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Low-value care: antipsychotic medication use among community-dwelling medicare beneficiaries with Alzheimer’s disease and related dementias and without severe mental illness

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Abstract

Background: Antipsychotic medication use among elderly with Alzheimer’s disease and related dementias (ADRD) and without severe mental illness is considered as low-value care. Our objective was to assess the factors associated with this inappropriate use of antipsychotic medications among community-dwelling Medicare beneficiaries with ADRD and without severe mental illness.

Methods: This study used a retrospective cross-sectional design. Data for this study were derived from the nationally representative Medicare Current Beneficiary Survey (MCBS) and linked Medicare claims. Logistic regression models were used to examine factors associated with low-value care.

Results: Overall 8.5% had low-value care. In the final adjusted logistic regression model, race other than Hispanic or Non-Hispanic White (AOR =0.54, 95% CI = [0.30,0.98]), individuals over 80 years of age (AOR =0.53, 95% CI = [0.36,0.76]), and obese individuals (AOR =0.55, 95% CI = [0.35,0.85]) had significantly lower odds of receiving low-value care. Those with depression (AOR =1.71, 95% CI = [1.21, 2.43]), who lived in the Midwest (AOR =1.7, 95% CI = [1.08,2.68]), and with a higher number of ADL limitations (AOR =1.28, 95% CI = [1.19,1.38]) had significantly higher odds of low-value care.

Conclusions: There were subgroup differences in low-value care. Interventions may target these subgroups to reduce low-value care.

Keywords

Antipsychotic medications; Medicare beneficiaries; severe mental illness; Low-value care; Alzheimer’s disease and related dementias

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Author contribution

All authors contributed to the conception and design of the research. MN conducted the statistical analyses under the supervision of US and CS. MN wrote the first draft. MN, CS, and US worked on successive iterations.

Disclosure statement

The authors report no conflicts of interest.

Introduction

Prescription of antipsychotic medications for patients with Alzheimer's disease and related dementias (ADRD) in the absence of severe mental illness (i.e. schizophrenia or bipolar disorder) fits the definition of low-value care because it is not likely to benefit the patient given the harms, cost, and available alternatives. (Verkerk, Tanke, Kool, van Dulmen, & Westert, 2018). It has been well-established that antipsychotic medications increase the risk of death among those with ADRD (Jeste et al., 2008; Wagner et al., 2006). A meta-analysis of 15 clinical trials showed that the all-cause mortality risk of older adults with dementia who used antipsychotic medications was approximately 1.6 times higher than those who did not use any antipsychotic medications (Schneider, Dagerman, & Insel, 2005). In addition, antipsychotic medications can expose older adults to the risk of side effects such as sedation, anticholinergic effects, and extrapyramidal symptoms (Olivieri-Mui, Devlin, Ochoa, Schenck, & Briesacher, 2018). Furthermore, none of the antipsychotic medications were approved by the Food Drug Administration (FDA) for ADRD (Buterbaugh, Jamrose, Lazzara, Honaker, & Thomas, 2014). In fact, the FDA issued a black-box warning against the use of atypical antipsychotic medications in 2005 and all antipsychotic medications (atypical and typical) in 2008 for elderly with ADRD and no severe mental illness. Therefore, several organizations such as the American Geriatric Society, the American Psychiatric Association and the American Medical Directors Association (Colla, Morden, Sequist, Schpero, & Rosenthal, 2015; Morley, 2012; Semla et al., 2015) and the choosing wisely campaign consider the use of antipsychotic medications among patients with ADRD and without severe mental illness as low-value care.

Despite being low-value care and the FDA black box warnings, it was reported that 14% of community-dwelling Medicare Part D enrollees with ADRD and no severe mental illness received at least one prescription of antipsychotic medication in 2012 at an estimated cost of \$171 million (US Government Accountability Office, 2015). This estimated cost was based on the cost of antipsychotic medications for Medicare Part D and is likely an underestimate as all other types of cost related to the use of antipsychotic medications, such as managing the side-effects of these medications, were not accounted for (Kolanowski, Fick, Waller, & Ahern, 2006). Reducing low-value care (i.e. antipsychotic medication use among those with ADRD and without severe mental illness) is a priority area for the Centers for Medicare and Medicaid Services (CMS) (US Government Accountability Office, 2015).

