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Extent and Predictors of Potentially Inappropriate Antidepressant Use Among Older Adults With Dementia and Major Depressive Disorder

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Abstract

Objective: To quantify the extent and identify predictors of potentially inappropriate antidepressant use among older adults with dementia and newly diagnosed major depressive disorders (MDD).

Methods: This retrospective cohort study included older adults (aged 65 years) with dementia and newly diagnosed MDD using Medicare 5% sample claims data (2012–2013). Based on Healthcare Effectiveness Data and Information Set guidelines, intake period for new antidepressant medication use was from May 1, 2012, through April 30, 2013. Index prescription start date was the first date of antidepressant prescription claim during the intake period. Dependent variable of this study was potentially inappropriate antidepressant use as defined by the Beers Criteria and the Screening Tool of Older Persons' potentially inappropriate Prescriptions criteria. The authors conducted multiple logistic regression analysis to identify individual-level predictors of potentially inappropriate antidepressant use.

Results: The authors' final study sample consisted of 7,625 older adults with dementia and newly diagnosed MDD, among which 7.59% (N = 579) initiated treatment with a potentially inappropriate antidepressant. Paroxetine (N = 394) was the most commonly initiated potentially inappropriate antidepressant followed by amitriptyline (N = 104), nortriptyline (N = 35), and

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SUPPLEMENTARY MATERIALS

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doxepin (N = 32). Initiation of a potentially inappropriate antidepressant was associated with age and baseline use of anxiolytic medications.

Conclusion: More than 7% of older adults in the study sample initiated a potentially inappropriate antidepressant, and the authors identified a few individual-level factors significantly associated with it. Appropriately tailored interventions to address modifiable and nonmodifiable factors significantly associated with potentially inappropriate antidepressant prescribing are required to minimize risks in this vulnerable population.

Keywords

Dementia; depression; antidepressants; psychotherapy; Beers Criteria; Screening Tool of Older Persons'; potentially inappropriate; Prescriptions criteria

INTRODUCTION

Approximately 5.5 million older adults (aged ≥65 years) in the United States suffer from dementia.[1] Compromised quality of life with dementia is common, which is due to progressive memory impairment as well as several co-occurring physical and mental chronic conditions. Depression is one of the most common psychiatric conditions affecting older adults with dementia.[2] Concurrent depression may lead to a wide array of negative outcomes among individuals with dementia, such as early cognitive decline, low medication adherence, increased functional disabilities, high rates of nursing home placement, and increased mortality.[3–6] Currently, there is a lack of solid evidence for the pharmacological treatment of depression among individuals with dementia. A systematic review and meta-analysis published in 2011 examined placebo-controlled antidepressant studies among patients with concurrent depression and dementia.[7] In the seven trials reviewed (n = 330), the authors found no significant difference in response rates or remission rates of depression among people with depression and dementia. Although rates of discontinuation due to adverse events were not significantly different between antidepressants and placebo, the authors noted a "suggestive" effect.[7] Moreover, in a multicenter, parallel-group, double-blind, placebo-controlled, randomized controlled trial of the clinical effectiveness of sertraline and mirtazapine with 13- and 39- week follow-up among individuals with probable or possible Alzheimer disease (AD) and co-existing depression (≥4 weeks' duration) conducted by Banerjee et al.,[8] the findings suggested that sertraline and mirtazapine along with normal care were not clinically effective to reduce depression among individuals with AD.

Because of the lack of a tailored depression treatment guideline among older adults with dementia and major depressive disorders (MDD), the alternative is to use the existing National Committee for Quality Assurance (NCQA) Healthcare Effectiveness Data and Information Set (HEDIS) guidelines for evaluating the current depression treatment in this vulnerable population. HEDIS guidelines recommend antidepressant medication management (AMM) among individuals newly diagnosed with MDD, including older adults with dementia.[9] However, the HEDIS recommendations are global with respect to AMM, and therefore, do not recognize that some of the antidepressants listed are potentially inappropriate for use among older adults according to the Beers Criteria and the Screening

Tool of Older Persons' potentially inappropriate Prescriptions criteria, both with the last update published in 2015.[10,11] Therefore, it is important to evaluate the current practice patterns of depression treatment among older adults with dementia and MDD to quantify the extent of use and identify predictors of potentially inappropriate antidepressant use. Our current study aims to address this gap in the literature by examining the extent of and identifying the factors associated with potentially inappropriate antidepressant use by using a nationally representative sample of Medicare beneficiaries in the United States.

