No Longer Undertreated? Depression Diagnosis and Antidepressant Therapy in Elderly Long Stay Nursing Home Residents, 1999–2007

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Abstract

OBJECTIVES—To examine the evolution of depression identification and use of antidepressants in elderly long-stay nursing home residents from 1999 through 2007, and the associated sociodemographic and facility characteristics.

DESIGN—Annual cross-sectional analysis of merged resident assessment data from the Minimum Data Set (MDS) and facility characteristics from the Online Survey Certification and Reporting (OSCAR) data.

SETTING—Nursing homes in eight states (5,445 facilities).

PARTICIPANTS—Long-stay nursing home residents aged 65 and over (2,564,687 assessments).

MEASUREMENTS—Physician-documented depression diagnoses recorded in the MDS were used to identify residents with depression; antidepressant use was measured by MDS information about a resident's receipt of an antidepressant in the seven days prior to assessment.

RESULTS—Both diagnosis of depression and antidepressant therapy among those diagnosed increased at a rapid rate. By 2007, 51.8% of residents were diagnosed with depression, among whom 82.8% received an antidepressant. Adjusted odds of treatment were higher for younger residents, whites, and those with moderate impairment of cognitive function.

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CONCLUSION—This study demonstrates striking increases in depression diagnosis and treatment with antidepressant medications; however, disparities persist without clear evidence about underlying mechanisms. More research is needed to assess effectiveness of antidepressant prescribing.

Keywords

Nursing home; depression; antidepressants; elderly

INTRODUCTION

Rates of depression among elderly nursing home (NH) residents are substantially higher than those in community-dwelling elders,[1] and the proportion of NH admissions with depression has increased in recent years.[2] Depression among NH residents has been generally viewed as under-diagnosed, and under-treated when diagnosed,[3,4] as reflected in recommendations for improving identification and treatment[5,6] and tracking of depression measures as indicators of NH quality. This study uses MDS resident data merged with Online Survey Certification and Reporting system (OSCAR) facility survey data for eight states to assess trends in the percent of residents with recorded depression diagnosis and antidepressant therapy of diagnosed depression from 1999 to 2007.

Several studies have examined the prevalence of depression in NH residents with widely varying results depending on the population studied and measurement of depression, with estimated prevalence rates ranging from 11% to 78%.[2,7–9] A study in five states for 1992–96 and another in Ohio for 2000 found diagnosed depression among NH residents to be associated with younger age, female gender, having ever been married, white non-Hispanic ethnicity, higher cognitive function, and physical comorbidity.[3,8] One study of long term care residents with dementia found that they manifested high levels of depression related symptoms -- particularly among those with severe cognitive impairment, behavioral symptoms of dementia, and pain – but that a diagnosis of depression was reported for fewer than half of them.[10] Among residents in whom depression has been diagnosed, reported rates of treatment have varied widely, from 55% to 82%.[2,3,8]

Antidepressants have become the most frequently used medical treatment for depression and are generally considered safe and efficacious for most elderly.[11,12] The selective serotonin reuptake inhibitors (SSRIs) and other newer antidepressants (NRIs) like venlafaxine are preferred to older tricyclic antidepressants (TCAs), because they are better tolerated by elderly patients, although tolerability issues remain.[5,13] To promote careful use and periodic reconsideration of the need for antidepressants, the Centers for Medicare & Medicaid Services (CMS) released updated guidelines to NH surveyors noting categories of medication, including antidepressants, to be considered for tapering,[14] which has led to recommendations encouraging judicious decision making about use of antidepressants in long term care.[15]

Studies which have assessed the impact of facility characteristics on depression care have found that increased treatment of depression is associated with more professional nursing hours and increased on-site time by medical directors and physicians.[8,16] Some evidence has shown that minorities are diagnosed and treated for depression at lower rates than non-Hispanic whites.[3,8,17]

METHODS

Data

We utilized the Long-term Care Minimum Data Set (MDS) for 1999 through 2007 from eight states whose NH population represents 43% of the US NH population[18]: California, Florida, Georgia, Illinois, New Jersey, New York, Ohio, and Texas. MDS data were merged with facility information from the Online Survey Certification and Reporting (OSCAR) data. The research protocol was approved by the Institutional Review Board at the researchers' university.

