Treatment Patterns with Antidementia Drugs in the United States: Medicare Cohort Study

Daniela Koller, PhD, Tammy Hua,† and Julie P.W. Bynum, MD, MPH‡*

OBJECTIVES: To evaluate frequency of use of two antidementia drug classes approved for treatment of symptoms, whether populations most likely to benefit are treated, and correlates of treatment initiation.

DESIGN: Nationally representative cohort study.

SETTING: Fee-for-service Medicare.

PARTICIPANTS: Elderly adults with dementia enrolled in Medicare Parts A, B, and D in 2009 (N = 433,559) and a subset with incident dementia (n = 185,449).

MEASUREMENTS: Main outcome was any prescription fill for antidementia drugs (cholinesterase inhibitors (ChEIs) or memantine) within 1 year.

RESULTS: Treatment with antidementia drugs occurred in 55.8% of all participants with dementia and 49.3% of those with incident dementia. There was no difference between ChEIs and memantine use according to dementia severity (measured as death within first year or living in residential care vs in a community setting) even though memantine is not indicated in mild disease. In incident cases, initiation of treatment was lower in residential care (relative risk (RR) = 0.82, 95% confidence interval (CI) = 0.81–0.83) and with more comorbidities (RR = 0.96, 95% CI = 0.96–0.96). Sixty percent of participants were managed in primary care alone. Seeing a neurologist (RR = 1.07, 95% CI = 1.06–1.09) or psychiatrist (RR = 1.17, 95% CI = 1.16–1.19) was associated with higher likelihood of treatment than seeing a primary care provider alone, and seeing geriatrician was associated with with lower likelihood (RR = 0.96, 95% CI = 0.93–0.99). Across the United States, the proportion of newly diagnosed individuals started on antidementia treatment varied from 32% to 66% across hospital referral regions.

CONCLUSION: Antidementia drugs are used less often in people with late disease, but there is no differentiation in medication choice. Although primary care providers most often prescribe antidementia medication without specialty support, differences in practice between specialties are evident. **J Am Geriatr Soc 64:1540–1548, 2016.**

Key words: dementia; drug treatment; Medicare

Alzheimer's disease (AD) is increasingly being brought to the attention of the U.S. public, healthcare providers, and policy-makers because of the enormous burden it places on families, the financial costs, and the projected tripling in number of affected adults over the next 40 years.[1–4]

The National Alzheimer's Project Act,[5] passed in 2011, has focused attention at a national level on ways to mitigate the effect of dementia on current and future populations by developing supportive policies and increasing funding for research. There is no curative treatment, and much of the increased research funding is targeted toward discovering therapies that prevent AD's onset or alter its course.

Two drug classes are currently available for the treatment of AD that the Food and Drug Administration has approved: cholinesterase inhibitors (ChEIs; including rivastigmine, donepezil, and galantamine) and the *N*-methyl-D-aspartate-receptor-antagonist memantine, together called "antidementia drugs." Studies on ChEIs have shown small positive effects for AD and mixed effects in other common dementias (vascular, Lewy body, Parkinson's).[6–8] ChEIs have an indication in early to moderate disease; donepezil and rivastigmine were later also approved for severe dementia.[9–12] Trials for memantine show benefit in AD but less so in other types of dementia, and its indication is for moderate to severe dementia and not mild disease.[13,14] Yet results of studies are inconsistent and there is disagreement about whether the magnitude of benefit outweighs risk, especially for ChEIs.[10,15,16] The uncertainty about the value of treatment is reflected in differences between guidelines for treatment across specialties and countries.[9,17–20]

From the *Department of Health Services Management, Munich School of Management, Ludwig Maximilian University of Munich, Munich, Germany; †Dartmouth College, Hanover; and ‡Dartmouth Institute for Health Policy and Clinical Practice, Geisel School of Medicine, Dartmouth College, Lebanon, New Hampshire.

Address correspondence to Julie P.W. Bynum, Associate Professor of Medicine, The Dartmouth Institute for Health Policy & Clinical Practice, Level 5, WTRB, 1 Medical Center Road, Lebanon, NH 0375. E-mail: julie.bynum@dartmouth.edu

DOI: 10.1111/jgs.14226

0002-8614/16/$15.00

Even with this uncertainty about effectiveness, antidementia drugs are in the top 15 drugs prescribed according to cost in Medicare Part D, accounting for 3.5% of total Part D spending.[21] Aricept (Pfizer, New York, NY), the brand name version of donepezil, was in the top 10 most-common brand-name drugs prescribed in Part D and had the highest median negotiated price in 2008 on that top 10 list,[22,23] although now it is available as a generic drug.

These drugs may be so commonly used because clinicians and families are willing to try treatments with low efficacy when in the challenging situation of managing a person with progressive cognitive loss that is also associated with difficult behaviors and psychotic symptoms. Trials suggest that the magnitude of benefit of antidementia drugs is smaller than that of nonpharmacological management strategies[24] and delivery of comprehensive primary care that incorporates caregiver support,[25] but instituting those interventions is more challenging for busy clinicians than writing a prescription.[26] The problem is that these medications may have high financial cost, low effectiveness, and side effects.[27–30]

Given the cost and uncertainty about benefit, evaluation of how these drugs are being used can identify where practice improvement is needed. This study, using a national sample of Medicare beneficiaries enrolled in Medicare Part D, evaluated the frequency of antidementia drug use in people with a diagnosis of dementia. To compare individuals with similar disease severity, treatment in individuals with a first dementia diagnosis and factors associated with likelihood of treatment initiation were then examined. It was hypothesized that dementia severity would decrease the likelihood that a person received antidementia treatment and influence whether a ChEI or memantine was used. Although some ChEIs now have an indication for severe disease, guidelines and opinions suggest that their use should be avoided in late-stage disease[10,31] and that memantine should predominantly be used in severe disease and not in mild disease.[14] How other factors influence likelihood of treatment, including whether a dementia specialist (neurologist, psychiatrist, geriatrician) was involved in care was also examined. Finally regional differences in use of antidementia drug use across the United States were examined.