METHODS

Study Design

We employed a retrospective cohort design using Medicare 5% sample claims data from 2012–2013.

Data Source

Medicare 5% sample claims data (2012–2013) were used for this study. The Medicare 5% sample claims data consists of: 1) inpatient; 2) outpatient; 3) skilled nursing facility; 4) carrier; 5) hospice care; 6) home health agency; 7) Part D event (PDE); and 8) durable medical equipment analytic data files. A unique deidentified Medicare beneficiary identifier is assigned to each enrollee to allow for longitudinal follow-up. All medical claims include dates of service provided; charge and payment amounts; medication use; clinical diagnosis codes; and procedure codes. The Medicare Beneficiary Summary File contains demographic characteristics such as age, gender, and race/ethnicity, as well as eligibility information.

Area Health Resource File is a publicly available county-specific database that contains information such as health facility descriptions; health profession representation; resource scarcity measures; economic activity assessments; health training program information; and socioeconomic and environmental characteristics. Medicare 5% sample claims dataset was merged with the Area Health Resource File dataset by using the state and Social Security Administration codes. This enabled the identification of important factors (e.g., the density of neurologists in a zip code area) for this study.

The National Plan and Provider Enumeration System (NPPES), also referred to as the National Provider Identifier (NPI) File, contains healthcare provider data for those having NPIs, and is a unique 10-digit identification number issued to healthcare providers in the United States by the Centers for Medicare and Medicaid Services. The NPPES files were used to obtain provider specialty information from NPIs that appear in the PDE files.

Study Sample

The study sample consisted of older adults (age ≥65 years) with dementia identified based on the Centers for Medicare and Medicaid Services Chronic Conditions Data Warehouse Condition Categories algorithm.[12] Based on HEDIS AMM guideline, the observation for the receipt of antidepressant medication among older Medicare beneficiaries with dementia started on May 1, 2012 and ended on April 30, 2013 (intake period).[9] The index prescription start date (IPSD) was the first observed date of prescription claim of antidepressant

medication during the intake period. Medicare beneficiaries with dementia who have continuous Medicare Part A, B, and D enrollment for 105 days before IPSD were included in the study sample. Medicare beneficiaries who had a pharmacy claim for either new or refill prescriptions for an antidepressant medication 105 days before IPSD were excluded from the study sample (negative medication history). Medicare beneficiaries with dementia were required to have a diagnosis of MDD in an inpatient, outpatient, or carrier claim during the 121-day period from 60 days before the IPSD, through the IPSD, and 60 days after the IPSD. Diagnosis of MDD was ascertained by HEDIS recommendation of using primary or secondary International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes of 296.2 (MDD, single episode), 296.3 (MDD, recurrent episode), 309.1 (prolonged depressive reaction), 300.4 (clinically significant depression), and 311 (depression not elsewhere classified).[9] Several existing studies have used these five ICD-9-CM codes to identify clinically significant or major depression.[13–16] The baseline period of our study was 105 days prior to IPSD (concurrent with negative medication history). Medicare beneficiaries were excluded from entering the final study sample if they: 1) were enrolled in Health Maintenance Organizations during baseline; 2) had end-stage renal disease during any time during the calendar year of IPSD; 3) were diagnosed with end-stage liver disease during baseline; or 4) had missing race/ethnicity information. End-stage renal disease was identified from the Medicare Beneficiary Summary File, whereas end-stage liver disease was identified using ICD-9-CM codes of 155.0 and 571.0–9.[17]

Dependent Variables

The dependent variable of this study was whether or not the index medication was a potentially inappropriate antidepressant according to the Beers Criteria[10] and the Screening Tool of Older Persons' potentially inappropriate Prescriptions[11] criteria, including tricyclic antidepressants (TCAs) (amitriptyline, amoxapine, clomipramine, desipramine, doxepin, imipramine, maprotiline, nortriptyline, protriptyline, trimipramine) and a certain selective serotonin reuptake inhibitor (e.g., paroxetine), among older adults with dementia. Although paroxetine is not a TCA like the other agents listed, its highly anticholinergic and sedative properties led to inclusion in the Beers Criteria in the 2015 update,[8] compared to the 2012 version. In the 2012 Beers Criteria, paroxetine was included in a table of highly anticholinergic medications but was not included in the list of potentially inappropriate medications in older adults.[18] Antidepressants that were included in this study based on the HEDIS guidelines are presented in Appendix 1.