The MDS is a nationally-standardized screening and assessment tool, consisting of approximately 350 items on NH residents' sociodemographic characteristics, physical functioning, psychological well-being, active clinical diagnoses, an extensive array of symptoms, and treatment and services received.[19] The revised MDS (v 2.0) was tested for reliability in multistate field tests.[20]

OSCAR is the uniform computerized data system maintained by CMS providing information on facility characteristics.[18] Validation studies have found the information in OSCAR to be reliable.[18] The Rural-Urban Commuting Areas Codes (RUCA) are available from WWAMI Rural Heath Research Center (2007) and were used to classify urban-rural location of NHs.

The study population was selected using a cross-sectional design for each year from 1999 through 2007. We excluded residents who were in the facility for less than three months after admission, as well as those who were comatose, had an active diagnosis of schizophrenia or bipolar disorder, or were residing in a hospital-based nursing home. The last full non-admission assessment for each year was selected for each unique resident and matched to the data from the OSCAR facility survey closest to the MDS assessment date. The final sample included 2,564,687 assessments in 5,445 facilities.

Measures

Depression Diagnosis and Treatment—A resident was considered to have diagnosed depression if there was a physician-documented depression diagnosis recorded by a trained nurse in the MDS assessment. Active medical diagnoses are conditions in medical records which are related to the resident's plan of care at the time of assessment.

Use of an antidepressant in the seven days before the assessment is documented in the MDS. Items in the Disease Diagnosis and Medication Use sections have been found to have inter-rater reliabilities above .7, for trained nurses transcribing from clinical records.[20]

Resident Characteristics—All resident characteristics were obtained from the MDS. Sociodemographic characteristics included gender, age (65–74, 75 to 84, 85–95, and 95 and older), race/ethnicity (Non-Hispanic white, Non-Hispanic black, Hispanic, Other), and marital status at admission assessment (never married, married, or widowed/divorced/separated). Medical comorbidities (including Alzheimer's disease or other dementia) were summed to obtain the number of conditions, then categorized so that each grouping contained roughly 25% of residents. Physical functioning was measured by the hierarchical activities of daily living (ADL) scale.[21]

Cognitive impairment was assessed using the MDS Cognition Scale.[22] Depressive symptoms were measured by the MDS Depression Rating Score (MDSDRS).[23] While the validity and clinical value of the MDSDRS for identifying depression has been criticized,[24]

scores of 3 or more can indicate the need for an evaluation of possible depression. Resident contact with relatives/close friends was obtained from the MDS assessment.

Facility Characteristics—The presence of an Alzheimer's/dementia special care unit (SCU) was obtained from the MDS. Some studies have reported that MDS behavioral and depression data were less reliable among cognitively impaired residents;[25] it is possible that nursing homes with staff specially trained to care for these residents may be better able to distinguish and treat depression in residents with dementia.

The remaining facility characteristics were obtained from the OSCAR data, including type of ownership (for-profit, non-profit, or government; part of a multi-facility chain), whether the facility was located in an urban or rural area, and whether or not the facility had onsite mental health staff. The overall acuity level for a facility was measured with an acuity index (ACUINDEX) that incorporates the ADL index and the proportion of residents that require special treatments (respiratory care, suctioning, IV therapy, tracheostomy care, parenteral feeding).[26] The level of nurse staffing was measured by the total number of nursing hours (RN, LPN, and CNA hours per resident per day). Facilities with implausible values and those with staff levels that were three standard deviations beyond the mean were excluded.[18]

The total number of facility survey deficiencies was obtained by summing deficiencies recorded in OSCAR across the 17 major areas used in the survey process. Since acuity level, number of beds in the facility, occupancy rate, percentage of residents with Medicaid as the primary payer, total nursing hours per resident day, and number of facility deficiencies were not distributed uniformly across their range, these variables were categorized into quartiles, and the highest quartile for each measure was compared to the lower 75% of facilities.

Analyses

Bivariate group differences in depression diagnosis and antidepressant use were tested using chi-square analysis. Multivariate logistic regressions were then performed to determine the effect of each of the covariates on the probability of being diagnosed with depression and, for those who received a diagnosis, on the probability of using antidepressants. We show 95% confidence intervals (CIs) for odds ratios; differences between years were assessed by the overlap between CIs. Both the bivariate analysis and logistic regressions adjusted for clustering of residents within facilities using SAS-callable SUDAAN V9.0 (SUDAAN software, version 9.0.1, Research Triangle Institute, 2005).

