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Use of Antipsychotics among Older Residents in Veterans Administration Nursing Homes

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Abstract

Background—Antipsychotic medications are commonly prescribed to nursing home residents despite their well-established adverse event profiles. Because little is known about their use in Veterans Administration(VA) nursing homes (i.e., Community Living Centers(CLCs)), we assessed the prevalence and risk factors for their use in older residents of VA CLCs.

Methods—This cross-sectional study included 3,692 Veterans age 65 who were admitted between January 2004-June 2005 to one of 133 VA CLCs and had a stay of 90 days. We used VA Pharmacy Benefits Management data to examine antipsychotic use and VA Medical SAS datasets and the Minimum Data Set to identify evidence-based indications for antipsychotic use (e.g., schizophrenia, dementia with psychosis). We used multivariable logistic regression with

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generalized estimating equations to identify factors independently associated with antipsychotic use.

Results—Overall, 948/3,692(25.7%) residents used an antipsychotic, of which 59.3% had an evidence-based indication for use. Residents with aggressive behavior (odds ratio[OR]=2.74, 95% confidence interval[CI]=2.04-3.67) and polypharmacy (9+ drugs; OR=1.84, 95% CI=1.41-2.40) were more likely to receive antipsychotics, as were users of antidepressants (OR=1.37, 95% CI=1.14-1.66), anxiolytic/hypnotics (OR=2.30, 95% CI=1.64-3.23) or drugs for dementia (OR=1.52, 95% CI=1.21-1.92). Those residing in Alzheimer's/dementia special care units were also more likely to use an antipsychotic (OR=1.66, 95% CI=1.26-2.21). Veterans with dementia but no documented psychosis were as likely as those with an evidence-based indication to receive an antipsychotic (OR=1.10, 95% CI=0.82-1.47).

Conclusions—Antipsychotic use is common in older VA CLC residents, including those without a documented evidence-based indication for use. Further quality improvement efforts are needed to reduce potentially inappropriate antipsychotic prescribing.

Keywords

Nursing Homes; Antipsychotics; Veterans; Pharmacoepidemiology

INTRODUCTION

Neuropsychiatric symptoms are common in dementia and are one of the reasons individuals with dementia are placed in nursing homes.^{1, 2} There are no Food and Drug Administration (FDA) approved medications for these behavioral symptoms, which include wandering, agitation, aggression, hallucinations and delusions. Nonetheless, antipsychotics are commonly used in nursing homes off-label to treat patients with dementia and behavioral symptoms, in addition to treating those with psychotic illnesses for whom antipsychotics are FDA approved (e.g., schizophrenia).³⁻¹⁰ In 2006, nearly 30% of nursing home residents in a large national study received an antipsychotic medication, of which 32% had no identified indication for use.⁵ Recently, the Office of the Inspector General in the Department of Health and Human Services addressed this potential overuse, reporting that 22% of Medicare Part D claims for atypical antipsychotics in nursing homes were not administered in compliance with Centers for Medicare and Medicaid Services (CMS) standards for appropriate drug use.¹¹

Unfortunately, there are few non-pharmacologic means to treat behavioral symptoms of dementia,¹² and for decades physicians have used antipsychotics for symptom management. However, antipsychotics have limited evidence of overall efficacy for these symptoms, and several studies suggest an increased mortality risk with their use in dementia.¹³⁻¹⁷ After years of concern among clinicians and researchers about their potential overuse and propensity for adverse effects,¹⁸⁻²³ the FDA issued a boxed warning in 2005 for the atypical antipsychotics, emphasizing their association with increased mortality when used for behavioral disorders in elderly residents with dementia. The warning was extended to conventional antipsychotics in 2008.

Although prior studies have documented the use of antipsychotics for outpatients with dementia in the Veterans Administration (VA) Healthcare System,^{1, 24} the rate of use of these agents among older residents of VA nursing homes is unknown. The VA maintains 133 nursing homes, recently renamed Community Living Centers (CLCs), across the country to provide short- and long-term care for eligible Veterans. The presence of an onsite pharmacy, along with centralized formulary and utilization management through the Pharmacy Benefits Management (PBM) services, makes the VA CLC environment different

from that of nursing homes outside the VA. Our aims for this study were to estimate the prevalence of antipsychotic use in older VA CLC residents and identify the patient and facility factors associated with antipsychotic use.