Independent Variables

Individual-level variables used in this study included gender (male/female); race/ethnicity (white and others); age (65–74 and ≥75 years); public assistance (indicated by Medicare premiums and deductibles that are subsidized by the state to indicate the financial status of the enrollee); physician specialty (neurology, psychiatry, general/family, other, and unknown); census region (Northeast, South, Midwest, West); metropolitan residency status (metro/nonmetro); density of neurologists and psychiatrists available within the zip code; and comorbidities and use of other medications during baseline. Density of neurologists and psychiatrists available in the zip code area were grouped into 4 categories: those with 0 and those with more than 0 divided into tertiles. To measure the burden of comorbidities, the

Elixhauser Comorbidity Index was used.[19] All Medicare encounter and condition files were used to identify baseline comorbidities for eligible beneficiaries. A rule-out algorithm (i.e., ≥2 separate dates with diagnoses of interest >30 days apart) was required to prevent overestimation of comorbidity when the Medicare physician or outpatient claims were used.[19,20] For all other analytic files (such as inpatient, skilled nursing facility, hospice care, home health agency, or durable medical equipment), at least one diagnosis claim was required to identify comorbidity. Elixhauser Comorbidity Index score was calculated by adding all 31 individual Elixhauser Comorbidity Index groups and was categorized into four nonordinal groups (0, 1, 2, and ≥3).[20] Exposure to commonly used concurrent medications during the baseline period included angiotensin-converting-enzyme inhibitors, angiotensin II receptor blockers, anticoagulants, antidiabetics, antipsychotics, anxiolytics, statins, beta-blockers, calcium-channel blockers, diuretics, antiparkinsonian, and/or proton pump inhibitors. We also included baseline psychotherapy use and baseline diagnosis of Parkinson's disease [using ICD-9-CM code of 332. xx][21,22] as independent variables. Psychotherapy use was identified using previously validated Current Procedural Terminology codes.[23,24] A detailed description of the Current Procedural Terminology codes are provided in Appendix 2.

Statistical Analysis

In comparing the groups initiating potentially inappropriate and appropriate antidepressant, we present descriptive statistics as well as the distribution of different independent variables between the two groups. Group differences between antidepressants categorized as potentially inappropriate or appropriate were ascertained by the use of the χ^2 tests. We conducted multiple logistic regression analysis to identify the predictors of potentially inappropriate antidepressant initiation among older adults with dementia and newly diagnosed MDD. Because of the large number of variables being tested, we opted to use a more conservative significance level (alpha = 0.01) to reduce Type I error rates. Analyses were conducted using SAS version 9.4 (SAS Institute, Cary, NC). Some of the NPIs did not match up between the Medicare PDE files and the NPPES file, and we categorized them as unknown physician specialty. We conducted a sensitivity analysis by removing the observations in which the physician specialty was unknown to examine if the findings from our base case analysis was robust after removing these observations.

RESULTS

Table 1 presents the baseline distribution of characteristics between potentially inappropriate and appropriate antidepressant initiation in our final study sample. We had a total of 7,625 older adults with dementia and newly diagnosed MDD who met all our study inclusion/exclusion criteria. In our final study sample, 579 (7.59%) older adults with dementia and newly diagnosed MDD began treatment with a potentially inappropriate antidepressant during the study period. Baseline characteristics between potentially inappropriate and appropriate antidepressant prescriptions were observed in terms of age, and baseline use of anxiolytic medications. For example, in the higher age group (aged ≥75 years), individuals with dementia and newly diagnosed MDD were prescribed fewer potentially inappropriate

antidepressants compared with those in the 65–74 years age group (7.2% versus 9.9%%; χ^2 = 10.526; df = 1; p value = 0.001).

