 * (0.04)	0.13 * (0.07)	0.09 * (0.04)	0.10 * (0.05)
Enabling Factors						
Metropolitan Statistical Area [a]	304,040 (79.70)	238,521 (77.74)	30,559 * (84.93)	20,266 * (89.94)	10,762 * (97.12)	3,932 (77.49)
Health Professional Shortage Area [a]	346,961 (90.95)	275,896 (89.92)	34,112 * (94.81)	21,623 * (95.97)	10,525 * (94.98)	4,805 * (94.70)
Census Regions [a]						
Northeast	83,272 (21.83)	69,072 (22.51)	6,098 (16.95)	4,588 (20.36)	2,257 (20.37)	1,257 (24.77)
Midwest	86,465 (22.67)	76,345 (24.88)	6,917 (19.22)	1,673 * (7.42)	778 * (7.02)	752 * (14.82)
South	150,135 (39.36)	116,888 (38.10)	20,731 * (57.62)	9,289 (41.23)	1,806 * (16.30)	1,421 * (28.01)
West	61,613 (16.15)	44,512 (14.51)	2,235 * (6.21)	6,982 * (30.99)	6,240 * (56.31)	1,644 * (32.40)
Need Factor						
Risk Adjustment Summary Score, mean (SD)	2.44 (1.63)	2.38 (1.59)	2.82 * (1.85)	2.64 * (1.73)	2.32 (1.59)	2.40 (1.69)

Proportion with Education ≥ High School refers to the proportion of individuals aged 25 years or older.

[a] Community-level characteristic.

* Characteristics statistically different from non-Hispanics Whites ($p < .05$). Northeast was used as a reference for comparison on census regions.

Abbreviation: SD, standard deviation.

Table 2.

Status of Enrollment in Medication Therapy Management Programs among Patients with Alzheimer's Disease and Related Dementias

Cohort	Study Period	Non-Hispanic White n (%)	Black n (%)	Hispanic n (%)	Asian/Pacific Islander n (%)	Other n (%)
Total Study Sample	2013–2014	48,743 (16.13)	6,971 * (17.30)	6,162 * (23.09)	1,951 * (18.25)	739 (17.67)
	2016–2017	44,299 (14.44)	6,014 * (16.71)	4,469 * (19.83)	1,846 * (16.66)	902 * (17.78)
Cohort with Diabetes	2013–2014	33,687 (29.17)	6,052 * (25.44)	5,359 (31.76)	1,622 (26.99)	623 (27.78)
	2016–2017	32,556 (27.69)	5,313 * (24.97)	3,984 (28.33)	1,595 (25.96)	766 (29.34)
Cohort with Hypertension	2013–2014	48,062 (17.68)	6,954 (17.88)	6,121 * (24.52)	1,930 (19.68)	732 * (19.57)
	2016–2017	43,805 (15.85)	6,002 * (17.26)	4,441 * (21.21)	1,832 * (18.08)	892 * (19.85)
Cohort with Hyperlipidemia	2013–2014	44,058 (19.69)	6,306 * (21.38)	5,797 * (26.91)	1,825 (21.43)	683 * (22.42)
	2016–2017	41,211 (17.35)	5,579 * (20.23)	4,265 * (23.23)	1,763 (19.26)	849 * (21.85)

* Frequency distribution significantly different from non-Hispanics Whites ($p < .05$).

Table 3–1.

Racial/Ethnic Disparity Patterns in Medication Therapy Management Enrollment among Medicare Beneficiaries with Alzheimer's Disease and Related Dementias.

	Total Study Sample (Years 2013 & 2014)		Total Study Sample (Years 2016 & 2017)		Cohort with Diabetes (Years 2013 & 2014)		Cohort with Diabetes (Years 2016 & 2017)	
Characteristics	**Odds Ratio**	**95% Confidence Interval**	**Odds Ratio**	**95% Confidence Interval**	**Odds Ratio**	**95% Confidence Interval**	**Odds Ratio**	**95% Confidence Interval**
Predisposing Factors								
Race/Ethnicity								
Blacks	0.85	0.80–0.89	0.91	0.86–0.97	0.72	0.68–0.77	0.75	0.71–0.80
Hispanics	1.35	1.11–1.64	1.29	1.15–1.45	1.11	0.92–1.33	1.02	0.91–1.14
Asians/Pacific Islanders	1.31	1.17–1.47	1.40	1.27–1.54	1.05	0.94–1.18	1.099	1.003–1.206
Other	1.02	0.92–1.13	1.17	1.04–1.32	0.90	0.81–1.01	1.05	0.94–1.17
Age	0.962	0.961–0.964	0.960	0.959–0.962	0.966	0.964–0.968	0.963	0.962–0.965
Male	0.83	0.81–0.85	0.88	0.86–0.90	0.82	0.80–0.84	0.87	0.85–0.89
Proportion of Married-Couple Families[a]	1.05	0.66–1.67	1.07	0.70–1.63	1.15	0.70–1.88	1.08	0.72–1.62
Proportion with Education ≥ High School[a]	0.50	0.21–1.19	0.18	0.09–0.37	1.12	0.46–2.75	0.51	0.28–0.94
Per Capita Income (in $1,000) [a]	0.9980	0.9964–0.9996	0.998	0.996–0.999	0.9981	0.9965–0.9997	0.9984	0.9970–0.9998
Proportion with No Health Insurance[a]	1.04	0.38–2.88	0.39	0.23–0.64	0.98	0.32–2.98	0.48	0.28–0.84
Enabling Factors								
Metropolitan Statistical Area[a]	1.01	0.97–1.06	1.03	0.99–1.07	0.98	0.94–1.03	0.98	0.94–1.03
Health Professional Shortage Area[a]	0.95	0.91–0.99	0.96	0.91–1.01	0.9499	0.9026–0.9998	0.95	0.89–1.01
Census Regions[a]								
Midwest	1.17	1.07–1.27	1.12	1.03–1.21	1.20	1.08–1.33	1.18	1.08–1.29
South	1.13	1.06–1.21	1.05	0.98–1.13	1.16	1.08–1.25	1.12	1.04–1.20
West	0.93	0.82–1.05	0.81	0.72–0.92	1.01	0.90–1.14	0.95	0.85–1.06
Need Factor								