METHODS

Setting and Study Sample

The VA is the one of the largest integrated health care systems in the U.S., with over 8 million Veterans enrolled and more than 5 million receiving care.^{25, 26} In 2005, the average daily census of VA CLCs was about 12,000 Veterans.²⁷

We collected data on all residents age 65 years or older admitted to any one of 133 VA CLCs between January 1, 2004 and June 30, 2005. Residents were included if they were long-stay residents (defined as a minimum admission length of 90 days) and had at least one drug dispensing record during that time period. We excluded residents admitted for respite or hospice care. The Pittsburgh VA Research and Human Subjects Committees approved the study.

Study Design and Data Sources

All Veterans in a VA CLC are evaluated using the Minimum Data Set (MDS, current version 2.0), which is a clinical assessment for residents of nursing homes that serves as a standardized tool to evaluate their quality of care.²⁸ The data are collected from resident and staff interviews and reviews of resident records at baseline (i.e., within 14 days of admission) and quarterly thereafter, or at the time of any significant change in health status. An electronic version of the MDS, which is stored in a central VA data warehouse, was made available through a data use agreement.

We linked each CLC resident's MDS data with all prescriptions dispensed during the first 90 days of their admission using VA PBM data.²⁹ For each dispensed drug, we collected start and stop date, medication name, medication strength, directions for use, and amount dispensed. To the MDS and drug use data we linked inpatient and outpatient International Classification of Diseases-9 (ICD-9) codes from the previous year from the VA Medical SAS datasets (Austin Information Technology Center in Austin, TX). We used this merged database to conduct all analyses. We also collected CLC facility characteristics (described below) from VA administrative sources because of the potential for nursing home organizational factors to affect antipsychotic prescribing.⁹

Study Outcome

Our primary outcome was the receipt of an antipsychotic at least once during the CLC stay. We use the terms "receipt," "use" and "prescribing" interchangeably because we assume that prescribed medications in the PBM database were received by the nursing home residents, who do not self-administer medications. For descriptive purposes, antipsychotics available in the VA at the time of this study were classified as atypical (i.e., aripiprazole, clozapine, olanzapine, quetiapine, risperidone, ziprasidone) or conventional (i.e., chlorpromazine, fluphenazine, haloperidol, loxapine, molindone, perphenazine, trifluoperazine, thiothixene, thioridazine), and use was categorized as regularly scheduled or as needed (i.e., "PRN").

Patient and Facility Characteristics

Demographic variables included resident age, race/ethnicity, gender, and education as obtained from the baseline MDS. We calculated a Charlson Comorbidity score (range 0-34) for each resident using ICD-9 codes from the VA Medical SAS databases indicating the

presence of 18 chronic conditions.^{30, 31} We recorded the amount of assistance (i.e., ADL Dependence) needed for five functional status items (bathing, dressing, grooming, toileting, eating), which is included in the baseline MDS for each resident. Each activity is rated from 0 (total independence) to 4 (complete dependence), and the overall function score ranges from 0-20, where 20 denotes complete dependence in all activities of daily living.³²

We recorded additional relevant neurologic/psychiatric health status variables, including aggressive behavior (based on the presence of verbally or physically abusive behavioral symptoms as documented on the MDS during the admission) and the use of physical restraints (yes/no, as described in the MDS). We used ICD-9 codes to define a diagnosis of post-traumatic stress disorder (309.81), other anxiety disorders (300.3, 300.01, 300.21, 300.00, 300.02, 300.09) and depression (296.2, 296.3, 298.0x, 300.4x, 309.1x, 311.xx, 301.12, 309.0x).³³⁻³⁵ To create a polypharmacy variable (i.e., the use of multiple medications), we identified the number of unique medications per resident, excluding psychiatric or dementia medications, from PBM data. We created separate dichotomous variables for the use of antidepressants, anxiolytic/hypnotics, and dementia treatment (i.e., acetylcholinesterase inhibitors [AChEI] and memantine). Finally, we ascertained whether residents were residing in Alzheimer's/dementia special care units based on information from Section P of the MDS.

In addition to these demographic and health status variables, we also included facility variables describing the location (i.e., urban/rural), census region (i.e., Northeast, Midwest, South, West), and size defined in terms of the number of beds (i.e., small (<60 beds), medium (60-120 beds), and large (>120 beds)), of each VA facility.