Efforts to reduce this low-value care can be greatly aided by an examination of the factors associated with antipsychotic medication use among Medicare beneficiaries with ADRD and no severe mental illness. However, to date, no study has investigated this area. Therefore, the main objective of this study is to evaluate the factors associated with low-value care among community-dwelling Medicare beneficiaries with ADRD and no severe mental illness.

Conceptual framework

We used Andersen's behavioral health model to guide our selection of variables associated with low-value care. As per the framework, low-value care may be affected by (1)

predisposing factors (age, sex, and race/ethnicity); (2) enabling factors (example: prescription drug insurance coverage); (3) need factors (example: physical health); (4) personal health practices (example: smoking); and (5) external environment (example: region of residence). We selected Andersen's framework for this study for several reasons: (1) it enables us to adjust for a comprehensive list of factors associated with low-value care; (2) well-suited for studies that have many variables representing the same domain; and (3) it is extensively used in health services research to explain utilization (Babitsch, Gohl, & von Lengerke et al., 2012). We also note that the variables included in each domain were derived from the standard list of variables from a systematic review that examined 328 articles published between 1998 and 2011 and used Anderson behavioral model as the conceptual framework (Babitsch et al., 2012).

Methods

Study design

This is a retrospective, observational, cross-sectional study of community-dwelling elderly fee-for-service Medicare beneficiaries with ADRD and without severe mental illness.

Data source

The data sources for this study are the Medicare Current Beneficiary Survey (MCBS) and Medicare claims of the survey respondents. The MCBS is a nationally representative survey of all Medicare beneficiaries. The unique feature of this database is the linkage between survey data of the participants and Medicare claims. The survey component of the MCBS includes self-reported information not available in claims databases (e.g. health status, functional limitations, smoking, and others). The Medicare claims component provides both Part A and B fee-for-service claims. These claims contain information on diagnosis, treatment, health services utilization, and Medicare payments (Eppig & Chulis, 1997). Part D claims file is appended to the Prescribed Medicine Event (PME) file and not given to the researchers as a separate file. PME file contains medications prescribed from Part D events if covered by Medicare Part D insurance or from self-report if not covered by Medicare Part D. To capture accurate reports of prescription drug information, the participants were asked to use a calendar for recording their prescription drugs and they were also requested to bring all their prescription drug bottles to the place of interview (Poisal, Murray, Chulis, & Cooper, 1999). For this study, we used the annual releases of Cost and Use files from 2006 through 2013. We selected these years because the FDA black box warning for atypical antipsychotic prescriptions for ADRD was first issued in 2005. We pooled the data to gain adequate cell sizes.

Study sample

The study sample was restricted to the community-dwelling Medicare beneficiaries (age 65 years) with ADRD, enrolled in fee-for-service (Part A and Part B) throughout the calendar year and alive during the calendar year. We identified community-dwelling beneficiaries by "living situation for the year", which indicated whether the beneficiary lived in the community or in a facility or both. Individuals with ADRD were identified from either the survey component or Medicare claims of the survey respondents. In the survey component,

self-reported ADRD was captured based on any positive response to the either of following two questions: “Has a doctor (ever) told [you/(SP)] that (you/he/ she) had Alzheimer disease?” and “Has a doctor (ever) told [(you/(SP)] that (you/he/she) had any type of dementia other than Alzheimer disease?”. In the Medicare claims, ADRD cases were identified by using a validated algorithm based on the International Classification of Diseases, ninth edition Clinical Modification (ICD-9-CM) codes, which was developed by the Centers for Medicaid and Medicare Services (CMS) Chronic Conditions Data Warehouse (CCD Warehouse, 2018). The following ICD-9-CM codes were used to identify ADRD: 2900, 29010, 29011, 29012, 29013, 29020, 29021, 2903, 29040, 29041, 29042, 29043, 2940, 29410, 29411, 29420, 29421, 2948, 3310, 33111, 33119, 3312, 3317, and 797.

We also excluded individuals with severe mental illness (bipolar disorders, schizophrenia, and other psychotic diseases), as antipsychotic medications may be needed for treating these conditions. Bipolar disorders and schizophrenia were identified from Medicare inpatient/ outpatient/ home healthcare files using the ICD-9-CM codes (Appendix 1, Supplementary material). Individuals who were partially enrolled in Part A or B during the calendar year were excluded as their claims data are not available for months not enrolled in Part A or B.

Measures

Dependent variable: Antipsychotic medication use (Yes/no)—The dependent variable was prescription antipsychotic medications use. We identified antipsychotic medications from prescription drug files using brand and generic drug names. Based on this, we created a binary variable that indicated whether an individual used antipsychotic medications or not.