METHODS

Study Sample

The study sample included Medicare Part D enrollees from 2008 to 2010 drawn from a 40% sample of Medicare beneficiaries, 50% of whom were enrolled in Part D. Individuals were selected when they had an index claim with a dementia diagnosis in 2009 using *International Classification of Diseases, Ninth Revision*, diagnostic codes from the Chronic Condition Warehouse (https://www.ccwdata.org/web/guest/condition-categories). Inclusion requirements were aged 66 and older, continuous enrollment in Medicare Parts A and B for 1 year before and Part D for 4 months before the index diagnosis and Parts A, B, and D for 12 months after index diagnosis. Individuals who died within the first 90 days of observation, which limited the opportunity for medication treatment, were excluded from the analysis. Participants were categorized as incident cases if a 12-month diagnosis-free period preceded the index diagnosis.

An inclusive approach to capturing dementia was used rather than splitting according to subtype because of the limitations inherent in claims. Claims have good specificity for dementia but lack sensitivity, underascertaining early disease,[32,33] and they do not differentiate well between types of dementia.[33–36] In addition, clinicians who make the diagnosis have difficulty distinguishing type, and even expert approaches sometimes do not agree.[37–40] The inclusive approach was used rather than creating what might be essentially arbitrary groups according to type of dementia.

Measures

The main outcome was one or more prescription fills for an antidementia drug in the year after the first appearance of a dementia diagnosis. The Lexi-Data Basic database was used to identify drugs according to National Drug Code.[41]

Information on age, sex, race, and hospital referral region (HRR) of residence was obtained from the beneficiary summary file. Additional control variables were receipt of low-income subsidy (from Part D records), comorbidities, and evaluation and management visits and hospitalizations during the year before diagnosis. Comorbidity count was based on the Deyo-Charlson Comorbidity Index, excluding dementia.[42,43] Survived days were also counted to account for death in the observation period. Information on visits to a neurologist, psychiatrist, or geriatrician in the 2 months before and after the date of the initial diagnosis was captured as an indicator of specialty involvement.

There was concern that whether the person had comorbid behavioral or psychotic symptoms would confound the analysis of type of specialty visited. To adjust for presence of psychiatric or behavioral symptoms, fills for psychopharmacologic drugs in the year before the index diagnosis in the six drug classes of benzodiazepines, second-generation sedatives, first-generation antipsychotics, atypical antipsychotics, selective serotonin reuptake inhibitors and serotonin-norepinephrine reuptake inhibitors, and older-generation antidepressants (tetra- and tricyclic) was used. Use was quantified as the count of unique psychopharmacologic medication classes prescribed.

Administrative data do not contain clinical information on the severity of dementia, so a proxy was developed based on whether the participant lived in residential care (nursing home, assisted living, other type of board-and-care facility). Participants who received at least 50% of their prescriptions through a long-term care pharmacy in the 4 months preceding their index diagnosis in 2009 were considered to be in residential care as opposed to community dwelling. Because the measure may be imperfect in its correlation with dementia severity, antidementia drug use according to whether the participant died within a year of index diagnosis was also reported.

Analysis

Descriptive analysis was performed for all participants diagnosed with dementia and for those with incident

Table 1. Characteristics of Medicare Fee-for-Service Beneficiaries Enrolled in Part D with a Diagnosis of Dementia in 2009 According to Treatment with a Cholinesterase Inhibitor (ChEI), Memantine, or Either for Dementia

Characteristic	All Participants, N = 433,559	Antidementia Drug Prescribed in Year After Index Diagnosis			
		None, n = 191,592 (44.2%)	ChEI, n = 211,920 (48.9%)	Memantine, n = 128,929 (29.7%)	Either, n = 241,967 (55.8%)
Age, mean ± standard deviation	83.2 ± 7.5	83.7 ± 8.1	82.6 ± 7.0	82.5 ± 6.9	82.7 ± 7.0
Sex, n (%)					
Male	115,737 (26.7)	50,766 (26.5)	57,196 (27.0)	34,661 (26.9)	64,971 (26.9)
Female	317,822 (73.3)	140,826 (73.5)	154,724 (73.0)	94,268 (73.1)	176,996 (73.2)
Race and ethnicity, n (%)					
White	354,499 (81.8)	155,079 (80.9)	174,513 (82.4)	108,044 (83.8)	199,420 (82.4)
Black	50,530 (11.7)	24,385 (12.7)	23,052 (10.4)	12,657 (9.8)	26,145 (10.8)
Asian	8,060 (1.9)	3,456 (1.8)	4,078 (1.9)	2,162 (1.7)	4,604 (1.9)
Hispanic	14,380 (3.3)	5,727 (3.0)	7,565 (3.6)	4,458 (3.5)	8,653 (3.6)
Other	6,090 (1.4)	2,945 (1.5)	2,712 (1.3)	1,608 (1.3)	3,145 (1.3)
Part D low-income subsidy, n (%)	253,989 (58.6)	121,529 (63.4)	115,752 (54.6)	68,985 (53.5)	132,460 (54.7)
Died within year of index diagnosis, n (%)	78,125 (18.0)	42,700 (22.3)	30,198 (14.3)	18,309 (14.2)	35,425 (14.6)
Newly diagnosed in 2009, n (%)	185,449 (42.8)	94,081 (49.1)	80,600 (38.0)	41,402 (32.1)	91,368 (37.8)
Proxy for dementia severity, n (%)					
Community-dwelling	262,659 (60.6)	106,142 (55.4)	137,854 (65.1)	82,308 (63.8)	156,517 (64.7)
In residential care	170,900 (39.4)	85,450 (44.6)	74,066 (35.0)	46,621 (36.2)	85,450 (35.3)

dementia. ChEI and memantine were initially examined separately to test for potential prescribing differences between them. A sensitivity analysis testing whether enrollment in hospice, which covers some medications, influenced treatment rates found no difference in antidementia or psychopharmacological medication use between hospice and nonhospice enrollees.