RESULTS

Overall Trends

Percent of residents diagnosed with depression in 1999, 2003 and 2007 is shown in Table 1, and antidepressant use among those diagnosed is shown in Table 2. Detailed trends data/results are in the Appendix. Between 1999 and 2007, the percentage of all residents diagnosed with depression increased steadily, from 33.8% to 51.8%. Diagnosis rates increased substantially for all racial/ethnic groups between 1999 and 2007, though remaining higher for non-Hispanic whites than other groups in all years. In 2007, the racial/ethnic differences in diagnosis rates remained substantial, with 55.1% of white, 48.3% of Hispanic, and 39.4% of black residents recorded as having depression.

Use of antidepressants among residents with a recorded depression diagnosis increased steadily, from 71.2% to 82.8%. Black residents with depression continued to be less likely than non-Hispanic whites to receive antidepressants between 1999 and 2007, with a gap of approximately six percentage points between the use rates for the two groups. However,

with the general increase in use, more than three-quarters of residents with depression in both groups received antidepressants by 2007. Rates of antidepressant use for Hispanics were similar to those for non-Hispanic whites.

The proportion of all long-stay residents diagnosed with depression and using antidepressants (treated prevalence) increased sharply over the period, from 24% to almost 43% of all long-stay residents. The rate of treated prevalence increased substantially for all groups, and more than doubled for non-Hispanic black residents.

Variations in Depression Diagnosis

Table 1 shows rates of depression diagnosis by resident and facility characteristics for 1999, 2003, and 2007, as well as odds ratios from a multiple logistic regression. Differences in rates of diagnosis between states were substantial, ranging from 42.6% to 62.8% in 2007, with odds ratios ranging up to 1.96 compared with California, the reference state.

Consistent with the increase in overall rates of depression diagnosis, rates of diagnosis increased for all demographic and clinical/functional subgroups. By 2007, slightly more than half of residents with dementia were also diagnosed with depression. Over the period, the presence of dementia became more predictive (OR increasing from 1.11 to 1.35). However, for the most part, in multivariate analysis the predictors of depression diagnosis followed a similar pattern as the overall rate increased. Depression diagnosis continued to be more prevalent for women, whites, younger residents, those with more medical comorbidities, those without contacts with relatives or close friends, and those who were dependent (but not totally dependent) in ADLs. Those with moderate cognitive impairment continued to be more likely to receive depression diagnoses than either those without impairment or those with severe impairment. Residents of facilities most reliant on Medicaid reimbursement continued to be somewhat less likely to receive a depression diagnosis, with the gap increasing over the time period (OR of .94 in 1999 and .90 in 2007 for facilities in the highest quartile of Medicaid reliance, as measured by the proportion of residents with Medicaid as primary payer). While bivariate comparisons were statistically significant for other facility characteristics, the results of the logistic regression indicated that most of these differences were very small and did not change substantially over time (results not shown).

Variations in Antidepressant Treatment

Rates of antidepressant use for those with diagnosed depression increased between 1999 and 2007, for every demographic, clinical, functional and facility subgroup that we examined (Table 2). Across states, differences remained in use of antidepressants, but rates increased in all states, from a range of 70–75% in 1999 to a range of 79%-85% across states in 2007. Logistic regression results for antidepressant use in depressed residents generally indicated that the increase was across the board, with some changes in the pattern of predictors as discussed below. As in 1999, the odds of antidepressant use among those depressed in 2007 were higher for younger residents, whites, and those with moderate impairment of cognitive function as contrasted with those with more severe impairment. There was no evidence of narrowing in the gap in antidepressant use for blacks, who had odds of .71 (CI .68 to .74) for treatment in 2007 versus .77 in 1999 (CI .73 to .82), since the confidence intervals overlapped slightly.

