Published in final edited form as:

Am J Geriatr Psychiatry. 2010 December ; 18(12): 1078–1092. doi:10.1097/JGP.0b013e3181d6c0c6.

Antipsychotic and Benzodiazepine Use Among Nursing Home Residents: Findings From the 2004 National Nursing Home Survey

David G. Stevenson, Ph.D., Sandra L. Decker, Ph.D., Lisa L. Dwyer, M.P.H., Haiden A. Huskamp, Ph.D., David C. Grabowski, Ph.D., Eran D. Metzger, M.D., and Susan L. Mitchell, M.D., M.P.H.

Department of Health Care Policy, Harvard Medical School, Boston, MA (DGS, HAH, DCG); Division of Health Care Statistics, National Center for Health Statistics, Hyattsville, MD (SLD, LLD); Hebrew SeniorLife, Institute for Aging Research (EDM, SLM); Departments of Psychiatry (EDM), and Medicine (SLM), Beth Israel Deaconess Medical Center, Boston, MA

Abstract

Objectives—To document the extent and appropriateness of use of antipsychotics and benzodiazepines among nursing home residents using a nationally representative survey.

Methods—Cross-sectional analysis of the 2004 National Nursing Home Survey. Bivariate and multivariate analyses examined relationships between resident and facility characteristics and antipsychotic and benzodiazepine use by appropriateness classification among residents aged 60 years and older (N = 12,090). Resident diagnoses and information about behavioral problems were used to categorize antipsychotic and benzodiazepine use as appropriate, potentially appropriate, or having no appropriate indication.

Results—More than one quarter (26%) of nursing home residents used an antipsychotic medication, 40% of whom had no appropriate indication for such use. Among the 13% of residents who took benzodiazepines, 42% had no appropriate indication. In adjusted analyses, the odds of residents taking an antipsychotic without an appropriate indication were highest for residents with diagnoses of depression (odds ratio [OR] = 1.31; 95% confidence interval [CI]: 1.12–1.53), dementia (OR = 1.82; 95% CI: 1.52–2.18), and with behavioral symptoms (OR = 1.97, 95% CI: 1.56–2.50). The odds of potentially inappropriate antipsychotic use increased as the percentage of Medicaid residents in a facility increased (OR = 1.08, 95% CI: 1.02–1.15) and decreased as the percentage of Medicare residents increased (OR = 0.46, 95% CI: 0.25–0.83). The odds of taking a benzodiazepine without an appropriate indication were highest among residents who were female (OR = 1.44; 95% CI: 1.18–1.75), white (OR = 1.95; 95% CI: 1.47–2.60), and had behavioral symptoms (OR = 1.69; 95% CI: 1.41–2.01).

Conclusion—Antipsychotics and benzodiazepines seem to be commonly prescribed to residents lacking an appropriate indication for their use.

Keywords

Nursing homes; antipsychotics; benzodiazepines

Prescription drug use among nursing home residents has been an ongoing concern for policymakers, providers, and advocates for decades. Nursing home residents—who often suffer from multiple chronic conditions and have cognitive impairments—typically take 6–10 different daily medications.^{1–3} Historically, providers have struggled to balance the need to treat residents' chronic conditions with the known risks of polypharmacy and adverse drug effects.^{4–6} Substantial challenges remain, especially related to appropriate use of psychotropic medications in the long-term care setting.^{7,8} As such, improving prescription practices has been a major focus of previous nursing home reforms, such as the Omnibus Budget Reconciliation Acts of 1987 and 1990, and the issuance by the Centers for Medicare and Medicaid Services (CMS) of revised guidelines for surveyor use in assessing nursing home prescribing practices.^{7,9}