Independent variables

Predisposing factors were: sex (male and female); age (less than 80 years and 80 years or older); race/ethnicity (Non-Hispanic White, Hispanic, or other races). Enabling factors were: marital status (married and not married); education level (less than high school, high school, and above high school); poverty status [based on income relative to the level of federal poverty line (FPL)] (less than 200% of FPL, or at least 200% of FPL); prescription drug coverage (yes/no). Prescription drug coverage included coverage from either Medicare, private plans or other sources. Need factors were: depression (yes/no); anxiety (yes/no); number (16) of limitations in activities of daily living (ADL) and the number (1–7) of chronic conditions (arthritis, cancer, diabetes, heart disease, hypertension, respiratory diseases, and osteoporosis). Personal health practices were: smoking status (never-smoker, former, and current smoker) and obesity status (obese and not obese). External environment factors were: region of residence (Northeast, South, Midwest, and West) and residency in metropolitan areas (Yes/No).

Statistical analyses

Unadjusted group differences in low-value care were tested with Rao-Scott Chi-square tests. We used several logistic regression models to examine the adjusted associations between independent variables and low-value care. Model 1 was adjusted for predisposing factors; Model 2 was adjusted for predisposing and enabling factors; Model 3 was adjusted for

predisposing, enabling, and need factors; and Model 4 was adjusted for predisposing, enabling, need, personal health practices, and external environment factors. In this study, poverty status and education level were highly correlated. So, in the second, third, and fully adjusted logistic regression models, we used only poverty status. Smoking status was not significant in all the models and was hence excluded. All analyses of this study were conducted using the survey procedures of Statistical Analysis Software (SASV®) version 9.4 to account for the complex survey design of MCBS.

Results

The study sample consisted of 2,570 person-years, which represented 1,169,894 community-dwelling elderly (age ≥ 65 years), fee-for-service Medicare beneficiaries with ADRD and without severe mental illness between 2006 and 2013. The majority of the sample were female (62.3%), white (75.6%), 80 years or older (61.9%), had less than 200% FPL income (63.6%) and had at least one ADL limitation (57.6%) (Table 1).

The overall prevalence of antipsychotic medication use was 8.5% during the study period. The percentage of antipsychotic medication use declined from 10.3% in 2006 and 7.5% in 2013 (Table 1). However, the decline was not statistically significant. Table 1 also characterizes low-value care by predisposing, enabling, need, lifestyle practices, and external environment characteristics. In unadjusted analyses, race/ethnicity, education, poverty status, depression, and ADL limitations were associated with low-value care.

Adjusted odds ratios (AOR) and 95% confidence intervals (95% CI) from logistic regression models on low-value care presented in Table 2. In Model 1 (adjusting only for predisposing characteristics) compared to Whites, Latinos had higher odds of reporting prescriptions for antipsychotic medications (AOR =2.13, 95% CI = [1.26, 3.58]). Elderly 80 years and older were 0.69 times as likely as those less than 80 years to report antipsychotic medication use (AOR =0.69, 95% CI = [0.50, 0.96]). In Model 2, when adjusting for predisposing and enabling factors, Latino ethnicity (AOR =1.86, 95% CI = [1.08, 3.20]) and older age (AOR =0.67, 95% CI = [0.48, 0.94]) remained statistically significant. Compared to those with income of at least 200% of the FPL, those with income less than 200% FPL had higher odds of antipsychotic medication use (AOR =1.6, 95% CI = [1.04, 2.46]).

In Model 3, which also adjusted for need factors (Table 2), the odds of antipsychotic medication use remained significantly lower for older age (AOR =0.57, 95% CI = [0.40, 0.82]). However, Latino ethnicity was no longer significant (AOR =1.55, 95% CI = [0.87, 2.76]). Compared to Whites, other races had lower odds of antipsychotic medication use (AOR =0.57, 95% CI = [0.33, 1.00]). Participants with depression had higher odds of receiving antipsychotic prescriptions (AOR =1.69, 95% CI = [1.20, 2.39]) than those without depression. A unit increase in the number of ADL limitations was associated with a 26% increase in the odds of antipsychotic medication use (AOR =1.26, 95% CI = [1.17, 1.36]).