Characteristics	Total Study Sample (Years 2013 & 2014)		Total Study Sample (Years 2016 & 2017)		Cohort with Diabetes (Years 2013 & 2014)		Cohort with Diabetes (Years 2016 & 2017)	
	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval
Risk Adjustment Summary Score	1.32	1.31–1.34	1.36	1.35–1.37	1.18	1.17–1.19	1.21	1.20–1.22
Year 2014 (compared to 2013)	1.26	1.22–1.30			1.23	1.18–1.28		
Year 2017 (compared to 2016)			0.89	0.87–0.91			0.95	0.92–0.97

Reference groups: non-Hispanic Whites, female, non-metropolitan statistical area, non-Health Professional Shortage Area, Northeast Census Region.

[a]Community-level characteristic.

Table 3–2.

Racial/Ethnic Disparity Patterns in Enrollment in Medication Therapy Management among Medicare Beneficiaries with Alzheimer's Disease and Related Dementias.

	Cohort with Hypertension (Years 2013 & 2014)		Cohort with Hypertension (Years 2016 & 2017)		Cohort with Hyperlipidemia (Years 2013 & 2014)		Cohort with Hyperlipidemia (Years 2016 & 2017)	
Characteristics	**Odds Ratio**	**95% Confidence Interval**	**Odds Ratio**	**95% Confidence Interval**	**Odds Ratio**	**95% Confidence Interval**	**Odds Ratio**	**95% Confidence Interval**
Predisposing Factors								
Race/Ethnicity								
Blacks	0.81	0.77–0.85	0.87	0.82–0.92	0.87	0.83–0.93	0.93	0.88–0.99
Hispanics	1.33	1.10–1.61	1.27	1.13–1.42	1.35	1.11–1.63	1.29	1.15–1.44
Asians/Pacific Islanders	1.27	1.14–1.42	1.37	1.25–1.51	1.26	1.11–1.43	1.34	1.21–1.48
Other	1.02	0.93–1.13	1.18	1.06–1.32	1.07	0.98–1.17	1.22	1.10–1.35
Age	0.959	0.958–0.961	0.957	0.956–0.958	0.966	0.965–0.968	0.962	0.961–0.963
Male	0.83	0.81–0.85	0.88	0.86–0.90	0.82	0.80–0.84	0.87	0.85–0.89
Proportion of Married-Couple Families[a]	1.11	0.70–1.74	1.08	0.72–1.63	0.95	0.60–1.52	0.93	0.61–1.41
Proportion with Education ≥ High School[a]	0.61	0.26–1.40	0.23	0.12–0.44	0.61	0.26–1.41	0.27	0.14–0.53
Per Capita Income (in $1,000) [a]	0.9983	0.9967–0.9999	0.998	0.997–0.999	0.998	0.996–0.999	0.998	0.996–0.999
Proportion with No Health Insurance[a]	1.04	0.38–2.84	0.41	0.25–0.68	0.78	0.29–2.11	0.39	0.24–0.65
Enabling Factors								
Metropolitan Statistical Area[a]	1.002	0.963–1.044	1.02	0.98–1.06	0.97	0.93–1.01	0.98	0.94–1.02
Health Professional Shortage Area[a]	0.953	0.912–0.996	0.96	0.91–1.01	0.94	0.90–0.98	0.96	0.91–1.01
Census Regions[a]								
Midwest	1.16	1.07–1.27	1.11	1.03–1.21	1.19	1.08–1.30	1.13	1.04–1.23
South	1.12	1.05–1.19	1.04	0.97–1.12	1.16	1.08–1.24	1.06	0.99–1.14
West	0.96	0.85–1.08	0.84	0.74–0.94	0.996	0.883–1.124	0.87	0.77–0.98
Need Factor								