Two drug classes that have raised particular concerns about their potential misuse are antipsychotics and benzodiazepines, which can have especially harmful effects for frail elderly patients.^{10,11} Antipsychotics are indicated to treat schizophrenia and other psychotic disorders, but nursing homes have been criticized previously for using them as chemical restraints to treat behavior problems.^{12,13} Similarly, benzodiazepines, which can be effective in treating anxiety disorders and insomnia in the elderly, may be used inappropriately to treat nursing home residents with depression or mild behavior problems.¹⁴ Although these medications are effective when used appropriately, prior research demonstrates substantial misuse of these drugs in nursing homes and the potential for serious side effects (e.g., sedation, falls, delirium, and even death) in frail older residents who commonly have cognitive impairment and substantial comorbidity.^{15–24} Previous reforms have focused on reducing unnecessary use of these medications and have required that providers first attempt non-pharmacologic approaches to reduce residents' emotional distress and behavior issues before prescribing psychotropic drugs.²⁵

Using data from the 2004 National Nursing Home Survey (NNHS), we document antipsychotic and benzodiazepine use among nursing home residents, assess the extent to which use seems appropriate, and identify facility and resident characteristics associated with the use of these therapeutic classes. Our work builds on previous research that has examined the use of psychotropic drugs among nursing home residents^{7,14,26–28} and includes benzodiazepines, which have been relatively understudied, when compared with antipsychotics. Furthermore, we include many resident and facility traits not previously examined and use a large nationally representative dataset of U.S. facilities and their residents.

METHODS

Data Source and Study Population

All resident- and facility-level data were obtained from the 2004 NNHS. The NNHS used a stratified two-stage probability sample design to collect detailed, nationally representative facility and resident-level information. The final sample consisted of data on 1,174 facilities and up to 12 current residents from each facility collected between August 2004 and January 2005. Our study merged data from the prescribed medications (PM) data file with other resident and facility information. The PM data file includes codes for medications the resident took on the day before the facility interview and medications taken regularly but not on the day before the facility interview (e.g., weekly bisphosphonates and monthly B-12 supplements). Emergency or urgent use of medications would not be captured unless it occurred on the day before the interview; in these cases, urgent use is not distinguished from ongoing/regular use. Up to 25 medications were entered for each category. Field interviewers obtained information from residents' medical/administrative records through a

designated staff member at each sampled facility. Information was not collected on dosage, strength, or frequency of medications.

Of the 13,507 residents in the 2004 NNHS, we first limited the sample to 12,454 residents aged 60 years and older. After excluding 364 residents (<3%) due to missing information on survey variables pertinent to the analyses, our final analytic sample was 12,090 residents.

Use and Appropriateness of Use of Antipsychotics and Benzodiazepines

Each resident was coded as taking an antipsychotic or benzodiazepine if any drug from these classes was found in his or her record in the PM data file. Drugs included in these medication classes were based on information obtained from Epocrates Online (<https://online.epocrates.com>), a free online database that includes therapeutic class information for the U.S. Food and Drug Administration-approved drugs (see Appendix A for a list of medications, by class).

Appropriateness of antipsychotic and benzodiazepine use was based on resident diagnoses. Each resident record included the primary diagnosis at the time of admission, the current primary diagnosis, and up to 15 current secondary diagnoses. Diagnoses were classified according to the International Classification of Diseases-9th Revision-Clinical Modification.

All documented resident diagnoses were considered in categorizing antipsychotic or benzodiazepine use as having an appropriate, potentially appropriate, or no appropriate indication. These categorizations were determined a priori based primarily on CMS survey and certification protocols and interpretive guidelines for defining unnecessary drug use in nursing homes²⁹ and on published literature on clinical guidelines for use of these drugs.^{7,19,20,22} With the exception of coding antipsychotic and benzodiazepine use as “potentially appropriate” for severe agitation/combateness in dementia without psychotic symptoms, we did not consider any potential off-label uses in our appropriateness coding. One geriatric psychiatrist (E.M.) and one geriatrician (S.L.M.) assigned appropriateness categories based on these guidelines.

The appropriateness of medication use was grouped as follows: “appropriate” if the resident had any appropriate diagnosis; “potentially appropriate” if the resident had a potentially appropriate diagnosis, and “not appropriate” if the resident lacked either an appropriate or potentially appropriate diagnosis.