In all years, residents with comorbid depression and dementia were less likely to use antidepressants than other residents with depression, both in bivariate and multivariate analysis. In 1999, 69% of residents diagnosed with depression and dementia, versus 76% of those diagnosed with depression only, received antidepressants (OR .88, CI .85 to .91). In 2007, the rates were indistinguishable and the odds were not significantly different from

1999 (OR 0.93, CI .90 to 0.96). Finally, for-profit facilities and those with greater reliance on Medicaid funding were less likely to provide treatment to residents diagnosed with depression in both years, with similar effect sizes.

DISCUSSION

Our results indicate that both diagnosis of depression and use of antidepressants among those diagnosed increased at a rapid rate between 1999 and 2007. By 2007, a slight majority of residents were diagnosed with depression, among whom 82.8% were receiving antidepressants at the time of MDS assessment; the overall proportion of long-stay residents receiving antidepressants (regardless of diagnosis) increased to nearly 50% and antidepressant use among those without a depression diagnosis reached 14.6% (data not shown). Our estimated treated prevalence rate (43%) among long-stay residents is similar to the findings of a recent study using OSCAR data.[16] These findings confirm recent studies showing substantial gains in depression diagnosis and antidepressant use in nursing home residents,[2,8] perhaps because of the increased availability of potentially effective drugs and updated treatment guidelines.[6] Increasing admissions of individuals with depression also likely contributed to these increases,with nearly one third of long-stay residents reportedly entering NHs with a depression diagnosis.[27]

Nevertheless, members of some subgroups were still less likely to be diagnosed in 2007, including non-Hispanic blacks, residents aged 85 and older, and those with severe cognitive impairment. Among those diagnosed, non-Hispanic blacks, those with total ADL dependence, moderate to very severe cognitive impairment, and comorbid dementia were substantially less likely to receive antidepressants.

While residents with more medical comorbidities were more likely to be diagnosed, they were less likely to receive an antidepressant given a depression diagnosis. Residents with many comorbid conditions may be more likely to receive a depression diagnosis because of more frequent interaction with healthcare professionals, but increased awareness of potentially adverse effects with increased drug burden and antidepressants in particular in frail NH residents [14,15] may affect prescribing practices. Guidelines suggest pharmacological treatment of major depression for six months or longer, and augmentation with another agent for patients not responsive to the first or second medication.[6] Recommendations regarding maintenance therapy for those elders who have responded to antidepressant treatment vary with history of depressive episodes.[5] A survey of experts found no clear consensus about the most appropriate duration and continuation of maintenance antidepressants for older individuals who have had two episodes of depression, although 98% of experts recommended antidepressant treatment for longer than three years for elders with three or more episodes of depression.[5] Recent evidence indicates that two years of maintenance antidepressant therapy was associated with less risk of relapse for elders with one or more episodes, although those with the highest number and severity of concomitant medical illnesses received less preventive benefit.[28]

Our study was not able to assess adequacy of treatment or appropriateness of prescribing, since we lacked information on specific depression diagnoses, severity of depressive symptoms, specific antidepressant medications, dosing, or total drug burden. In one recent study, nearly one third of NH residents who were diagnosed with depression received a suboptimal drug choice or dose of antidepressants, perhaps suggesting the need for more geropsychiatric consultations.[3] In addition, it is unclear from our data whether antidepressant treatment has been clinically successful. The MDS indicators have poor sensitivity for identifying individuals with diagnosed depression[23] and preclude assessment of severity, so it is not possible to determine whether symptoms improve with use of

antidepressants. The MDS 3.0, scheduled for NH use in October 2010, includes a structured and validated depression interview, the 9-item Patient Health Questionnaire (PHQ-9), which will allow identification of changes in depression severity over time[29] and provide the basis for more complete assessment regarding the effect of antidepressant therapy on remission of depressive symptoms.