We present the distribution of the initiation of individual potentially inappropriate and appropriate antidepressants in Table 2. Paroxetine (N = 394) was the most commonly initiated potentially inappropriate antidepressant followed by amitriptyline (N = 104), nortriptyline (N = 35), and doxepin (N = 32). In terms of appropriate antidepressants, citalopram (N = 1,552), sertraline (N = 1,543), escitalopram (N = 1,055), and mirtazapine (N = 1,042) were the most frequently initiated antidepressants.

Our findings from the multiple logistic regression analysis is shown in Table 3. The baseline characteristics that were significantly associated with the initiation of a potentially inappropriate antidepressant were age, and baseline use of anxiolytic medications. The odds of initiating a potentially inappropriate antidepressant were 28% lower for the older (≥75 years) age group than for the younger (65–74 years) age group (adjusted odds ratio [AOR]: 0.72; 99% confidence interval: 0.54–0.96; multiple logistic regression analysis Wald χ^2 = 8.816; p = 0.003). Baseline anxiolytic medication use was associated with 34% (AOR: 1.34; 99% confidence interval: 1.01–1.78; multiple logistic regression analysis Wald χ^2 = 7.269; p = 0.007) higher odds of initiating a potentially inappropriate antidepressant among older adults with dementia and newly diagnosed MDD.

We conducted a sensitivity analysis by removing the observations in which the physician specialty was unknown (N = 164). The distribution of baseline characteristics between potentially inappropriate and appropriate antidepressant initiation (see Supplemental Table 1), distribution of initiation of potentially inappropriate and appropriate antidepressants (see Supplemental Table 2), and predictors of potentially inappropriate antidepressants (see Supplemental Table 3) were similar to the base case analysis.

DISCUSSION

Of the potentially inappropriate antidepressants initiated in our study sample with dementia and newly diagnosed MDD, paroxetine had the highest prevalence. This may be because of the timing of our sample. We used the 2012–2013 Medicare data for this analysis, which were collected prior to the publication of the 2015 Beers Criteria update when paroxetine was added to the list of potentially inappropriate medications in older adults. In the 2012 Beers Criteria, paroxetine was listed in the table of medications having high anticholinergic properties, so technically part of the Criteria, but it was not included in the separate table of potentially inappropriate medications.[18] Paroxetine, in fact, is the most sedating and anticholinergic selective serotonin reuptake inhibitors (SSRIs) available;[25] however, if prescribers followed the 2012 Beers Criteria, they may not have noticed such a fact to avoid paroxetine, as SSRIs as a class were considered safer than TCAs among elders. Therefore, the prescribers from which the study data were collected may have been initiating paroxetine as a safer agent compared with other potentially inappropriate antidepressants. This is supported by evidence in which paroxetine was found to have approximately one-fifth the anticholinergic potential of nortriptyline in elderly depressed patients.[26] Nevertheless, it is important to note that NCQA HEDIS recommendation[9] does not differentiate

appropriateness of the antidepressant classes or specific agents, although the importance of tracking initiation and continuation of treatment for depression is underscored. The finding from our study on paroxetine use among older patients highlights the need for cautious prescribing according to safety differences that can exist even among antidepressants in the same class. At the same time, consistent provider education for those prescribing to older populations is needed with changing evidence and guidelines. For example, the Beers Criteria has been revised again this year (the 2018 update) and will be published in the near future.[27] The desired education and prescribing guidance may be accomplished by constructing NCQA HEDIS recommendation that is more specific to population being served including older adults with co-occurring dementia and MDD.