Diagnoses coded as appropriate for antipsychotic use included psychotic disorder, schizophrenia, delusional disorder, bipolar disorder, schizoaffective disorder, and a range of mood disorders including those accompanied by psychotic features (Appendix B). Diagnoses coded as potentially appropriate for antipsychotic use included mental retardation, disruptive disorder, and personality disorder. Diagnoses of dementia (294.8) and Alzheimer disease (331.0) were coded as potentially appropriate only if residents also displayed behavioral symptoms (documented by a “yes” response to the following question: “Does [RESIDENT] display any behavioral symptoms, such as wandering, verbally abusive language, physically abusive actions, socially inappropriate or disruptive symptoms, or resisting care?”); otherwise, residents with these diagnoses were considered to have no appropriate indication. Diagnoses coded as appropriate for benzodiazepine use included anxiety disorder, insomnia, obsessive compulsive disorder, and panic disorder (Appendix C). A diagnosis of bipolar disorder was coded as appropriate if the benzodiazepine used was clonazepam.³⁰ Diagnoses coded as potentially appropriate for benzodiazepine use were alcohol dependence, disruptive behavior disorder, and unspecified nonpsychotic mental disorder.

Resident- and Facility-Level Variables

The resident and facility characteristics selected as independent variables were guided by previous literature on appropriate prescribing and on nursing home quality of care (Briesacher et al.⁷ and Mor et al.³¹). Resident characteristics included demographic factors, length of stay since admission, health status measures, and payment source. The demographic variables were gender, race (white and non-white), age, and marital status at time of admission (married and not married). The health status variables were functional disability, diagnoses of dementia and depression, any falls or fractures in the previous 6 months, any hospital admission or emergency department (ED) visit in the previous 90 days, and whether or not the resident had behavior problems based on the aforementioned NNHS question. Functional disability was quantified on a 0–5 scale based on the number of activities of daily living (i.e., transferring, eating, dressing, toileting, and bathing) for which residents needed assistance.

The NNHS asked about all payment sources for each resident's current admission for the prior month or billing period. For this study, we created a set of mutually exclusive categories (Medicaid, Medicare, out-of-pocket/private insurance, and unknown) approximating the primary source of payment. The Medicaid category includes 6,961 residents from the sample, including a small number (145) with other government sources of payment (e.g., Veterans Affairs). The Medicare category includes 1,116 residents from the sample, including 117 residents for whom Medicaid payment is also reported and whose length of stay is less than or equal to 100 days. For these residents, Medicaid likely financed the copay that is required for Days 21–100 of the Medicare skilled nursing facility benefit.³² The out-of-pocket/private insurance category includes 2,557 residents who report no government sources of payment, 2,380 of whom report out-of-pocket payments, and the rest of whom report private insurance or other insurance. The unknown category includes 1,456 residents who report no Medicaid, Medicare, Veterans Affairs, welfare, private insurance, other insurance, or out-of-pocket payments.

Facility characteristics selected as independent variables were chain status, ownership status (for profit, nonprofit, and government), number of beds, registered nurse and certified nursing assistant full-time equivalents per resident, the percent of residents with Medicaid as the primary payment source, the percent of residents with Medicare as the primary payment source, Census region (Northwest, Midwest, South, or West), and facility location by metropolitan area status (i.e., a geographic area that included an urban core with more than 50,000 individuals³³).