Multivariate regression modeling was performed to estimate the probability of newly diagnosed beneficiaries receiving prescriptions for antidementia drugs. Because the outcome was common, Poisson regression with robust error variance was used to estimate relative risks.[44] The model included demographic factors, survived days, baseline year of healthcare use, low-income subsidy, HRR, clinical factors (psychopharmacological co-medication, comorbidity, dementia severity proxy), and specialty involvement. Use of ChEI and memantine was initially modeled separately, and no differences were found in the association between factors and likelihood of prescription from the combined outcome of antidementia medications grouped together.

Regional use according to HRR was adjusted for population age, sex, race, and low-income subsidy using the indirect method and grouped into quintiles of adjusted treatment rates.

All analyses were performed using SAS version 9.2 (SAS Institute, Inc., Cary, NC), and the map was produced using ArcGIS desktop version 10.2 (ESRI, Redlands, CA). This study received expedited institutional review board approval.

RESULTS

Of 433,559 beneficiaries with a dementia diagnosis in 2009 (Table 1) in this fee-for-service Medicare sample, 55.8% received a prescription for an antidementia drug.

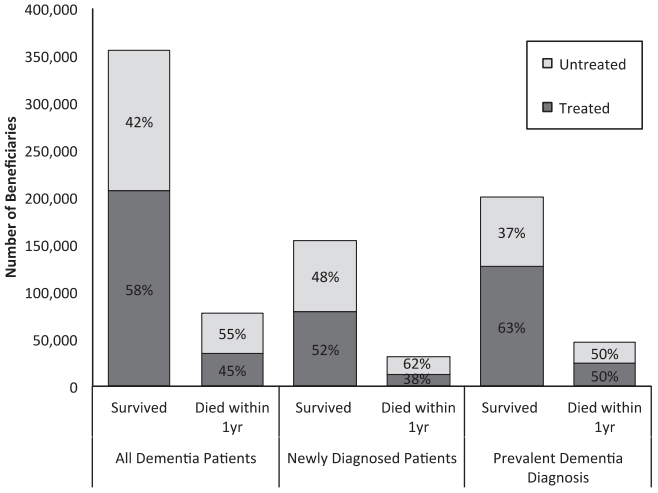

Figure 1. Treatment with antidementia drugs in Medicare fee-for-service Part D beneficiaries with a prevalent or new diagnosis of dementia in 2009 stratified by whether the individual died within 1 year of the first occurrence of a claim with a diagnosis of dementia in 2009.

Treated participants were slightly younger than those not treated (82.7 vs 83.7, $P < .001$), but there was no difference in treatment according to sex. White and Hispanic participants received a prescription more often, as did those with less-severe dementia, whereas black participants and people receiving a low-income subsidy were less frequently treated. Eighteen percent of participants with dementia died within 1 year of their index diagnosis, 45% of whom were treated with an antidementia drug (Figure 1). It was not possible to assess from prescription fill data whether medications are taken simultaneously or in sequence, but 46.7% of participants

received only ChEIs, 40.9% a ChEI and memantine, and 12.4% only memantine. There were no meaningful differences between the percentage of people treated with ChEI and those treated with memantine according to dementia severity proxy or level of comorbidity. Results combining the two classes are reported for the remainder of the article.

Of all participants with dementia, 185,449 had a new diagnosis. Those with incident dementia were less likely to receive a prescription in the following year than prevalent cases (49.3% vs 60.7%, $P < .001$). Table 2 shows the differences between treated and untreated participants with incident dementia. The 49% treated with antidementia drugs were younger, slightly less likely to be male or black and more likely to be Hispanic, and had fewer comorbid conditions. Treated participants also had less severe-dementia as indicated by the proxy measure (19.1% of treated participants and 28.5% of untreated participants lived in residential care, $P < .001$) and less likely to die within the year (12.8% vs 20.3%, $P < .001$).

To further characterize differences between treatment groups, drugs used to treat psychiatric problems were examined. People treated with psychopharmacological drugs before their dementia diagnosis received antidementia drugs more often than those who were not (57.9% vs 53.0%, $P < .001$). Table S1 shows the specific classes of psychopharmacological prescriptions received stratified according to the proxy for dementia severity and specialty involvement, which confirms that participants who had been receiving these drugs were more likely to see psychiatrists. Treatment with first-generation antipsychotics and older antidepressants was low (≤5%) in all groups, consistent with recommendations against use of these classes of drugs.[45–47]

Figure 2 shows the modeled relative risk of antidementia drug treatment. When controlled for all other factors, there was not a meaningful relationship between treatment and age (RR = 0.99, 95% CI = 0.995–0.997) or treatment and sex (RR = 0.98, 95% CI = 0.97–0.99). Blacks (RR = 0.94, 95% CI = 0.93–0.96) were less likely and Hispanics (RR = 1.10, 95% CI = 1.07–1.13) and Asians (RR = 1.05, 95% CI = 1.01–1.08) were more likely than whites to be treated. Participants receiving psychopharmacological medications were more likely to be treated (RR = 1.05, 95% CI = 1.05–1.06) than those not receiving them. Participants in residential care had a lower probability of receiving an antidementia drug (RR = 0.82, 95% CI = 0.81–0.83) than community-dwelling participants, and each additional comorbid condition had a negative effect (RR = 0.96, 95% CI = 0.96–0.96). The type of specialist seen also influenced the probability of receiving antidementia drugs. A visit to a geriatrician near the time of diagnosis was associated with 4% lower likelihood of a medication fill, whereas a psychiatrist visit was associated with an 8% greater likelihood and a neurologist visit with a 17% greater likelihood of antidementia drug treatment.