Our analyses indicate very little difference in recorded symptoms between those residents diagnosed with depression who use antidepressants compared to those who do not. Because of limitations with our data, it is difficult to draw clear conclusions. To meet DSM-IV criteria for major depressive disorder (MDD), older adults must exhibit depressed mood and/ or anhedonia, plus four or more additional symptoms for at least two weeks, and NH residents are more likely to complain of loss of interest or exhibit agitation rather than overt depressed mood.[13] However, there is controversy in the field of geriatric psychiatry over agreed-upon definitions of what constitutes clinically significant depression which warrants treatment.[30] Experts in late-life depression suggest a more inclusive approach and favor treatment in cases that are unclear, in light of the benefits of treatment and the general safety and efficacy of currently available pharmacotherapy.[13] In this light, the very high rates of antidepressant treatment identified could represent a beneficial trend toward increased recognition and treatment of previously undiagnosed depression, perhaps including mild depression, dysthymic disorder, and other manifestations that do not reach the traditional DSM-IV MDD criteria. However, our results also raise concerns that the pendulum may have swung away from under-diagnosis and reflect overtreatment or ineffective treatment of depression in NHs. Another study found that antidepressant use was reported prior to depression diagnosis for nearly half of those diagnosed after admission[27], perhaps because antidepressants may be prescribed for conditions other than depression[15] or depression diagnoses may not be recorded for reasons related to factors such as stigma or reimbursement. These results suggest that use of antidepressants has become very common in NHs, without clear evidence that depressive symptoms are improved by treatment or a complete understanding of the potential impact on risks for falls, fractures, or pneumonia in this very frail population.

CONCLUSION

This study demonstrates a striking increase in diagnosed depression and use of antidepressant medications in NHs. However, disparities in diagnosis and antidepressant use persist, without clear evidence about underlying mechanisms. The high rates of diagnosed depression and antidepressant use indicate improvements in recognition and treatment of depression in NHs, but also raise questions about the adequacy or appropriateness of antidepressant therapy for elderly residents in NHs where specialist care and psychological services are often lacking. Use of PHQ-9 in the MDS 3.0 may provide improved measurement of depressive symptoms; the addition of claims information to capture more precise information about antidepressant choice and dosing would also enhance our understanding of appropriate antidepressant prescribing in NHs.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Table 1

Resident and Facility Characteristics of Long-Stay Nursing Home Residents Associated with Diagnosed Depression

	1999			2003			2007		
	Percent Diagnosed with Depression	Logistic Regression on Diagnosed Depression		Percent Diagnosed with Depression	Logistic Regression on Diagnosed Depression		Percent Diagnosed with Depression	Logistic Regression on Diagnosed Depression	
		OR	95% CI		OR	95% CI		OR	95% CI
TOTAL	33.8	--	--	44.8	--	--	51.8	--	--
Resident Characteristics									
State of Residence									
California	27.1†	--	--	37.1†	--	--	42.6†	--	--
Florida	39.5	1.79*	1.73–1.86	50.8	1.66*	1.61–1.72	59.5	1.96*	1.90–2.02
Georgia	30.9	1.28*	1.22–1.34	46.2	1.58*	1.52–1.64	56.1	1.78*	1.71–1.85
Illinois	35.2	1.45*	1.39–1.50	43.0	1.23*	1.19–1.27	49.2	1.21*	1.17–1.25
New Jersey	26.7	0.99	0.95–1.03	37.0	1.02	0.99–1.06	46.1	1.18*	1.14–1.22
New York	26.9	1.01	0.97–1.05	38.9	1.11*	1.08–1.15	46.2	1.22*	1.18–1.26
Ohio	45.7	1.97*	1.91–2.04	56.7	1.85*	1.79–1.91	62.8	1.92*	1.85–1.98
Texas	34.6	1.49*	1.43–1.55	47.5	1.56*	1.51–1.62	53.5	1.53*	1.48–1.58
Gender									
Male	31.1†	--	--	41.4†	--	--	47.7†	--	--
Female	34.7	1.28*	1.25–1.30	45.9	1.27*	1.25–1.30	53.5	1.33*	1.30–1.35
Age									
65–74	32.6†	--	--	43.9†	--	--	51.3†	--	--
75–84	36.3	0.86*	0.84–0.88	47.2	0.86*	0.84–0.88	53.6	0.72*	0.71–0.74
85–94	37.0	0.68*	0.66–0.69	46.9	0.69*	0.67–0.71	54.8	0.58*	0.57–0.60
95 and over	25.1	0.46*	0.44–0.47	36.0	0.48*	0.47–0.50	43.3	0.42*	0.41–0.43