Indications for Antipsychotic Use

We classified each resident in the cohort into one of three mutually exclusive groups based on the potential indication (or lack of indication) for receipt of an antipsychotic.^{3, 33-35} The first group included individuals who had a potentially appropriate indication for use of an antipsychotic (i.e., either a psychiatric diagnosis in which psychotic symptoms are a prominent feature or a diagnosis of dementia and psychotic symptoms from the MDS (e.g., hallucinations)).³⁶ Psychiatric diagnoses were identified using the following inpatient or outpatient ICD-9 codes: ICD-9 CM codes 295.0-295.3, 295.5, 295.6-295.9 for schizophrenia and schizoaffective disorder; 295.4 for schizophreniform disorder; 296.4-8 for bipolar disease; 298.8 for brief psychotic disorder; 293.0 and 293.1 for medical illnesses or delirium with manic or psychotic symptoms; 298.9 for psychosis not otherwise specified or atypical psychosis; 297.x for delusional disorder; 292.81 for drug-induced delirium; and 296.14 for manic affective disorder with psychotic behavior.^{33, 34} Individuals with Tourette's (ICD-9 307.23) or Huntington's disease (ICD-9 333.4) also were included in this group. A small proportion (7%) of residents with psychotic symptoms reported in MDS did not have dementia (ICD-9 codes 331.0, 290.4, 331.82, 331.19, 046.1, 331.11, 290.0, 331.2, 797, 294.1, and 290.2) but were also assigned to the group with a potentially appropriate indication.

We then categorized the remaining residents without documentation of psychiatric diagnoses or psychosis (as defined above) into two groups defined by whether or not they had dementia. Both of these groups were considered to be potentially inappropriate recipients of antipsychotics based on accepted indications for these drugs.¹¹

Analysis

We summarized all variables using descriptive statistics. We described the proportion of Veteran CLC residents receiving an antipsychotic and reported the indication for use of an

antipsychotic among antipsychotic users. Characteristics of antipsychotic users and non-users were compared with Chi-square or t-tests, as appropriate. We examined the relationship between antipsychotic use and each of our variables using logistic regression models to identify those factors independently associated with antipsychotic use. Variable selection for the final model was based on logistic regression with backward elimination using an alpha of 0.10; we recognize that this approach to model selection without adjusting for correlation could be anticonservative (i.e., including extra variables for consideration in the final model), particularly for facility-level predictors. For those variables that remained statistically significant, we subsequently used generalized estimating equations (GEEs) to account for clustering of residents within facility and to estimate odds ratios and 95% confidence intervals for antipsychotic use.³⁷ The adjustment for clustering made very little difference in the final quantitative or qualitative results. All analyses were carried out using SAS® version 9.0 (Cary, NC).

RESULTS

The final cohort included 3,692 Veterans over age 65 residing in 133 VA CLCs. Residents were predominately male (97.2%) and white (80.7%) (**Table 1**). Over half of Veterans in CLCs (52.5%) used nine or more medications, and half (50.0%) received an antidepressant. About 10% of the cohort resided in an Alzheimer's/dementia special care unit. Slightly over a third (36.8%) of residents had a psychosis diagnosis or psychotic behavior and thus a potentially appropriate indication for an antipsychotic.

Overall, 948/3,692 (25.7%) Veterans used an antipsychotic during their CLC stay. The vast majority (90.6% of users) received 'atypical' antipsychotics, with 6.6% of antipsychotic use being limited to 'PRN' only. Antipsychotic users were more likely than non-users to have aggressive behavior (19.0% vs. 5.1% $p<0.001$) and were more likely to receive antidepressants, anxiolytic/hypnotics, and medications for dementia ($p<0.001$ for each) (**Table 1**). Among Veterans who received an antipsychotic, 59.3% had psychosis or psychotic behavior and a documented indication for use, while the remaining 40.7% had no evidence of psychosis (including 14.7% with dementia but no documented psychosis and 26.1% without dementia or documented psychosis) (**Table 1**).

Characteristics Associated with Antipsychotic Use

In unadjusted analyses, older residents (aged 85+) and those with higher Charlson Comorbidity scores were less likely to receive antipsychotics (**Table 2**). Residents without dementia or psychosis were less likely than those with psychosis to receive an antipsychotic (OR 0.20, 95% CI 0.17-0.24); however, those with dementia but no psychosis were as likely to receive an antipsychotic as were those with psychosis (OR 0.98, 95% CI 0.77-1.24). Those residing in Alzheimer's/dementia special care units and in larger facilities had higher unadjusted odds of antipsychotic use (**Table 2**).