In the fully adjusted model (model 4), other race (AOR =0.54, 95% CI = [0.30, 0.98]), older age (AOR =0.53, 95% CI = [0.36, 0.76]) and obesity (AOR =0.55, 95% CI = [0.35, 0.85]) were associated with lower odds of antipsychotic medications use compared whites, younger

age, and not obese. Number of ADL limitations (AOR =1.28, 95% CI = [1.19, 1.38]), depression diagnosis (AOR =1.71, 95% CI = [1.21, 2.43]), and residency in the Midwest region (AOR =1.7, 95% CI = [1.08, 2.68]) were associated with higher odds of antipsychotic medication use.

Discussion

We examined low-value care (antipsychotic medication without indication) and factors associated with low-value care among community-dwelling elderly fee-for-service Medicare beneficiaries with ADRD and without severe mental illness. We observed that between 2006 and 2013, one in 12 Medicare beneficiaries with ADRD received low-value care. Our estimated rate of antipsychotic medications for ADRD is lower than 19% (between 2002 and 2004) reported by Rhee and colleagues (Rhee, Csernansky, Emanuel, Chang, & Shega, 2011) and 24% reported by Rattinger and colleagues (Rattinger et al., 2013). The difference in estimated rates of antipsychotic medications use among all these studies could partially be explained by differences in the study population. For example, Rhee et al. and Rattinger et al. did not exclude the elderly with severe mental illness (i.e., schizophrenia and/or bipolar disorders).

Although not statistically significant, we observed a reduction in antipsychotic medication use between 2006 (10.3%) and 2013 (7.5%), among community-dwelling elderly fee-for-service Medicare beneficiaries with ADRD and no severe mental illness. We can speculate that this decline may be related to the 2005 FDA black box warning for atypical antipsychotics and 2008 FDA black box warning for all antipsychotic medications. However, it is concerning that 8.5% of elderly individuals with ADRD and no severe mental illness were prescribed antipsychotic medications (Liperoti, Pedone, & Corsonello, 2008). Expanding already existing and effective efforts to the community-dwelling elderly can be prioritized by the CMS to reduce low-value care. For example, concerted efforts by the CMS through the “National Partnership to Improve Dementia Care in Nursing Homes” program reduced the use of antipsychotic medications among residents of nursing homes by 15% between 2011 and 2013 (US Government Accountability Office, 2015). The low-value care may be reduced if the prescription of antipsychotic medications for ADRD is incorporated as a quality measure for the physicians by the CMS. Prior studies have shown that such quality indicators are essential in improving health equity and changing prescription practices (Bierman & Clark, 2007; Wells et al., 2004).

Our study makes a unique contribution to the literature on low-value care. Previous research studies have estimated the use of antipsychotic medications among elderly with ADRD (Rattinger et al., 2013) and factors associated with antipsychotic medication use (Rhee et al., 2011). However, these studies did not specifically analyze low-value care because these studies did not exclude individuals with schizophrenia or bipolar disorders for whom antipsychotic medications have been approved for treatment by the FDA (Jeste et al., 2008). Although the US Government Accountability Office report estimated low-value care, it did not analyze factors associated with low-value care (US Government Accountability Office, 2015).

Our study also extended the prior literature by identifying factors that were associated with low-value care among community-dwelling elderly fee-for-service Medicare beneficiaries with ADRD and no severe mental illnesses. The findings of this study are especially valuable to providers, CMS, and other stakeholders in their surveillance efforts of low-value care and identification of subgroups that are vulnerable to such care. In our study, predisposing factors (age and race), need factors (number of ADL limitations and depression diagnosis), personal health practices (obesity), and external environment (residency in the Midwest region) were associated with low-value care.

Consistent with our findings, a study by Lövheim et al. in Sweden suggest that a higher number of ADL limitations was associated with antipsychotic medication use for ADRD (Lövheim, Sandman, Kallin, Karlsson, & Gustafson, 2006). While we did not examine the reasons, we can speculate that elderly with higher number of ADL limitations may also have lower cognitive functioning and higher risk of behavioral and psychological symptoms of dementia (Neuhaus & McCulloch, 2014; Campana, Bonin-Guillaume, Yagoubi, Berbis, & Franqui, 2016); they may have been prescribed antipsychotic medications to control these symptoms. Unfortunately, these patients are at high risk of antipsychotic medications side effects such as sedation, fall, and cardiovascular events (Jeste et al., 2008), and antipsychotic medication use can accelerate cognitive functioning decline (Foebel et al., 2015).