Table 2. Characteristics of Medicare Fee-for-Service Beneficiaries Enrolled in Part D with a New Diagnosis of Dementia in 2009 According to Whether Treated with an Antidementia Drug

Characteristic	All Participants Newly Diagnosed with Dementia, n = 185,449 (100%)	Filled Prescription for Any Antidementia Drug, n = 91,368 (49.3%)	No Antidementia Drug Prescription Filled, n = 94,081 (50.7%)
Age, mean ± SD	82.5 ± 7.5	82.1 ± 7.1	82.8 ± 8.1
Sex, n (%)			
Male	53,224 (28.7)	25,847 (28.3)	27,377 (29.1)
Female	132,225 (71.3)	65,521 (71.7)	66,704 (70.9)
Race and ethnicity, n (%)			
White	151,493 (81.7)	75,512 (82.7)	75,981 (80.8)
Black	20,573 (11.1)	9,026 (9.9)	11,547 (12.3)
Asian	4,189 (2.3)	2,126 (2.3)	2,063 (2.2)
Hispanic	6,346 (3.42)	3,416 (3.7)	2,930 (3.1)
Other	2,848 (1.5)	1,288 (1.4)	1,560 (1.66)
Part D low-income subsidy, n (%)	94,144 (50.8)	42,583 (46.6)	51,561 (54.8)
Died within year of first diagnosis, n (%)	30,767 (16.6)	11,669 (12.8)	19,098 (20.3)
Comorbidity count, mean ± SD	2.3 ± 1.8	2.1 ± 1.7	2.6 ± 1.9
Psychopharmacological co-medication count, mean ± SD	0.67 ± 0.80	0.68 ± 0.80	0.66 ± 0.81
Proxy for dementia severity, n (%)			
Community dwelling	141,235 (76.2)	73,962 (81.0)	67,273 (71.5)
Residential care	44,214 (23.8)	17,406 (19.1)	26,808 (28.5)
Visited dementia specialist, n (%)			
None	111,539 (60.1)	53,369 (58.4)	58,170 (61.8)
Psychiatrist	23,446 (12.6)	10,911 (11.9)	12,535 (13.3)
Neurologist	33,434 (18.0)	19,187 (21.0)	14,247 (15.1)
Geriatrician	5,160 (2.8)	2,228 (2.4)	2,932 (3.1)
>1 type	11,870 (6.4)	5,673 (6.2)	6,197 (6.6)

SD = standard deviation.

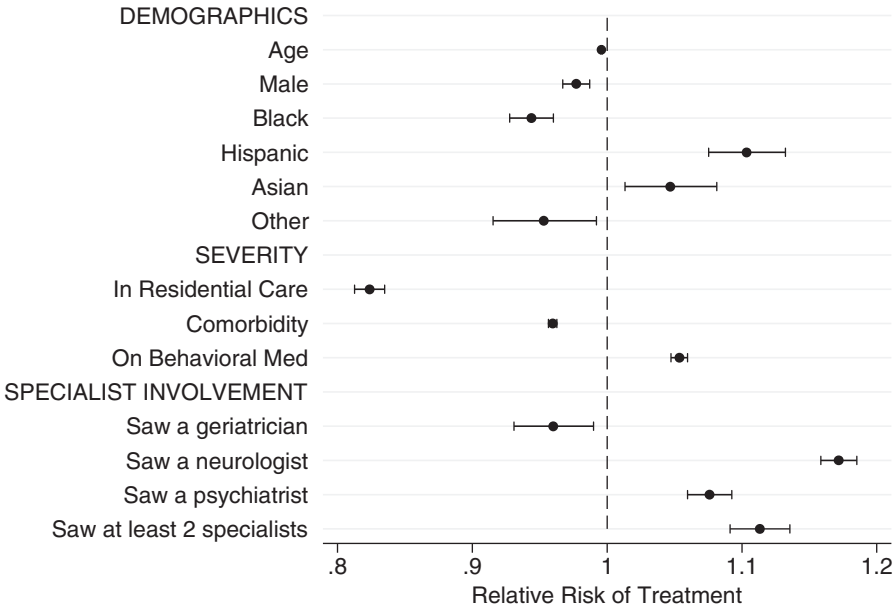

Figure 2. Modeled association between beneficiary characteristics and treatment with antidementia drug within 1 year of newly diagnosed dementia. Model also adjusted for individual low-income subsidy status, number of survived days, visits and hospitalizations in year before diagnosis, and hospital referral region of residence.