In the multivariable GEE logistic analysis, the only demographic factor associated with antipsychotic use was age, with older Veterans significantly less likely to receive antipsychotics (OR 0.77, 95% CI 0.64-0.93 for age 75-84, OR 0.67, 95% CI 0.51-0.88 for age 85+) (**Table 2**). The estimated OR of receiving an antipsychotic decreased with increasing comorbidity (OR 0.89 per unit increase in the Charlson Score, 95% CI 0.86-0.93). Residents with aggressive behavior (OR 2.74, 95% CI 2.04-3.67) and polypharmacy (9+ drugs-OR 1.84, 95% CI 1.41-2.40) were more likely to receive antipsychotics, as were users of antidepressants (OR 1.37, 95% CI 1.14-1.66), anxiolytic/hypnotics (OR 2.30, 95% CI 1.64-3.23), or drugs for dementia (OR 1.52, 95% CI 1.21-1.92). Veterans residing in an Alzheimer's/dementia special care unit were significantly more likely to use an antipsychotic (OR 1.66, 95% CI 1.26-2.21). Veterans with dementia but no

psychosis were about as likely as those with an evidence-based indication to receive an antipsychotic (OR 1.10, 95% CI 0.82-1.47).

DISCUSSION

In a national sample of older Veterans residing in VA nursing homes (CLCs), more than one in four were prescribed an antipsychotic. Additionally, four out of every ten antipsychotic users in VA CLCs did not have a clear evidence-based indication for use (i.e., psychosis or psychotic behavior). Residents with aggressive behavior, those using more medications, and those residing in Alzheimer's/dementia special care units were more likely to receive antipsychotics.

Rates of antipsychotic use in VA CLCs are similar to rates in non-VA nursing homes, which range from 25% to 32%.^{3, 5-10} The proportion of antipsychotic users in VA CLCs without an evidence-based indication for use is also similar to the proportion outside the VA.⁸ Our rates of antipsychotic use are lower than the 49% reported in a previous analysis of VA CLCs that included residents of all ages who were institutionalized for at least a year;³⁸ it is likely that younger Veterans confined to nursing homes have a higher prevalence of psychiatric disease, which was not measured in the prior study and likely explains the higher rates.

Residents with dementia but no evidence of psychosis were about as likely to receive antipsychotics in VA CLCs as those with documented psychosis. These individuals may have behavioral symptoms that are troublesome but do not necessarily fit the established criteria for use of antipsychotics, either as per the structured package label or through CMS surveyor guidance on potentially inappropriate medication use.³⁹ We did include an indicator for aggressive behavior from the MDS and found that residents with aggressive behavior had almost three times greater odds of antipsychotic use. It is unclear whether clinicians are using antipsychotics in residents with dementia without considering the risks, or whether they are considering the risks but have determined that the behavioral symptoms are sufficiently problematic (either for the resident or their family) that the potential benefits outweigh the risks of therapy. We are unable to answer this question without examining individual medical records, and even then, the documentation may not exist.

Veterans residing in Alzheimer's/dementia special care units had 66% greater odds of receiving an antipsychotic, even after adjusting for age, clinical indication, comorbidity, and aggressive behavior. It is possible that residents in these dementia care units have more severe dementia or behavioral or neurocognitive symptoms that cannot be captured in currently available databases. However, one might expect that these units, whose staff likely have expertise in treating Alzheimer's and other types of dementia,⁴⁰ would be more likely to use non-pharmacologic treatments. It may be that they are, in fact, using more non-pharmacologic treatments while also using more medication. Further work is needed to better understand why residents in dementia special care units have a higher probability of use of antipsychotics and whether this association also holds outside the VA.

We also found that polypharmacy and the use of other psychoactive medications, including anxiolytic/hypnotics, antidepressants, and medications for dementia were associated with greater use of antipsychotics. This association remains after statistical adjustment, making it unlikely that polypharmacy is simply a surrogate for more severe behavioral problems. Polypharmacy may reflect greater health services use within the VA healthcare system prior to admission, which could potentially lead to greater access to antipsychotics. Once again, without access to detailed medical records it would be difficult to know for sure the reasons for this association. Nonetheless, polypharmacy is one of the most important risk factors for functional status decline, increased health services utilization, adverse drug events, and

death among older adults, and it is addressable.^{41, 42} The association between polypharmacy and the use of antipsychotics in nursing homes is one additional reason for clinicians to evaluate the need for each medication in these patients and to discontinue those that are not necessary.