We observed that individuals with ADRD and depression had higher odds of low-value care compared to those without a diagnosis of depression. This is not surprising, given that antipsychotic medications, such as aripiprazole and quetiapine have been recommended as adjuvant therapy or the last resort for the treatment of major depressive disorder (Gelenberg et al., 2010). Future studies need to investigate the benefits and harms associated with antipsychotic medications for depression among older adults with ADRD.

The higher odds of low-value care among Medicare beneficiaries living in the Midwest is supported by a geographical analysis of the rate of pharmacological treatment initiation for severe mental illness (Huang, Tom, Harris, & Simoni-Wastila, 2016). Using spatial statistics, the study by Huang et al. reported that there are regions in the Midwest that have a higher rate of initiation of antipsychotic medications relative to their surrounding areas. Similarly, a geographical analysis of antipsychotic medications utilization indicated that the highest rate of antipsychotic medication use was observed in some parts of the Midwest, specifically Appalachia (King & Essick, 2013). Future studies need to explore the reasons for geographical disparities in antipsychotic medications use.

Strengths & limitations

To date, ours is the first study to examine low-value care in terms of antipsychotic medication use among a nationally representative sample of community-dwelling, fee-for-service Medicare beneficiaries with ADRD and without severe mental illness. Linked survey data with Medicare claims enabled us to examine a comprehensive set of factors associated with this low-value care. The study utilized a theoretical framework (i.e. Andersen's health care utilization) to guide the selection of our variables.

This study also has some limitations. We relied on self-reports for some variables, which may be subject to social desirability and recall bias. Variables that were derived from claims data may be prone to under or over coding. Our study findings are not generalizable to all Medicare beneficiaries because we did not include Medicare HMO enrollees or those who were institutionalized during the study period. Despite the advantages of linked survey with claims, the dataset lacked information on some variables such as patient preferences, cognitive functioning, and severity of ADRD. Finally, this study is a cross-sectional study and establishing a cause and effect relationship is hard. Future prospective cohort studies may be helpful in identifying factors related to the use of antipsychotic medications among community-dwelling Medicare beneficiaries with ADRD.

Conclusions

Low-value care remains an issue among community-dwelling Medicare beneficiaries with ADRD and no severe mental illness. Some groups remain vulnerable to low-value care. Interventions may need to target these subgroups to reduce low-value care among community-dwelling Medicare beneficiaries.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

- Babitsch B, Gohl D, & von Lengerke T (2012). Re-visiting Andersen's Behavioral Model of health services use: A systematic review of studies from 1998–2011. *GMS Psycho-Social-Medicine*, 9, 1–15.
- Bierman AS, & Clark JP (2007). Performance measurement and equity. *BMJ (Clinical Research ed.)*, 334(7608), 1333–1334.
- Buterbaugh WM, Jamrose T, Lazzara J, Honaker L, & Thomas CJ (2014). Review of antidepressants in the treatment of behavioral and psychiatric symptoms in dementia (BPSD). *Mental Health Clinician*, 4(4), 183–188.
- Campana M, Bonin-Guillaume S, Yagoubi R, Berbis J, & Franqui C (2016). Difficulties encountered by general practitioners during acute behavioral disturbances of their dementia patients. *Geriatric et Psychologie Neuropsychiatrie Du Vieillessement*, 14(2), 167–174. [PubMed: 27277148]
- CCD Warehouse. (2018). Chronic Conditions Data Warehouse. Retrieved from <https://www.ccwdata.org/web/guest/condition-categories>
- Colla CH, Morden NE, Sequist TD, Schpero WL, & Rosenthal MB (2015). Choosing wisely: prevalence and correlates of low-value health care services in the United States. *Journal of General Internal Medicine*, 30(2), 221–228. [PubMed: 25373832]
- Eppig FJ, & Chulis GS (1997). Matching MCBS (Medicare Current Beneficiary Survey) and Medicare data: The best of both worlds. *Health Care Financing Review*, 18(3), 211. [PubMed: 10170350]

- Wagner AK, Chan KA, Dashevsky I, Raebel MA, Andrade SE, Lafata JE, ... Platt R (2006). FDA drug prescribing warnings: Is the black box half empty or half full?. *Pharmacoepidemiology and Drug Safety*, 15(6), 369–386. [PubMed: 16294363]
- Wells K, Sherbourne C, Schoenbaum M, Ettner S, Duan N, Miranda J, ... Rubenstein L (2004). Five-year impact of quality improvement for depression: Results of a group-level randomized controlled trial. *Archives of General Psychiatry*, 61(4), 378–386. [PubMed: 15066896]

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Characteristics of elderly community-dwelling fee-for-service medicare beneficiaries with ADRD and without Severe Mental Illness By Low-Value Care (i.e., Antipsychotic Medication Use) Medicare Current Beneficiary Survey Linked with Medicare Claims, 2006–2013.