	1999			2003			2007		
	Percent Diagnosed with Depression	Logistic Regression on Diagnosed Depression		Percent Diagnosed with Depression	Logistic Regression on Diagnosed Depression		Percent Diagnosed with Depression	Logistic Regression on Diagnosed Depression	
		OR	95% CI		OR	95% CI		OR	95% CI
Race/Ethnicity									
White, non-Hispanic	36.0†	--	--	47.6†	--	--	55.1†	--	--
Black, non-Hispanic	20.5	0.46*	0.44–0.47	30.0	0.47*	0.46–0.48	39.4	0.50*	0.49–0.52
Hispanic	30.6	0.89*	0.86–0.93	42.4	0.89*	0.86–0.92	48.3	0.84*	0.82–0.86
Others	22.4	0.64*	0.60–0.69	29.9	0.57*	0.54–0.61	35.0	0.56*	0.53–0.59
Marital Status									
Never married	27.2†	--	--	36.6†	--	--	44.3†	--	--
Married	34.1	1.34*	1.29–1.38	45.5	1.35*	1.31–1.39	52.1	1.30*	1.27–1.34
Widowed/divorced/sep.	34.6	1.36*	1.32–1.40	45.7	1.37*	1.33–1.40	53.5	1.34*	1.31–1.37
# Of Medical									
None	26.6†	--	--	35.8†	--	--	44.0†	--	--
1–2	33.1	1.26*	1.23–1.29	43.6	1.28*	1.25–1.31	50.4	1.24*	1.21–1.27
3–4	39.5	1.53*	1.48–1.57	50.2	1.52*	1.48–1.57	55.8	1.46*	1.42–1.50
5 and above	46.7	1.86*	1.75–1.98	46.9	1.83*	1.74–1.93	61.1	1.70*	1.63–1.78
ADL self-performance									
Independent	33.2†	--	--	42.2†	--	--	48.1†	--	--
Limited	34.2	1.04	1.00–1.08	43.8	1.05*	1.02–1.09	49.7	1.04	1.00–1.08
Dependent	36.5	1.28*	1.23–1.32	48.2	1.31*	1.26–1.36	55.3	1.31*	1.27–1.36
Total dependence	26.3	1.14*	1.09–1.19	36.6	1.13*	1.09–1.18	42.9	1.13*	1.08–1.18
MDSDRS score									
<3	32.5†	--	--	43.9†	--	--	51.1†	--	--

	1999			2003			2007		
	Logistic Regression on Diagnosed Depression			Logistic Regression on Diagnosed Depression			Logistic Regression on Diagnosed Depression		
	Percent Diagnosed with Depression	OR	95% CI	Percent Diagnosed with Depression	OR	95% CI	Percent Diagnosed with Depression	OR	95% CI
>=3	51.3	1.81[*]	1.76–1.87	60.8	1.56[*]	1.51–1.62	66.3	1.44[*]	1.38–1.49
Cognitive performance									
Intact	35.3[†]	--	--	44.2[†]	--	--	49.7[†]	--	--
Moderate impairment	39.2	1.11[*]	1.08–1.14	50.2	1.21[*]	1.18–1.24	56.7	1.21[*]	1.18–1.24
Moderate-severe	23.6	0.86[*]	0.84–0.89	45.6	0.96[*]	0.94–0.99	53.0	0.98	0.96–1.01
Very severe impairment	35.3	0.52[*]	0.50–0.54	33.6	0.59[*]	0.57–0.62	40.0	0.58[*]	0.56–0.60
Presence of Dementia									
Yes	33.2[†]	1.11[*]	1.09–1.13	45.1[†]	1.16[*]	1.14–1.18	49.5[†]	1.35[*]	1.32–1.37
No	34.6	--	--	44.3	--	--	53.5	--	--
Has contact with relatives/close friends									
Yes	33.7[†]	--	--	44.7[†]	--	--	51.7[†]	--	--
No	37.1	1.13[*]	1.08–1.18	47.1	1.07	1.02–1.13	56.1	1.15[*]	1.09–1.22
Facility Characteristics[‡]									
% Residents with Medicaid as primary									
Lowest 75%	35.6[†]	--	--	46.7[†]	--	--	53.3[†]	--	--
Highest quartile	29.8	0.94[*]	0.92–0.96	38.6	0.89[*]	0.87–0.90	45.1	0.90[*]	0.89–0.92
Has Alzheimers care									
Yes	32.8[†]	0.91[*]	0.88–0.95	44.0[†]	0.93[*]	0.90–0.95	53.1[†]	0.97	0.95–1.00
No	33.9	--	--	44.9	--	--	51.7	--	--

Note: Based on residents aged 65 and older in nursing homes in 8 states, excluding those who were in the home for less than 3 months, comatose, had an active diagnosis of schizophrenia or bipolar disorder, or were living in a hospital-based nursing home.