What should clinicians do for the troublesome neurocognitive symptoms seen in nursing home residents with dementia, who may be receiving antipsychotics currently? Unfortunately, successful interventions that address inappropriate prescribing in nursing homes can be resource intensive.⁴³⁻⁴⁵ The VA is undertaking several initiatives to address the use of antipsychotics in VA nursing homes, including increasing the availability and integration of psychologist services, and piloting behavioral management programs such as the Staff Training in Assisted Living Residences in VA (STAR-VA) and the Activators Behaviors and Consequences (ABC) models.^{46, 47} The VA is also supporting efforts for better documentation in the medical record of risk/benefit discussions regarding the use of these antipsychotic agents.

While our study is the first to address this important topic in VA nursing homes, there are limitations to consider. First, our data were collected prior to the 2005 FDA boxed warning and thus may not reflect current practice. However, ours are the most recent data available to address the topic of medication use in VA CLCs, and despite the lack of an FDA warning in 2004-2005, publications and reports already appeared in print about the risks of these agents.¹ Second, our study is cross sectional, and as such we cannot make any causal inferences. Third, we were not able to capture additional organizational factors that may be important, such as nurse or nurse assistant staffing ratios, staff turnover, and presence of geriatricians, geriatric specialty trained pharmacists and nurses, or geriatric psychiatrists. However, we did evaluate a number of facility characteristics, none of which was independently associated with antipsychotic use. Fourth, some antipsychotics can be used off-label for indications other than neurocognitive symptoms of dementia (e.g., adjunct treatment of depression⁴⁸), and we are not able to capture those indications in our analysis, although we did control statistically for the use of antidepressants. Finally, our study may not be generalizable to younger Veterans in nursing homes or to women, who are not well represented in our sample.

In summary, antipsychotic prescribing is common in older VA nursing home residents, including residents without a documented evidence-based indication for use. Rates of use are similar to rates in non-VA nursing homes. Quality improvement efforts are needed to reduce potentially inappropriate antipsychotic prescribing and increase the use of non-pharmacological behavior modification approaches. These efforts are underway in the VA, and their effectiveness should be carefully evaluated.

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Table 1

Characteristics of 3,692 Long-Term VA Community Living Center Residents, including Antipsychotic Users and Non-users, from 2004-2005.

	Overall * (n=3,692)	Antipsychotic Users * (n=948)	Non-users * (n=2,744)	P value
Demographics				
Age				0.07
65-74	1,134 (30.7)	306 (32.3)	828 (30.2)	
75-84	1,926 (52.2)	502 (53.0)	1,424 (51.9)	
85+	632 (17.1)	140 (14.8)	492 (17.9)	
Race				0.35
White	2981 (80.7)	777 (82.0)	2,204 (80.3)	
Black	499 (13.5)	115 (12.1)	384 (14.0)	
Other	212 (5.7)	56 (5.9)	156 (5.7)	
Female Gender	103(2.8)	30 (3.2)	73 (2.7)	0.42
Education				0.45
Below High School	1,112 (30.1)	277 (29.2)	835 (30.4)	
High School	1,716 (46.5)	459 (48.4)	1,257 (45.8)	
Above High School	822 (22.3)	204 (21.5)	618 (22.5)	
Missing	42 (1.1)	8 (0.8%)	34 (1.2)	
Health Status				
Charlson Comorbidity Score, mean (standard deviation)	2.7 (2.2)	2.2 (2.0)	2.9 (2.3)	<0.001
ADL Dependence, mean (standard deviation)	9.1 (6.5)	9.6 (6.5)	8.9 (6.5)	0.01
Aggressive Behavior	319 (8.6)	180 (19.0)	139 (5.1)	<0.001
Physical Restraint Use	20 (0.5)	9 (0.9)	11 (0.4)	0.05
Post Traumatic Stress Disorder (PTSD)	245 (6.6)	84 (8.9)	161 (5.9)	0.001
Other Anxiety	286 (7.7)	93 (9.8)	193 (7.0)	0.006
Depression Diagnosis or Symptoms	811 (22.0)	243 (25.6)	568 (20.7)	0.002
Number of medications (excluding classes below)				<0.001
0-4	845 (22.9)	193 (20.4)	652 (23.8)	
5-8	909 (24.6)	289 (30.5)	620 (22.6)	
9+	1,938 (52.5)	466 (49.2)	1,472 (53.6)	
Antidepressant Use	1,846 (50.0)	539 (56.9)	1,307 (47.6)	<0.001
Anxiolytic/Hypnotic Use	231 (6.3)	101 (10.7)	130 (4.7)	<0.001
Dementia Treatment (i.e., acetylcholinesterase inhibitor or memantine use)	567 (15.4)	249 (26.3)	318 (11.6)	<0.001
Admitted to Alzheimer's/dementia special care unit	372 (10.1)	181 (19.1)	191 (7.0)	<0.001
Indication by Psychosis/Dementia Diagnosis				<0.001
Psychotic Diagnosis or Symptoms (Potentially Appropriate)	1,358 (36.8)	562 (59.3)	796 (29.0)	