Table 1.

	Total		Antipsychotic Medication Use		No Antipsychotic Medication Use		Sig
	N	Wt %	N	Wt %	N	Wt %	
ALL	2,570	100.0	218	8.5	2,352	91.5	
Predisposing Characteristics							
Sex							
Female	1,620	62.3	136	8.4	1,484	91.6	
Male	950	37.7	82	8.5	868	91.5	
Age in Years							
Less than 80	784	38.1	81	10.1	703	89.9	
At least 80	1,786	61.9	137	7.5	1,649	92.5	**
Race/Ethnicity							
White	1,932	75.6	159	8.2	1,773	91.8	
Latino	209	7.8	32	15.4	177	93.7	
Other race	429	16.6	27	6.3	402	84.6	
Enabling Characteristics							
Marital Status							
Married	1,091	44.5	89	8	1,002	92	
Not married	1,479	55.5	129	8.8	1,350	91.2	
Education							
Less than high school	910	33	101	11.4	809	88.6	
High school	865	33.9	62	7.5	803	92.5	
Above high school	795	33.1	55	6.6	740	93.4	*
Poverty Status							
Less than 200% FPL	1,673	63.6	158	9.7	1,515	90.3	
At least 200% FPL	897	36.4	60	6.3	837	93.7	
Prescription Drug Coverage							
Yes	1,872	73.2	165	8.8	1,707	91.2	
No	698	26.8	53	7.7	645	92.3	

	Total		Antipsychotic Medication Use		No Antipsychotic Medication Use		Sig
	N	Wt %	N	Wt %	N	Wt %	
ALL	2,570	100.0	218	8.5	2,352	91.5	
Need Characteristics							
Anxiety							
Yes	302	11.9	34	10.9	268	89.1	
No	2,268	88.1	184	8.1	2,084	91.9	
Depression							
Yes	557	22.4	70	12.2	487	87.8	***
No	2,013	77.6	148	7.4	1,865	92.6	
# Chronic Conditions							
0-2	962	38.5	80	8.2	882	91.8	
3-4	1,209	45.9	106	8.8	1,103	91.2	
5-7	399	15.7	32	7.9	367	92.1	
# ADL							
None	1,054	42.4	47	4.8	1,007	95.2	
1-2	738	28.3	62	8.6	676	91.4	
3-6	773	29.3	109	13.7	664	86.3	
Lifestyle Practices							
Smoking status							
Current or past	1,325	53.1	122	9.3	1,203	90.7	
Never smoked	1,234	46.9	96	7.7	1,138	92.3	
Obesity							
Yes	423	17.5	27	6.3	396	93.7	
No	2,114	81.2	18	8.8	1,927	91.2	
External Environment							
Metro Status							
Yes	1,777	71.4	149	8.3	1,628	91.7	
No	793	28.6	69	9	724	91	
Region of Residence							
North East	398	17.4	33	8.5	365	91.5	
South	572	21.7	32	5.7	540	94.3	

	Total		Antipsychotic Medication Use		No Antipsychotic Medication Use		Sig
	N	Wt %	N	Wt. %	N	Wt %	
ALL	2,570	100.0	218	8.5	2,352	91.5	
Midwest	1,192	43.5	116	9.8	1,076	90.2	
West	408	17.4	37	8.5	371	91.5	
Calendar Year							
2006	391	13.2	37	10.3	354	89.7	
2007	290	9.8	23	8.7	267	91.3	
2008	290	10.2	26	7.8	264	92.2	
2009	303	11.6	26	8.5	277	91.5	
2010	261	10.9	23	8.5	238	91.5	
2011	355	14.4	32	9.1	323	90.9	
2012	331	14.0	26	7.4	305	92.6	
2013	349	15.9	25	7.5	324	92.5	

Note: Based on 2,570 person-years of community-dwelling elderly (age 65 years) Medicare beneficiaries with ADRD and without severe mental illness (i.e. schizophrenia or bipolar disorders), continuously enrolled in fee-for-service Part A and Part B during the calendar year and alive during the calendar year. Significant group differences in antipsychotic medication use were based on Rao-scott chi-square tests.