In our study, 7.59% of older adults with dementia and newly diagnosed MDD were prescribed a potentially inappropriate antidepressant. Of these, paroxetine was prescribed most often, followed by amitriptyline, nortriptyline, and doxepin (Table 2). These antidepressants are categorized as potentially inappropriate owing to their high incidence of anticholinergic side effects and adverse events compared with other first-line antidepressants (e.g., most SSRIs, serotonin norepinephrine reuptake inhibitors, bupropion, and mirtazapine).[28] Anticholinergic side effects include drowsiness, dizziness, confusion, blurred vision, dry mouth, constipation, urinary retention, and increased fall and fracture risk.[29] As Alzheimer disease is the most common dementia type,[30] this population is also more likely to be hypersensitive to these anticholinergic effects as a result of impaired cholinergic function.[31] TCAs are also lethal in overdose (due to cardiac arrhythmias).[32] This is significant considering that older adults have been shown to be more likely than younger adults to complete suicide.[33] Therefore, although TCAs have been shown to have similar efficacy to SSRIs and serotonin norepinephrine reuptake inhibitors,[34] they are not considered to be as safe, particularly in older adults. Paroxetine also possesses more drug interactions compared with other SSRIs,[35] primarily through its impact on CYP2D6, which should be avoided in older adults taking multiple medications for medical comorbidities. To the best of our knowledge, there is no other comparable data regarding the prevalence of potentially inappropriate antidepressant use among older adults with dementia and MDD. Rhee et al.[36] assessed prescribing trends for high-risk anticholinergic medications, including antidepressants, among older adults (aged ≥65 years) between 2006 and 2015, using the National Ambulatory Medical Care Survey data. This study found anticholinergic prescribing in 6.2% of 96,996 visits by older adults. Three of the most commonly used anticholinergic medication classes, that constituted 70% of the overall prescribed anticholinergic medications, included antidepressants, antimuscarinics, and antihistamines.[36] Another study using the 2010–2012 National Ambulatory Medical Care Survey data and 2012/2015 Beers Criteria to designate potentially inappropriate antidepressants evaluated the effects of depression screening in primary care and subsequent diagnoses and treatment among older adults (aged ≥65 years).[37] This study found a total of 1.4% receiving potentially inappropriate antidepressant, and comparatively 1.5% in those who were not screened for depression versus 0.1% in those who were screened.[37] Although the use of potentially inappropriate antidepressants in our current study was higher than these two studies, it should be considered that this comparison is limited by the difference in the study

samples of our study (older adults with dementia and MDD) compared with these studies[36,37] (generally older adults).

Although TCAs are not recommended first-line in the treatment of geriatric depression with dementia, they certainly have their place in therapy.[38] For example, an individual may have been prescribed these medications for several years (since early adulthood) or have previously failed multiple first-line treatment options. In these cases, the risk of depression relapse in those with a history of severe depression or suicide attempt may outweigh the risk of anticholinergic side effects. As it is unknown what antidepressants (if any) these individuals took prior to 2011/2012, it is possible that the antidepressants had been prescribed during adulthood.

TCAs are also commonly prescribed for a variety of off-label uses, such as neuropathic pain and sleep (particularly amitriptyline).[39] Prescribers may find it more appropriate to use a TCA to address these symptoms in addition to treating depression, rather than prescribe additional medications. For example, rather than prescribing a benzodiazepine, a benzodiazepine receptor agonist hypnotic, or antihistamine (all of which are also included in the Beers Criteria) for sleep in addition to an antidepressant for mood, a clinician may choose to use a TCA to address both; especially if a patient has previously failed other first-line antidepressants. This also reduces the potential for polypharmacy, which can also put older adults at an increased risk of falls and adverse drug events.[28,40–42] Therefore, amitriptyline and doxepin may have been used more often to address sleep and/or neuropathic pain. Dosing of TCAs for these off-label uses are often much lower than that for depression, which is also important to note because the likelihood of experiencing anticholinergic side-effects is dose-dependent.[26] If a TCA is being used solely for the treatment of depression, it is recommended that a secondary TCA be used as they are less anticholinergic.[43,44] This may explain why nortriptyline was the next most commonly prescribed TCA following amitriptyline.

Although the focus of this study was to report on the prevalence and predictors of potentially inappropriate antidepressant use among older adults with dementia and newly diagnosed depression, it is noteworthy to mention that citalopram was the most commonly used drug in our study sample. The Food and Drug Administration recommends against using citalopram doses above 20 mg in adults over the age of 60 owing to increased risk of QTc prolongation.[45] However, studies demonstrating efficacy with citalopram for treatment of depression had more robust effects with doses above 20 mg.[46] There is therefore a risk of either exposing patients to a higher risk of adverse effects related to cardiac conduction at doses needed to achieve therapeutic efficacy, or treating patients subtherapeutically to minimize this risk. Given the number of safer alternative antidepressants, it is interesting that citalopram continues to be so frequently prescribed.