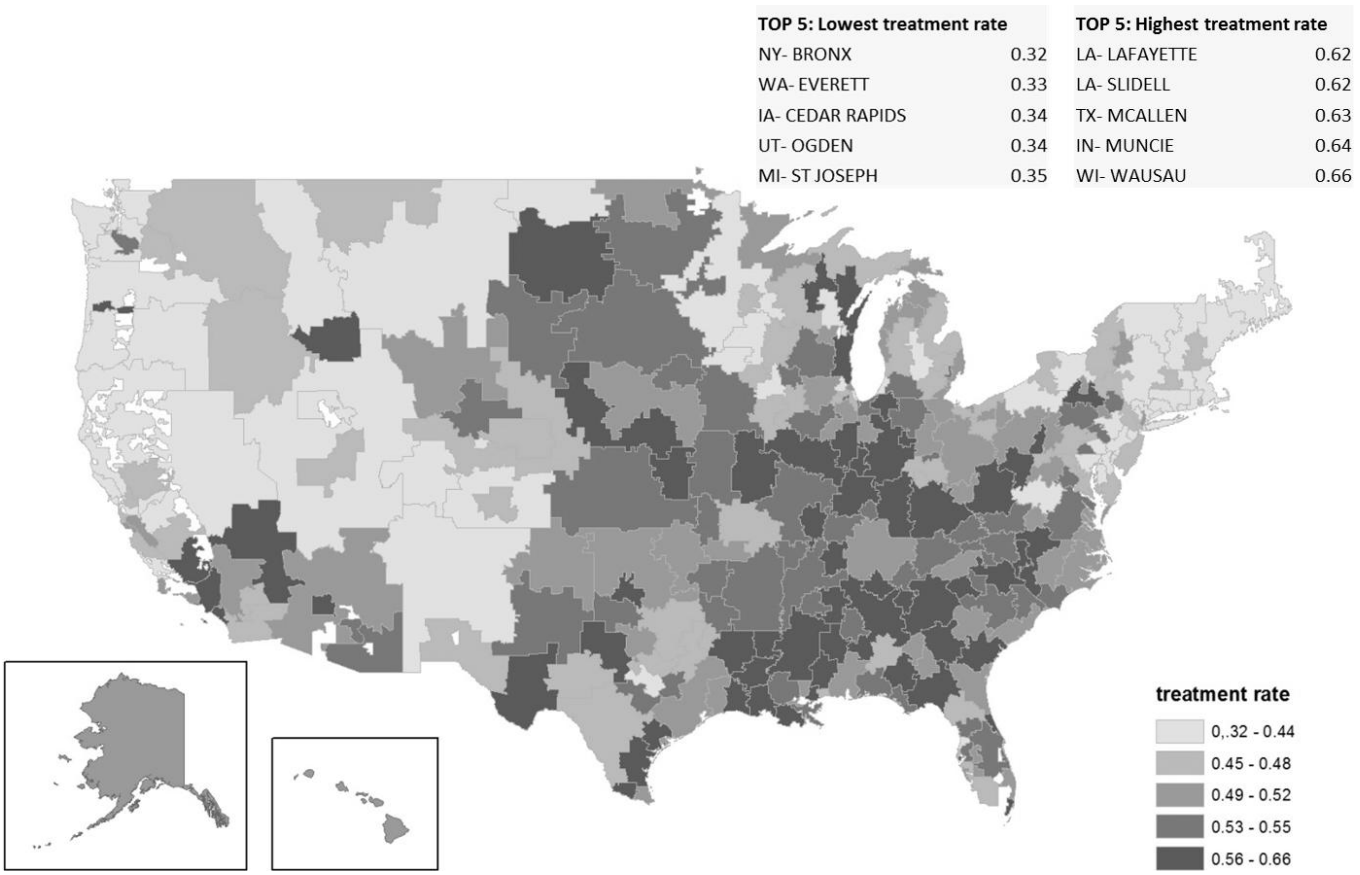

Figure 3. Variation in treatment with antidementia drugs across hospital referral regions (HRR) of the United States, adjusted for population differences in age, sex, race, and low-income subsidy status.

Figure 3 maps treatment rates for individuals with newly diagnosed dementia across the United States adjusted for age, sex, race, and low-income subsidy use. The percentage of people with newly identified dementia treated with antidementia drugs varied from 32% in the Bronx, New York, to 66% in Wausau, Wisconsin.

CONCLUSIONS

More than half of all people with a dementia diagnosis, according to the physicians who bill for their care, receive antidementia drugs. People who are newly diagnosed have a 50:50 chance of being treated. In accordance with guidelines, people who appear to be in later stages of dementia are less likely to be treated, but there is no difference between use of ChEI or memantine related to any of the proxy measures for dementia severity. People who have comorbid psychiatric symptoms are more likely to receive an antidementia drug. Factors not directly related to disease, such as race and region of residence, also influence treatment rates. Finally, the type of clinician involved in care may independently influence whether a person is treated.

Several findings suggest areas for improvement in dementia treatment. One area is better targeting of the drug for the right population. The expectation was that a higher proportion of newly diagnosed people would receive treatment than people with prevalent or longer-standing disease and that there would be a differentiation between use of ChEI and memantine, but neither was found. The second potential area is to understand better the independent association between greater likelihood of dementia treatment when other psychopharmacological treatments are being used. The antidementia drugs have a small if any effect on other psychiatric symptoms.[48,49] Further efforts are needed to explore whether clinicians are aware of the small benefit and availability and effectiveness of nonpharmacological approaches. Finally, regional variation and differences between specialists suggest there may not be good consensus regarding what constitutes best practice, in spite of existing guidelines and syntheses of the evidence, which will make translating the current evidence into practice difficult.

These observed treatment levels need to be put in the context of previous reports. Reported treatment rates vary greatly depending on country, prevalent versus incident cases, the context (nursing home or not), and region of the United States. More than 80% of observed individuals in a Swedish study of prevalent cases were treated with antidementia drugs.[50] In Spain, 53% of individuals with dementia were treated,[51] and in Germany 27% of incident cases received antidementia medication.[52] Like in the United States, many people in Britain and Germany are managed in primary care, but when a specialist is seen, antidementia drugs are more likely to be prescribed.[52–54] Within the United States, use has been studied at the end of life in nursing homes[55] and in the Medicare Current Beneficiaries Survey with self-reported or claims diagnosis found that only 26% of people with dementia were treated.[56] An apples-to-apples comparison between these studies is challenging because they use different types of data (clinical, survey, or billing date)[34–36] and different definitions of dementia, a problem that has plagued epidemiological estimates of dementia prevalence as well.[57] The Dartmouth Atlas reported a fourfold (from 3.7% to 17.1%) variation in per capita use[58] not per identified dementia case, combining likelihood of being diagnosed (which varies[59]) and likelihood of being treated into one measure. The current study found a twofold variation in the use of these drugs in those with newly diagnosed dementia, varying from 32% to 66% across HRRs.

Several conceptual models exist to explain large variations in clinical practice, and one provides helpful guidance in understanding the use of antidementia drugs based on their cost effectiveness.[60,61] Drugs can be effective with few tradeoffs, heterogeneous in effect because of dependency on appropriate patient selection, have low cost effectiveness or limited evidence of effectiveness, or be ineffective because of evidence of harm.[57] In this framework, antidementia drugs would be considered to have heterogeneous benefits, and part of the variation in use could be due to differential expertise in targeting the population most likely to benefit. The trial evidence suggests that likelihood of benefit with ChEI versus memantine differs according to disease severity, so treatment should target individuals according to severity, but no such pattern in actual practice was observed, suggesting that a major concern is appropriate selection of individuals most likely to benefit. The additional observation that specialists in the field have divergent care patterns suggests that perhaps there is disagreement between thought leaders as to whether these drugs offer value, so treatment practices may vary based on limited evidence of effectiveness that different providers interpret differently.