*
Significant differences relative to the reference group (p<.05). The regression also includes an intercept term. All calculations are weighted to reflect clustering within facilities.

†
Denotes group differences significant at .05 level based on chi-square statistics.

‡
Facility characteristics with non-significant OR's or significant OR's between 0.95 and 1.05 are not shown. The following characteristics were significant within these limits: chain affiliation, number of beds, occupancy rate, rural location, and having mental health staff.

ADL = activity of daily living; CI = Confidence interval.

Table 2

Resident and Facility Characteristics of Long-Stay Nursing Home Residents Diagnosed with Depression and Receiving Antidepressant Therapy

	1999			2003			2007		
		Logistic Regression on Antidepressant Treatment			Logistic Regression on Antidepressant Treatment			Logistic Regression on Antidepressant Treatment	
	Percent Treated	OR	95% CI	Percent Treated	OR	95% CI	Percent Treated	OR	95% CI
TOTAL	71.3	--	--	79.4	--	--	82.8	--	--
Resident Characteristics									
State of Residence									
California	71.7†	--	--	80.6†	--	--	81.9†	--	--
Florida	71.0	0.97	0.91–1.03	82.0	1.01	0.95–1.08	85.5	1.26*	1.19–1.33
Georgia	73.6	1.18*	1.09–1.28	79.5	0.94	0.87–1.01	83.1	1.16*	1.08–1.24
Illinois	68.0	0.77*	0.72–0.82	76.3	0.65*	0.61–0.69	81.9	0.90*	0.84–0.96
New Jersey	66.0	0.74*	0.69–0.80	77.5	0.77*	0.72–0.83	79.7	0.84*	0.78–0.90
New York	73.9	1.07	1.00–1.14	80.1	0.92	0.89–1.02	82.4	1.00	0.94–1.06
Ohio	73.2	1.05	0.99–1.12	79.7	0.85*	0.80–0.91	82.2	0.93*	0.88–0.99
Texas	70.4	0.95	0.89–1.02	79.5	0.88*	0.82–0.93	83.2	1.06	1.00–1.12
Gender									
Male	72.5†	--	--	80.2†	--	--	82.7	--	--
Female	70.1	1.02	0.99–1.06	79.4	1.04*	1.01–1.08	82.8	1.10*	1.06–1.13
Age									
65–74	69.8†	--	--	79.2†	--	--	82.6†	--	--
75–84	72.9	0.94*	0.89–0.98	80.3	0.95*	0.91–0.99	83.5	0.93*	0.89–0.97
85–94	74.6	0.81*	0.77–0.85	81.1	0.89*	0.85–0.93	83.9	0.82*	0.79–0.85
95 and over	64.6	0.64*	0.60–0.69	75.0	0.71*	0.67–0.76	78.3	0.65*	0.61–0.69
Race/Ethnicity									
White, non-Hispanic	71.7†	--	--	80.1†	--	--	83.5†	--	--