The study identified a few demographic and clinical characteristics that were associated with potentially inappropriate antidepressant prescribing. In a previous study,[47] older adults who were aged 75 years or older were less likely to be treated for depression. Our results suggest that this group is also less likely to be treated inappropriately. One possible theory is that providers who are willing to treat these patients may weigh the risks and benefits differently,

leading to less potential inappropriate prescribing in the oldest group. Baseline use of anxiolytics is indicative of an existing pattern of potential inappropriate medication prescribing by providers who are caring for these patients. In other words, anxiolytics themselves must be used with great caution in older adults.

Key strengths of this study include use of a large, nationally representative sample of older Medicare beneficiaries with dementia and concurrent MDD, lack of recall bias, and use of robust study design. However, some limitations include lack of dementia and depression severity measure within claims data, findings not generalizable to other populations or settings, and potential coding errors in the dataset.

CONCLUSION

To our knowledge, this is the first of its kind of study that revealed that more than 7% of newly prescribed antidepressants were potentially inappropriate for older adults with dementia and MDD in a nationally representative sample of Medicare beneficiaries with dementia and newly diagnosed MDD. Initiation of a potentially inappropriate antidepressant was associated with age, and baseline use of anxiolytic medications. Appropriately tailored interventions to address modifiable and nonmodifiable factors significantly associated with potentially inappropriate antidepressant prescribing are required to minimize risks in this vulnerable population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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TABLE 1.

Baseline Distribution of Characteristics Between Inappropriate and Appropriate Antidepressant Initiators in Medicare 5% Sample Claims Data (2012–2013)

	Overall		Inappropriate Antidepressant Initiators		Appropriate Antidepressant Initiators				
	N	%	N	%	N	%	χ^2	df	p Value
Age group[a]							10.526	1	0.001
65–74 years	1,183	15.5	117	9.9	1,066	90.1			
75+ years	6,442	84.5	462	7.2	5,980	92.8			
Gender							0.897	1	0.344
Male	1,970	25.8	140	7.1	1,830	92.9			
Female	5,655	74.2	439	7.8	5,216	92.2			
Race/ethnicity							0.020	1	0.887
White	6,795	89.1	517	7.6	6,278	92.4			
Other	830	10.9	62	7.5	768	92.5			
Public assistance							0.007	1	0.933
Yes	2,356	30.9	178	7.6	2,178	92.4			
No	5,269	69.1	401	7.6	4,868	92.4			
Region							8.638	3	0.035
Northeast	1,549	20.3	106	6.8	1,443	93.2			
South	3,116	40.9	270	8.7	2,846	91.3			
Midwest	2,073	27.2	143	6.9	1,930	93.1			
West	887	11.6	60	6.8	827	93.2			
Metropolitan status							3.328	1	0.068
Yes	6,046	79.3	442	7.3	5,604	92.7			
No	1,579	20.7	137	8.7	1,442	91.3			
Baseline Parkinson disease							0.396	1	0.529
Yes	455	6.0	38	8.4	417	91.6			
No	7,170	94.0	541	7.5	6,629	92.5			
Baseline psychotherapy							5.418	1	0.020
Yes	930	12.2	53	5.7	877	94.3			
No	6,695	87.8	526	7.9	6,169	92.1			

	Overall		Inappropriate Antidepressant Initiators		Appropriate Antidepressant Initiators				
	N	%	N	%	N	%	χ^2	df	p Value
Provider specialty							12.500	4	0.014
General Family	5,774	75.7	439	7.6	5,335	92.4			
Neurology	176	2.3	16	9.1	160	90.9			
Psychiatry	426	5.6	23	5.4	403	94.6			
Other	1,085	14.2	97	8.9	988	91.1			
Unknown	164	2.2	4	2.4	160	97.6			
Density of neurologists							7.691	3	0.053
0	1,503	19.7	131	8.7	1,372	91.3			
1	2,040	26.8	162	7.9	1,878	92.1			
2	2,059	27.0	158	7.7	1,901	92.3			
3	2,023	26.5	128	6.3	1,895	93.7			
Density of psychiatrists							8.202	3	0.042
0	1,119	14.7	96	8.6	1,023	91.4			
1	2,137	28.0	184	8.6	1,953	91.4			
2	2,200	28.9	150	6.8	2,050	93.2			
3	2,169	28.4	149	6.9	2,020	931			
ELX Index							8.474	3	0.037
0	1,248	16.4	118	9.5	1,130	90.5			
1	1,198	15.7	90	7.5	1,108	92.5			
2	1,163	15.3	91	7.8	1,072	92.2			
≥3	4,016	52.7	280	7.0	3,736	93.0			
Baseline medication use ACE inhibitors							2.277	1	0.131
Yes	1,908	25.0	160	8.4	1,748	91.6			
No	5,717	75.0	419	7.3	5,298	92.7			
Anticoagulants							0.355	1	0.551
Yes	915	12.0	65	7.1	850	92.9			
No	6,710	88.0	514	7.7	6,196	92.3			
Antidiabetic							1.030	1	0.310
Yes	1,344	17.6	111	8.3	1,233	91.7			
No	6,281	82.4	468	7.5	5,813	92.5			