Characteristics	Cohort with Hypertension (Years 2013 & 2014)		Cohort with Hypertension (Years 2016 & 2017)		Cohort with Hyperlipidemia (Years 2013 & 2014)		Cohort with Hyperlipidemia (Years 2016 & 2017)	
	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval
Risk Adjustment Summary Score	1.29	1.28–1.30	1.32	1.31–1.34	1.30	1.29–1.31	1.34	1.32–1.35
Year 2014 (compared to 2013)	1.26	1.22–1.30			1.23	1.19–1.28		
Year 2017 (compared to 2016)			0.89	0.87–0.91			0.88	0.86–0.91

Reference groups: non-Hispanic Whites, female, non-metropolitan statistical area, non-Health Professional Shortage Area, and Northeast Census Region.

[a]Community-level characteristic.

Table 4.

Changes in Racial/Ethnic Disparities in Enrollment in Medication Therapy Management among Medicare Beneficiaries with Alzheimer's Disease and Related Dementias across Time Periods.

	Total Study Sample		Cohort with Diabetes		Cohort with Hypertension		Cohort with Hyperlipidemia	
Characteristics	**Odds Ratio**	**95% Confidence Interval**	**Odds Ratio**	**95% Confidence Interval**	**Odds Ratio**	**95% Confidence Interval**	**Odds Ratio**	**95% Confidence Interval**
Predisposing Factors								
Race/Ethnicity								
Blacks	0.83	0.79–0.88	0.72	0.68–0.76	0.80	0.76–0.84	0.86	0.81–0.91
Hispanics	1.38	1.11–1.70	1.12	0.92–1.38	1.35	1.09–1.67	1.37	1.11–1.68
Asians/Pacific Islanders	1.33	1.18–1.49	1.06	0.94–1.18	1.29	1.15–1.44	1.27	1.13–1.44
Other	1.03	0.93–1.13	0.91	0.81–1.01	1.03	0.93–1.13	1.07	0.98–1.17
Age	0.961	0.960–0.962	0.965	0.964–0.966	0.958	0.957–0.959	0.964	0.963–0.965
Male	0.85	0.84–0.87	0.84	0.83–0.86	0.85	0.84–0.87	0.84	0.83–0.86
Proportion of Married-Couple Families[a]	1.04	0.67–1.61	1.10	0.71–1.72	1.08	0.70–1.64	0.93	0.60–1.43
Proportion with Education ≥ High School[a]	0.27	0.13–0.56	0.66	0.33–1.32	0.33	0.16–0.67	0.37	0.18–0.74
Per Capita Income (in $1,000) [a]	0.998	0.997–0.999	0.9983	0.9969–0.9997	0.9982	0.9969–0.9995	0.998	0.996–0.999
Proportion with No Health Insurance[a]	0.36	0.19–0.71	0.40	0.20–0.81	0.37	0.19–0.71	0.33	0.17–0.62
Enabling Factors								
Metropolitan Statistical Area[a]	1.02	0.98–1.06	0.98	0.95–1.02	1.01	0.97–1.05	0.97	0.94–1.01
Health Professional Shortage Area[a]	0.9588	0.9194–0.9999	0.956	0.914–1.001	0.963	0.925–1.004	0.95	0.92–0.99
Census Regions[a]								
Midwest	1.16	1.07–1.25	1.20	1.10–1.31	1.15	1.06–1.25	1.17	1.08–1.27
South	1.14	1.07–1.21	1.19	1.12–1.26	1.13	1.06–1.20	1.15	1.09–1.22
West	0.89	0.79–1.01	1.001	0.897–1.117	0.92	0.82–1.03	0.95	0.85–1.07
Need Factor								
Risk Adjustment Summary Score	1.34	1.33–1.35	1.19	1.18–1.20	1.31	1.29–1.32	1.32	1.31–1.33
Time Period 2 (Years 2016–2017)	0.80	0.77–0.83	0.86	0.82–0.89	0.80	0.77–0.83	0.78	0.75–0.81

Characteristics	Total Study Sample		Cohort with Diabetes		Cohort with Hypertension		Cohort with Hyperlipidemia	
	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval
Time Period 2 × Race/Ethnicity								
Blacks	1.11	1.05–1.16	1.06	1.01–1.12	1.11	1.05–1.16	1.10	1.04–1.16
Hispanics	0.96	0.85–1.08	0.93	0.83–1.04	0.96	0.86–1.08	0.97	0.86–1.08
Asians/Pacific Islanders	1.04	0.97–1.13	1.03	0.95–1.12	1.05	0.98–1.14	1.04	0.96–1.12
Other	1.15	1.02–1.29	1.17	1.02–1.33	1.16	1.03–1.30	1.15	1.03–1.29

Reference groups: non-Hispanic Whites, female, non-metropolitan statistical area, non-Health Professional Shortage Area, Northeast Census Region, and period 1 (years 2013–2014).

[a]Community-level characteristic.