The finding regarding involvement of specialists has important implications for healthcare delivery for people with dementia. When a specialist is seen, neurologists and psychiatrists are more likely and geriatricians less likely to prescribe antidementia drugs than when primary care manages alone, yet 60% of people with newly diagnosed dementia are managed in primary care without input from dementia care specialists. It is likely that there is some residual confounding from the factors that lead a person to choose to see a specialist or take medication, but the finding suggests that the uncertainty about treatment is not entirely random across physicians and highlights that improvement in care will require strong engagement from primary care providers.

The nature of the study design and data sources requires consideration of its limitations. First, as an observational study, association was tested but not causal relationships. There may be residual confounding particularly in the specialty finding. For example, if people who prefer more-aggressive treatment also seek out neurologists, it may be that individual preference rather than a specialty predilection is being detected. Second, proxies were used for disease severity and psychiatric symptoms because claims lack detailed clinical information, but the advantage of using administrative data is inclusion of diverse beneficiaries who may not be represented in community-based studies or research registries. Third, place of residence as a proxy for severity of dementia has face validity, but factors in addition to disease severity may influence the timing of transitioning from community dwelling to residential care.[62–64] In addition, using long-term care pharmacy prescription fills as the indicator of residential care may include settings with differing levels of dementia severity depending on the type of facility, from board and care to nursing home. The strategy to mitigate the

heterogeneity of stage was to focus on people whose diagnosis appeared to be new, but even that approach may be imperfect given that diagnostic delay and late presentation is common for various reasons.[65,66] Fourth, the indications for use of ChEIs have changed since the time of this study, expanding to severe disease for some ChEIs, yet the evidence has not changed, and evaluations of the benefit continue to assert that their use should be limited in late-stage disease.[10,31] Also, the data analyzed shows use from 2008 to 2010. At the time the study was initiated, these were the most-recent Part D data available. Although more-recent data would be desirable, the main results regarding correlates of treatment initiation are unlikely to be different because the state of evidence has not changed since 2010. Future studies including changes in drug usage over time would be an interesting next step. There is evidence that antipsychotic drug use has declined since the time of this study (use by nursing home residents declined from 23.8% in 2012 to 19.4% in 2014[67]), but trends in antidementia drug use have not been explored.

Implications

The human and cost implications of managing the growing population of people with dementia have garnered increased attention in the last several years. This study suggests that, even among the experts, consensus has not been reached about the best practice for management of antidementia medication, and treatment targeting can be improved. In addition, much medication management occurs in primary care. Dementia is underrecognized in primary care, and primary care physicians report not feeling confident about the diagnosis.[68–70] Interventions and policies are needed to build expertise in primary care providers and to promote care that reflects best evidence. Those efforts should be designed to ensure that all providers make medication decisions based on realistic expectations of benefits and can share that information with patients and families, with the goal of improving targeting of these medications.

Many of the initial recommendations of the National Advisory Council tasked by National Alzheimer's Project Act to develop a national strategy focused on finding curative or preventative treatments, and more recently, the scope has expanded toward building the supports needed for high-quality community caregiving. Although both of these are urgently needed, understanding what constitutes best practice in medical care and how best to deliver that care for this population is equally important.

ACKNOWLEDGMENTS

The study was supported by the National Institute on Aging Grant P01 AG19783 (Dr. Bynum). Dr. Koller was a German Harkness Fellow for Health Policy of the Commonwealth Fund. Support for Dr. Koller was provided by The Commonwealth Fund.

Conflict of Interest: The editor in chief has reviewed the conflict of interest checklist provided by the authors and has determined that the authors have no financial or any other kind of personal conflicts with this paper.

Author Contributions: Bynum: data acquisition. Koller, Bynum: study concept. Koller, Hua, Bynum: data analysis, manuscript preparation.

Sponsor's Role: The views presented here are those of the authors and should not be attributed to The Commonwealth Fund or its directors, officers, or staff. No sponsor had a role in in the design, methods, subject recruitment, data collections, analysis, and preparation of paper.

REFERENCES

1. Prince MJ, Bryce R, Albanese E et al. The global prevalence of dementia: A systematic review and metaanalysis. Alzheimers Dement 2013;9:63–75.
2. Hebert LE, Weuve J, Scherr P et al. Alzheimer disease in the United States (2010-2050) estimated using the 2010 census. Neurology 2013;80:1778–1783.
3. Wimo A, Jönsson L, Bond J et al. The worldwide economic impact of dementia 2010. Alzheimers Dement 2013;9:1–11.e3.
4. Hurd MD, Martorell P, Delavande A et al. Monetary costs of dementia in the United States. N Engl J Med 2013;368:1326–1334.
5. Public Law 111-375-Jan 4 2011. National Alzheimer's Project Act. USA, 2011.
6. Birks J. Cholinesterase inhibitors for Alzheimer's disease. Cochrane Database Syst Rev 2006;1:CD005593.
7. Rolinski M, Fox C, Maidment I et al. Cholinesterase inhibitors for dementia with Lewy bodies, Parkinson's disease dementia and cognitive impairment in Parkinson's disease. Cochrane Database Syst Rev 2012;3:CD006504.
8. Birks J, Craig D. Galantamine for vascular cognitive impairment. Cochrane Database Syst Rev 2006;4:CD004746.
9. Qaseem A, Snow V, Cross JT et al. Current pharmacologic treatment of dementia: A clinical practice guideline from the American College of Physicians and the American Academy of Family Physicians. Ann Intern Med 2008;148:370–378.
10. Raina P, Santaguida P, Ismaila A et al. Effectiveness of cholinesterase inhibitors and memantine for treating dementia: Evidence review for a clinical practice guideline. Ann Intern Med 2008;148:379–397.
11. Federal Drug Administration. FDA Approves Expanded Use of Treatment for Patients with Severe Alzheimer's Disease, 2006 [on-line]. Available at http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/2006/ucm108768.htm Accessed January 3, 2016.
12. Medscape. FDA Approves Exelon Patch for Severe Alzheimer's, 2013 [on-line]. Available at http://www.medscape.com/viewarticle/807062 Accessed January 3, 2016.
13. McShane R, Areosa Sastre A, Minakaran N. Memantine for dementia. Cochrane Database Syst Rev 2006;2:CD003154.
14. Schneider LS, Dagerman KS, Higgins JPT et al. Lack of evidence for the efficacy of memantine in mild Alzheimer disease. Arch Neurol 2011;68:991–998.
15. Kavirajan H, Schneider LS. Efficacy and adverse effects of cholinesterase inhibitors and memantine in vascular dementia: A meta-analysis of randomised controlled trials. Lancet Neurol 2007;6:782–792.
16. Kaduszkiewicz H, Bachmann C, van den Bussche H. Telling, "the truth" in dementia—do attitude and approach of general practitioners and specialists differ? Patient Educ Couns 2008;70:220–226.
17. Herrmann N, Gauthier S. Diagnosis and treatment of dementia: Management of severe Alzheimer disease. Can Med Assoc J 2008;179:1279–1287.
18. Nakamura S, Article R. A guideline for the treatment of dementia in Japan. Intern Med 2004;43:18–29.
19. Hort J, O'Brien JT, Gainotti G et al. EFNS guidelines for the diagnosis and management of Alzheimer's disease. Eur J Neurol 2010;17:1236–1248.
20. NICE Guidelines (CG42). Dementia: Supporting People with Dementia and their Carers in Health and Social Care [on-line]. Available at https://www.nice.org.uk/guidance/cg42/chapter/1-guidance#interventions-for-cognitive-symptoms-and-maintenance-of-function-for-people-with-dementia Accessed January 3, 2016.
21. Medicare Payment Advisory Commission. A Data Book: Health Care Spending and the Medicare Program, 2013 [on-line]. Available at http://www.medpac.gov/documents/publications/jun14databookentirereport.pdf Accessed January 3, 2016.
22. Centers for Medicare and Medicaid Services. Part D Program Analysis, 2013 [on-line]. Available at http://www.cms.gov/Medicare/Prescription-Drug-Coverage/PrescriptionDrugCovGenIn/ProgramReports.html Accessed January 3, 2016.