	Overall		Inappropriate Antidepressant Initiators		Appropriate Antidepressant Initiators				
	N	%	N	%	N	%	χ^2	df	p Value
Antiparkinsonian							1.061	1	0.303
Yes	499	6.5	32	6.4	467	93.6			
No	7,126	93.5	547	7.7	6,579	92.3			
Antipsychotic							5.924	1	0.015
Yes	1,220	16.0	72	5.9	1,148	94.1			
No	6,405	84.0	507	7.9	5,898	92.1			
Anxiolytic[a]							8.124	1	0.004
Yes	1,270	16.7	121	9.5	1,149	90.5			
No	6,355	83.3	458	7.2	5,897	92.8			
ARBs							3.237	1	0.072
Yes	988	13.0	89	9.0	899	91.0			
No	6,637	87.0	490	7.4	6,147	92.6			
Statins							3.158	1	0.076
Yes	2,717	35.6	226	8.3	2,491	91.7			
No	4,908	64.4	353	7.2	4,555	92.8			
PPIs							0.022	1	0.883
Yes	2,284	30.0	175	7.7	2,109	92.3			
No	5,341	70.0	404	7.6	4,937	92.4			
Beta-blockers							0.104	1	0.747
Yes	2,998	39.3	224	7.5	2,774	92.5			
No	4,627	60.7	355	7.7	4,272	92.3			
CCB							0.403	1	0.526
Yes	1,794	23.5	130	7.2	1,664	92.8			
No	5,831	76.5	449	7.7	5,382	92.3			
Diuretic							0.096	1	0.756
Yes	2,679	35.1	200	7.5	2,479	92.5			
No	4,946	64.9	379	7.7	4,567	92.3			

Notes: Analysis based on 7,625 older adults with dementia and newly diagnosed major depression. At least one potentially inappropriate antidepressant was initiated by 579 (7.59%) older adults in this study sample. Results are based on the χ^2 test analysis. For density of neurologists and psychiatrists, the category 0 represents zero neurologists/psychiatrists in the zip code and the categories 1, 2, and 3 represents the first, second, and third tertiles, respectively, of nonzero densities. ACE: angiotensin converting enzyme; ARBs: angiotensin receptor blockers; CCB: calcium channel blockers; ELX: Elixhauser; PPIs: proton pump inhibitors.

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[a] Represents statistical significance ($p < 0.01$).

TABLE 2.

Counts and Proportions of Potentially Inappropriate and Appropriate Antidepressant Initiation Medicare 5% Sample Claims Data (2012–2013)

Inappropriate Antidepressants (N = 579)	
Amitriptyline	104 (17.96)
Clomipramine	2 (0.35)
Desipramine	3 (0.52)
Doxepin	32 (5.53)
Imipramine	9 (1.55)
Nortriptyline	35 (6.04)
Paroxetine	394 (68.05)
Appropriate Antidepressants (N = 7,046)	
Bupropion	194 (2.75)
Citalopram	1,552 (22.03)
Desvenlafaxine	32 (0.45)
Duloxetine	475 (6.74)
Escitalopram	1,055 (14.97)
Fluoxetine	361 (5.12)
Fluoxetine/olanzapine	1 (0.01)
Fluvoxamine	7 (0.10)
Mirtazapine	1,042 (14.79)
Nefazodone	2 (0.03)
Phenelzine	0 (0.00)
Selegiline	3 (0.04)
Sertraline	1,543 (21.90)
Tranylcypromine	0 (0.00)
Trazodone	489 (6.94)
Venlafaxine	265 (3.76)
Vilazodone	25 (0.35)

Notes: Analysis based on 7,625 older adults with dementia and newly diagnosed major depression. At least one potentially inappropriate antidepressant was initiated by 579 (7.59%) older adults in this study sample.