ADL: activities of daily living limitations; ADRD: Alzheimer's disease and related dementias; FPL: federal poverty level; N: unweighted number; Sig: significance; Wt: weighted; #: number.

p < .001

**
.001 p < .01

*
.01 p < .05.

Table 2.

Adjusted Odds Ratios (AOR) and 95% Confidence Intervals from Logistic Regressions on Low-Value Care (i.e. Antipsychotic Medication Use) Elderly Community-Dwelling, Fee-for-service Medicare Beneficiaries with ADRD and without Severe Mental illness linked Medicare Current Beneficiary Survey Linked with Medicare Claims, 2006–2013.

	Model 1			Model 2			Model 3			Fully-Adjusted Model		
	AOR	95% CI	Sig	AOR	95% CI	Sig	AOR	95% CI	Sig	AOR	95% CI	Sig
Predisposing Characteristics												
Sex												
Female	0.96	[0.70, 1.32]		0.88	[0.63, 1.24]		0.84	[0.59, 1.20]		0.86	[0.60, 1.24]	
Male (Ref)												
Race/Ethnicity												
White (Ref)												
Latino	2.13	[1.26, 3.58]	**	1.86	[1.08, 3.20]	*	1.55	[0.87, 2.76]		1.54	[0.81, 2.92]	
Other Race	0.70	[0.41, 1.19]		0.62	[0.36, 1.07]		0.57	[0.33, 1.00]	*	0.54	[0.30, 0.98]	*
Age in years												
LT 80 years												
80 years or older (Ref)	0.69	[0.50, 0.96]	*	0.67	[0.48, 0.94]	*	0.57	[0.40, 0.82]	**	0.53	[0.36, 0.76]	***
Enabling Characteristics												
Marital Status												
Married (Ref)												
Not married				1.05	[0.72, 1.53]		0.98	[0.67, 1.46]		0.97	[0.66, 1.43]	
Poverty Status												
LT 200% FPL				1.60	[1.04, 2.46]	*	1.48	[0.95, 2.29]		1.53	[0.99, 2.36]	
GE 200% FPL (Ref)												
Prescription Drug Coverage												
Yes (Ref)												
No				0.87	[0.58, 1.32]		0.88	[0.58, 1.33]		0.88	[0.58, 1.34]	
Need Characteristics												
Depression												
Yes							1.69	[1.20, 2.39]	**	1.71	[1.21, 2.43]	**
No (Ref)												

	Model 1			Model 2			Model 3			Fully-Adjusted Model		
	AOR	95% CI	Sig	AOR	95% CI	Sig	AOR	95% CI	Sig	AOR	95% CI	Sig
# Chronic Conditions												
# ADL				0.95	[0.85, 1.06]		0.96	[0.86, 1.08]		0.96	[0.86, 1.08]	
Lifestyle Practices				1.26	[1.17, 1.36]	***	1.28	[1.19, 1.38]	***	1.28	[1.19, 1.38]	***
Obesity												
Yes							0.55	[0.35, 0.85]	**	0.55	[0.35, 0.85]	**
No (Ref)												
External Environment Characteristics												
Region of Residence												
Northeast							1.24	[0.69, 2.23]		1.24	[0.69, 2.23]	
South (Ref)												
Midwest							1.70	[1.08, 2.68]	*	1.70	[1.08, 2.68]	*
West							1.20	[0.61, 2.36]		1.20	[0.61, 2.36]	

Note: Based on 2,570 person-years of community-dwelling elderly (age ≥ 65years) Medicare beneficiaries with ADRD and without severe mental illness (i.e. schizophrenia or bipolar disorders), continuously enrolled in fee-for-service Part A and Part B during the calendar year and alive during the calendar year.

Model 1 adjusted for only predisposing characteristics

Model 2: adjusted for predisposing and enabling factors

Model 3: adjusted for predisposing, enabling, and need factors

Fully adjusted model: adjusted for predisposing, enabling, need, individual's health practice, and external environment factors.

ADL: activities of daily living limitations; ADRD: Alzheimer's disease and related dementias; FPL: federal poverty level; Ref: reference group; LT: less than; GE: greater than or equal to; Sig: significance; #: number.

p < .001

**
.001 p < .01

*
.01 p < .05.