23. Hargrave E, Hoadley J, Merrell K et al. Medicare Part D 2008 Data Spotlight: Ten most common brand-name drugs [on-line]. Available at http://kff.org/medicare/issue-brief/medicare-part-d-2008-data-spotlight-ten Accessed January 3, 2016.
24. Deudon A, Maubourguet N, Gervais X et al. Non-pharmacological management of behavioural symptoms in nursing homes. Int J Geriatr Psychiatry 2009;24:1386–1395.
25. Callahan CM, Boustani MA, Unverzagt FW et al. Effectiveness of collaborative care for older adults with Alzheimer disease in primary care: A randomized controlled trial. JAMA 2006;295:2148–2157.
26. Fowler NR, Chen Y-F, Thurton CA et al. The impact of Medicare prescription drug coverage on the use of antidementia drugs. BMC Geriatr 2013;13:37.
27. Gill S, Bronskill S, Normand S-LT et al. Antipsychotic drug use and mortality in older adults with dementia. Ann Intern Med 2007;146:775–786.
28. Schneider LS, Dagerman KS, Insel P. Risk of death with atypical antipsychotic drug treatment for dementia. JAMA 2005;294:1934–1943.
29. U.S. Food and Drug Administration. FDA Alert. Information for Healthcare Professionals: Conventional Antipsychotics, 2005 [on-line]. Available at http://www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/ucm124830.htm Accessed January 3, 2016.
30. U.S. Food and Drug Administration. Public Health Advisory. Deaths with Antipsychotics in Elderly Patients with Behavioral Disturbances, 2008 [on-line]. Available at http://www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/ucm124830.htm Accessed April 4, 2016.
31. Parsons C, Hughes CM, Passmore AP et al. Withholding, discontinuing and withdrawing medications in dementia patients at the end of life: A neglected problem in the disadvantaged dying? Drugs Aging 2010;27:435–449.
32. Newcomer R, Clay T, Luxenberg JS et al. Misclassification and selection bias when identifying Alzheimer's disease solely from Medicare claims records. J Am Geriatr Soc 1999;47:215–219.
33. Taylor DH, Fillenbaum GG, Ezell ME. The accuracy of Medicare claims data in identifying Alzheimer's disease. J Clin Epidemiol 2002;55:929–937.
34. Pressley J. Dementia in community-dwelling elderly patients: A comparison of survey data, Medicare claims, cognitive screening, reported symptoms, and activity limitations. J Clin Epidemiol 2003;56:896–905.
35. Taylor DH, Østbye T, Langa KM et al. The accuracy of Medicare claims as an epidemiological tool: The case of dementia revisited. J Alzheimers Dis 2009;17:807–815.
36. Ostbye T, Taylor DH, Clipp EC et al. Identification of dementia: Agreement among national survey data, Medicare claims, and death certificates. Health Serv Res 2008;43:313–326.
37. Van Hout H, Vernooij-Dassen M, Poels P et al. Are general practitioners able to accurately diagnose dementia and identify Alzheimer's disease? A comparison with an outpatient memory clinic. Br J Gen Pract 2000;50:311–312.
38. Arevalo-Rodriguez I, Segura O, Solà I et al. Diagnostic tools for Alzheimer's disease dementia and other dementias: An overview of diagnostic test accuracy (DTA) systematic reviews. BMC Neurol 2014;14:183.
39. Koepsell TD, Gill DP, Chen B. Stability of clinical etiologic diagnosis in dementia and mild cognitive impairment: Results from a multicenter longitudinal database. Am J Alzheimers Dis Other Demen 2013;28:750–758.
40. Lopez OL, Litvan I, Catt KE et al. Accuracy of four clinical diagnostic criteria for the diagnosis of neurodegenerative dementias. Neurology 1999;53:1292–1299.
41. Lexi-Data Basic database (Lexicomp). Denver, CO: Cerner Multum. Available at http://www.lexi.com/businesses/solutions/clinicaldecision-support Accessed January 3, 2016.
42. Charlson ME, Pompei P, Ales KL et al. A new method of classifying prognostic comorbidity in longitudinal studies: Development and validation. J Chronic Dis 1987;40:373–383.
43. Deyo R, Cherkin D, Ciol M. Adapting a clinical comorbidity index for use with ICD-9-CM administrative databases. J Clin Epidemiol 1992;45:613–619.
44. Zou G. A modified Poisson regression approach to prospective studies with binary data. Am J Epidemiol 2004;159:702–706.
45. Beers MH, Ouslander JG, Rollingher I et al. Explicit criteria for determining inappropriate medication use in nursing home residents. UCLA Division of Geriatric Medicine. Arch Intern Med 1991;151:1825–1832.
46. Beers MH. Explicit criteria for determining potentially inappropriate medication use by the elderly. An update. Arch Intern Med 1997;157:1531–1536.
47. Fick DM, Semla TP. 2012 American Geriatrics Society Beers Criteria: New year, new criteria, new perspective. J Am Geriatr Soc 2012;60:614–615.