TABLE 3.

Predictors of Inappropriate Antidepressant Use Among Older Adults With Dementia and MDD

	AOR	99% CI	Wald χ^2	p Value
Age group[a]				
75+ years versus 65–74 years	0.72	[0.54, 0.96]	8.816	0.003
Gender				
Female versus Male	1.12	[0.86, 1.46]	1.198	0.274
Race/ethnicity				
White versus Other	1.05	[0.71, 1.54]	0.102	0.750
Public assistance				
Yes versus No	1.00	[0.77, 1.30]	0.001	0.972
Region			7.649	0.054
Northeast versus West	1.16	[0.74, 1.82]		
South versus West	1.37	[0.92, 2.05]		
Midwest versus West	1.07	[0.69, 1.65]		
Metropolitan status				
Yes versus No	0.93	[0.66,1.30]	0.331	0.565
Baseline Parkinson				
Yes versus No	1.51	[0.87, 2.61]	3.715	0.054
Baseline psychotherapy				
Yes versus No	0.81	[0.55, 1.20]	1.932	0.165
Provider specialty			10.411	0.034
Neurology versus General Family	1.11	[0.55,2.22]		
Other versus General Family	1.17	[0.86, 1.58]		
Psychiatry versus General Family	0.72	[0.40, 1.28]		
Unknown versus General Family	0.29	[0.08, 1.08]		
Density of neurologists			2.537	0.469
1 versus 0	0.97	[0.63, 1.49]		
2 versus 0	0.96	[0.60,1.54]		
3 versus 0	0.79	[0.47, 1.32]		
Density of psychiatrists			2.835	0.418

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	AOR	99% CI	Wald χ^2	p Value
1 versus 0	1.11	[0.71, 1.74]		
2 versus 0	0.92	[0.55, 1.53]		
3 versus 0	1.07	[0.62, 1.86]		
ELX Index			7.440	0.059
1 versus 0	0.79	[0.54,1.16]		
2 versus 0	0.83	[0.56, 1.21]		
≥3 versus 0	0.72	[0.52, 0.99]		
ACE inhibitors				
Yes versus No	1.22	[0.93, 1.60]	3.633	0.057
Anticoagulants				
Yes versus No	0.97	[0.67, 1.40]	0.049	0.825
Antidiabetic				
Yes versus No	1.10	[0.81, 1.49]	0.611	0.435
Antiparkinsonian				
Yes versus No	0.66	[0.37, 1.19]	3.288	0.070
Antipsychotics				
Yes versus No	0.77	[0.55, 1.09]	3.689	0.055
Anxiolytics[a]				
Yes versus No	1.34	[1.01, 1.78]	7.269	0.007
ARBs				
Yes versus No	1.30	[0.93, 1.81]	3.969	0.046
Statins				
Yes versus No	1.14	[0.89, 1.45]	1.810	0.179
PPIs				
Yes versus No	1.00	[0.78, 1.29]	0.001	0.970
Beta-blockers				
Yes versus No	0.97	[0.76, 1.24]	0.109	0.741
CCB				
Yes versus No	0.90	[0.68, 1.19]	0.967	0.325
Diuretics				
Yes versus No	0.95	[0.73, 1.22]	0.331	0.565

Notes: Analysis based on 7,625 older adults with dementia and newly diagnosed major depression. Results are based on multiple logistic regression analysis. For density of neurologists and psychiatrists, the category 0 represents zero neurologists/psychiatrists in the zip code and the categories 1, 2, and 3 represent the first, second, and third tertiles, respectively, of nonzero densities. Global Wald χ^2 was significant, $\chi^2_{35} = 77.644$; $p < 0.0001$. ACE: angiotensin converting enzyme; AOR: adjusted odds ratio; ARBs: angiotensin receptor blockers; CCB: calcium channel blockers; CI: confidence interval; ELX: Elixhauser; PPIs: proton pump inhibitors.

[a]Represents statistical significance ($p < 0.01$).