	Overall * (n=3,692)	Antipsychotic Users * (n=948)	Non-users * (n=2,744)	P value
Dementia without Psychosis (Potentially Inappropriate)	341 (9.2)	139 (14.7)	202 (7.4)	
No Dementia or Psychosis (Potentially Inappropriate)	1,993 (54.0)	247 (26.1)	1,746 (63.6)	
Facility Factors				
Rural	951 (25.8)	259 (27.3)	692 (25.2)	0.20
Region				0.21
Northeast	916 (24.8)	252 (26.6)	664 (24.2)	
Midwest	747 (20.2)	176 (18.6)	571 (20.8)	
South	1,489 (40.3)	391 (41.2)	1,098 (40.0)	
West	540 (14.6)	129 (13.6)	411 (15.0)	
Facility Size				0.004
Small (<60 beds)	510 (13.8)	104 (11.0)	406 (14.8)	
Medium (60-120 beds)	1,744 (47.2)	443 (46.7)	1,301 (47.4)	
Large (>120 beds)	1,438 (38.9)	401 (42.3)	1,037 (37.8)	

* All values are n (%) unless otherwise noted and all percentages are column percentages.

Table 2

Patient and Facility Characteristics Associated with Antipsychotic Use among 3,692 Older Residents of VA Community Living Centers, from 2004-2005.

	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Demographics		
Age		
65-74	1.00 (ref)	1.00 (ref)
75-84	0.95 (0.81-1.13)	0.77 (0.64-0.93)
85+	0.77 (0.61-0.97)	0.67 (0.51-0.88)
Race		
White	1.00 (ref)	-
Black	0.85 (0.68-1.06)	-
Other	1.02 (0.74-1.40)	-
Female Gender	1.20 (0.78-1.84)	-
Education		
Below High School	1.00 (Ref)	-
High School	1.10 (0.93-1.31)	-
Above High School	1.00 (0.81-1.23)	-
Missing	0.71 (0.32-1.55)	-
Health Status		
Charlson Comorbidity Score (OR per unit increase)	0.87 (0.83-0.90)	0.89 (0.86-0.93)
ADL Dependence, mean (OR per unit increase)	1.02 (1.00-1.03)	-
Aggressive Behavior	4.39 (3.47-5.56)	2.74 (2.04-3.67)
Physical Restraint Use	2.38 (0.98-5.77)	-
Post Traumatic Stress Disorder (PTSD)	1.56 (1.19-2.05)	-
Other Anxiety	1.44 (1.11-1.86)	-
Depression Diagnosis or Symptoms	1.32 (1.11-1.57)	-
Number of medications (excluding classes below)		
0-4	1.00 (ref)	1.00 (ref)
5-8	1.58 (1.27-1.95)	1.79 (1.39-2.29)
9+	1.07 (0.88-1.30)	1.84 (1.41-2.40)
Antidepressant Use	1.45 (1.25-1.68)	1.37 (1.14-1.66)
Anxiolytic/Hypnotic Use	2.40 (1.83-3.14)	2.30 (1.64-3.23)
Dementia treatment (i.e., acetylcholinesterase inhibitor or memantine use)	2.72 (2.26-3.27)	1.52 (1.21-1.92)
Admitted to Alzheimer's/dementia special care unit	3.15 (2.53-3.93)	1.66 (1.26-2.21)
Indication by Psychosis/Dementia Diagnosis		
Psychotic Diagnosis or Symptoms (Potentially Appropriate)	1.00 (ref)	1.00 (ref)
Dementia without Psychosis (Potentially Inappropriate)	0.98 (0.77-1.24)	1.10 (0.82-1.47)
No Dementia or Psychosis (Potentially Inappropriate)	0.20 (0.17-0.24)	0.25 (0.21-0.30)
Facility Factors		

	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Rural	1.11 (0.94-1.32)	-
Region		
Northeast	1.00 (ref)	-
Midwest	0.81 (0.65-1.01)	-
South	0.94 (0.78-1.13)	-
West	0.83 (0.65-1.06)	-
Facility Size		
Small (<60 beds)	1.00 (ref)	-
Medium (60-120 beds)	1.33 (1.04-1.69)	-
Large (>120 beds)	1.51 (1.18-1.93)	-