48. Howard RJ, Juszczak E, Ballard CG et al. Donepezil for the treatment of agitation in Alzheimer's disease. N Engl J Med 2007;357:1382–1392.
49. Fox C, Crugel M, Maidment I et al. Efficacy of memantine for agitation in Alzheimer's dementia: A randomised double-blind placebo controlled trial. PLoS ONE 2012;7:e35185.
50. Johnell K, Weitoft GR, Fastbom J. Education and use of dementia drugs: A register-based study of over 600,000 older people. Dement Geriatr Cogn Disord 2008;25:54–59.
51. Avila-Castells P, Garre-Olmo J, Calvó-Perxas L et al. Drug use in patients with dementia: A register-based study in the health region of Girona (Catalonia/Spain). Eur J Clin Pharmacol 2012;69:1047–1056.
52. Van den Bussche H, Kaduszkiewicz H, Koller D et al. Antidementia drug prescription sources and patterns after the diagnosis of dementia in Germany: Results of a claims data-based 1-year follow-up. Int Clin Psychopharmacol 2011;26:225–231.
53. Martinez C, Jones RW, Rietbrock S. Trends in the prevalence of antipsychotic drug use among patients with Alzheimer's disease and other dementias including those treated with antidementia drugs in the community in the UK: A cohort study. BMJ Open 2013;3:e002080.
54. Hoffmann F, van den Bussche H, Wiese B et al. Impact of geriatric comorbidity and polypharmacy on cholinesterase inhibitors prescribing in dementia. BMC Psychiatry 2011;11:190.
55. Tjia J, Briesacher BA, Peterson D et al. Use of medications of questionable benefit in advanced dementia. JAMA Intern Med 2014;174:1763–1771.
56. Zuckerman IH, Ryder PT, Simoni-Wastila L et al. Racial and ethnic disparities in the treatment of dementia among Medicare beneficiaries. J Gerontol B Psychol Sci Soc Sci 2008;63B:S328–S333.
57. Wilson RS, Weir DR, Leurgans SE et al. Sources of variability in estimates of the prevalence of Alzheimer's disease in the United States. Alzheimers Dement 2011;7:74–79.
58. Munson J, Morden N, Goodman D et al. The Dartmouth Atlas of Medicare Prescription Drug Use, 2013 [on-line]. Available at http://www.dartmouthatlas.org/downloads/reports/Prescription_Drug_Atlas_101513.pdf Accessed January 3, 2016.
59. Koller D, Bynum JP. Dementia in the USA: State variation in prevalence. J Pub Health (Oxf) 2014;37:597–604.
60. Wennberg J, Fisher E, Skinner J. Geography and the debate over Medicare reform. Health Aff 2002;(Suppl Web Exclusives):W96–W114.
61. Chandra A, Skinner J. Technology growth and expenditure growth in health care. Natl Bur Econ Res Bull Aging Health 2011;2:1–2.
62. Mehta KM, Yaffe K, Pérez-Stable EJ et al. Race/ethnic differences in AD survival in U.S. Alzheimer's Disease Centers. Neurology 2008;70:1163–1170.
63. Luck T, Luppa M, Weber S et al. Time until institutionalization in incident dementia cases—results of the Leipzig Longitudinal Study of the Aged (LEILA 75+). Neuroepidemiology 2008;31:100–108.
64. Yaffe K, Fox P, Newcomer R et al. Patient and caregiver characteristics and nursing home placement in patients with dementia. JAMA 2002;287:2090–2097.
65. Mitchell AJ, Meader N, Pentzek M. Clinical recognition of dementia and cognitive impairment in primary care: A meta-analysis of physician accuracy. Acta Psychiatr Scand 2011;124:165–183.
66. Valcour VG, Masaki KH, Curb JD et al. The detection of dementia in the primary care setting. Arch Intern Med 2000;160:2964–2968.
67. CMS. Partnership to Improve Dementia Care in Nursing Homes Antipsychotic Drug Use in Nursing Homes Trend Update. 2014:5–8. Available at https://www.cms.gov/Outreach-and-Education/Outreach/NPC/Downloads/2014-10-27-Trends.pdf Accessed April 1, 2016.
68. Iliffe S, Robinson L. Primary care and dementia: 1. Diagnosis, screening and disclosure. Int J Geriatr Psychiatry 2009;24:895–901.
69. Boustani M, Callahan CM, Unverzagt FW et al. Implementing a screening and diagnosis program for dementia in primary care. J Gen Intern Med 2005;20:572–577.
70. Boustani MA, Schubert C, Sennour Y. The challenge of supporting care for dementia in primary care. Clin Interv Aging 2007;2:631–636.

SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Table S1. Psychopharmacological Treatments in the 4 Months Before First Diagnosis of Dementia in Medicare

Fee-for-Service Beneficiaries Enrolled in Part D with a New Diagnosis of Dementia in 2009.

Please note: Wiley-Blackwell is not responsible for the content, accuracy, errors, or functionality of any supporting materials supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author for the article.