| | 1999 | | | 2003 | | | 2007 | | |
| | Percent Treated | Logistic Regression on Antidepressant Treatment | | Percent Treated | Logistic Regression on Antidepressant Treatment | | Percent Treated | Logistic Regression on Antidepressant Treatment | |
		OR	95% CI		OR	95% CI		OR	95% CI
Black, non-Hispanic	65.6	0.77*	0.73–0.82	73.3	0.76*	0.72–0.80	77.8	0.71*	0.68–0.74
Hispanic	69.5	0.98	0.91–1.06	78.5	0.95	0.89–1.01	82.6	0.97	0.91–1.02
Others	70.7	0.91	0.79–1.04	75.1	0.75*	0.67–0.84	79.1	0.80*	0.72–0.88
Marital Status									
Never married	69.1†	--	--	77.3†	--	--	81.7†	--	--
Married	72.9	1.29*	1.22–1.38	80.7	1.29*	1.22–1.36	83.5	1.21*	1.15–1.27
Widowed/divorced/sep.	72.0	1.18*	1.12–1.24	80.0	1.18*	1.13–1.24	82.8	1.12*	1.07–1.17
# Of Medical									
None	70.4†	--	--	78.2†	--	--	81.7†	--	--
1–2	72.1	0.99	0.94–1.02	80.1	1.06*	1.01–1.11	83.1	1.05	1.00–1.10
3–4	73.1	0.97	0.92–1.02	80.5	1.01	0.96–1.06	82.8	0.97	0.92–1.02
5 and above	72.5	0.86*	0.78–0.96	78.9	0.85*	0.78–0.93	81.2	0.84*	0.78–0.91
ADL self-performance									
Independent	76.6†	--	--	84.0†	--	--	85.4†	--	--
Limited	77.0	1.08*	1.01–1.16	84.0	1.05	0.98–1.13	86.1	1.06	0.98–1.14
Dependent	74.0	1.03	0.97–1.10	81.8	1.02	0.95–1.09	82.1	1.06	0.98–1.14
Total dependence	56.7	0.67*	0.62–0.72	66.1	0.63*	0.59–0.69	68.9	0.66*	0.61–0.72
MDSDRS score									
<3	72.0†	--	--	79.9†	--	--	82.8	--	--
>=3	74.2	1.07*	1.02–1.12	80.6	1.00	0.94–1.06	82.6	0.97	0.91–1.03
Cognitive performance									
Intact	78.1†	--	--	84.8†	--	--	85.6†	--	--
Moderate impairment	77.5	1.01	0.97–1.06	80.1	1.04	0.99–1.09	86.1	1.09*	1.04–1.14

| | 1999 | | | 2003 | | | 2007 | | |
| | Logistic Regression on Antidepressant Treatment | | | Logistic Regression on Antidepressant Treatment | | | Logistic Regression on Antidepressant Treatment | | |
	Percent Treated	OR	95% CI	Percent Treated	OR	95% CI	Percent Treated	OR	95% CI
Moderate-severe	70.9	0.82*	0.78–0.86	80.5	0.81*	0.77–0.85	82.1	0.87*	0.83–0.92
Very severe impairment	53.9	0.48*	0.45–0.51	78.9	0.48*	0.45–0.52	68.9	0.51*	0.48–0.55
Presence of Dementia									
Yes	69.0[†]	0.88*	0.85–0.91	78.1[†]	0.93*	0.90–0.96	81.3	0.93*	0.90–0.96
No	76.0	--	--	82.7	--	--	84.7	--	--
Has contact with relatives/close friends									
Yes	72.2	--	--	80.0	--	--	82.7	--	--
No	72.4	0.98	0.91–1.06	78.9	0.99	0.90–1.08	83.4	1.07	0.97–1.18
Facility Characteristics									
Type of ownership									
For-profit	71.8[†]	--	--	79.6[†]	--	--	82.4[†]	--	--
Non-profit	72.5	1.09*	1.05–1.13	80.3	1.07*	1.03–1.10	83.9	1.12*	1.08–1.15
Government	72.5	1.13*	1.05–1.22	79.6	1.09*	1.02–0.17	82.6	1.07	1.00–1.14
% Residents with Medicaid as primary									
Lowest 75%	71.9[†]	--	--	80.3[†]	--	--	83.2[†]	--	--
Highest quartile	69.5	0.91*	0.87–0.94	76.5	0.84*	0.81–0.87	80.6	0.90*	0.87–0.93

Note: Based on residents aged 65 and older in nursing homes in 8 states, excluding those who were in the home for less than 3 months, comatose, had an active diagnosis of schizophrenia or bipolar disorder, or were living in a hospital-based nursing home.

*
Significant differences relative to the reference group (p<.05). The regression also includes an intercept term. All calculations are weighted to reflect clustering within facilities.

[†]
Denotes group differences significant at .05 level based on chi-square statistics.

[‡]
Facility characteristics with non-significant OR's or significant OR's between 0.95 and 1.05 are not shown. The following characteristics were significant within these limits: Chain affiliation, having an Alzheimers care unit, having mental health staff and having more than 8 deficiencies.

ADL = activity of daily living; CI = Confidence interval.