Statistical Analyses

We first summarized the use of antipsychotics and benzodiazepines in U.S. nursing homes by appropriateness category. We then performed bivariate and multivariate analyses to examine the relationship between the use of antipsychotics and benzodiazepines and resident and facility traits of interest. Our bivariate analyses of each drug class were stratified by residents' appropriateness status and tested for differences in use across facility and resident characteristics using Wald χ^2 tests. (For example, among individuals without an appropriate indication for antipsychotic use, we test to see whether antipsychotic use differed across the 60–79, 80–89, and 90+ age groups.) Our primary rationale in examining use within each appropriateness category is that most resident and facility traits would not be expected to have an association with indications for appropriateness (outside of a few variables the clinicians used in coding appropriateness, such as dementia); our approach, thus, isolates differences in use within each category. Moreover, given the goal to encourage non-pharmacologic interventions to the extent possible, examining use across all appropriateness categories offers greater insights relative to a narrower analytic approach (e.g., use among

only those without an appropriate indication). Continuous resident and facility variables (e.g., resident age and facility staffing levels) were analyzed categorically with the sample divided roughly into tertiles. Residents in the appropriate and potentially appropriate categories were combined for analyses of benzodiazepine use because of few residents (about 4% of the sample) in the potentially appropriate category. Multivariate logit models were used to analyze resident and facility characteristics associated with antipsychotic and benzodiazepine use. Although there are circumstances where antipsychotics and benzodiazepines are appropriate and warranted clinically, our multivariate analysis followed previous literature and focused on whether residents with no appropriate indication for use took antipsychotics or benzodiazepines.^{7,25} Multivariate models included all resident and facility traits examined in bivariate analyses except for three resident-outcome variables (i.e., ED use and hospitalization within the past 90 days and falls or fractures within the past 6 months) that were considered endogenous to the outcome of interest. Some independent variables that were considered categorically for bivariate analyses, including resident age and several facility characteristics, were analyzed linearly in the logit analyses. All analyses used sample weights and accounted for the possibility of nonindependence of observations within NNHS sampling units, by using a Taylor series linearization method for variance estimation and STATA Version 10.^{34–36}

RESULTS

Of the 12,090 residents in our analytic sample, 26% used an antipsychotic medication of whom 35% had an appropriate indication for use, 26% had a potentially appropriate indication, and 40% lacked either of the two (Table 1). Of the 12,090 residents in the sample, 70% had no appropriate diagnostic indication, of whom 15% were taking antipsychotic medications.

Approximately 13% of residents took benzodiazepines; 58% of them had either an appropriate or potentially appropriate indication for use, and 42% lacked an appropriate or potentially appropriate indication. Approximately 82% of residents had no appropriate indication for benzodiazepine use, of whom 9% took benzodiazepines.

Table 2 presents results of bivariate analyses examining the association between resident and facility characteristics and the use of antipsychotics by appropriateness classification. *p* values reflect the statistical significance of the association between resident and facility traits and use within an appropriateness category. Having any behavioral symptoms was a resident characteristic that was significantly associated ($p < 0.05$) with antipsychotic use across appropriateness categories. Importantly, however, the impact of behavioral symptoms on use seems to differ across appropriateness categories. In particular, use for individuals who have a potentially appropriate indication is more than twice as high among individuals with behavioral symptoms relative to those without (41.3% versus 19.3%). Several resident characteristics were significantly associated with antipsychotic use only among residents who had no indication of appropriateness. These included resident payer source, having a diagnosis of dementia, having a diagnosis of depression (without psychotic features), having an ED visit within the last 90 days, and having a fall/fracture in the last 6 months. Relative to resident characteristics, fewer facility characteristics were significantly associated with antipsychotic use. Facility factors significantly associated with antipsychotic use without an appropriate indication included facility share of Medicaid residents, region, and being located in a metropolitan area.

Table 3 presents results of bivariate analyses examining the association between resident and facility characteristics and the use of benzodiazepines by appropriateness status. Resident characteristics significantly associated with benzodiazepine use across

appropriateness classifications included white race, younger age, and shorter length of stay. Additional resident characteristics significantly associated with benzodiazepine use among those without an appropriate indication include having behavioral symptoms and having a fall/fracture in the last 6 months. Among facility traits, region was significantly associated with benzodiazepine use without an appropriate indication. Significant differences were also seen across facility Medicare share, though these differences were not monotonic in direction.

Table 4 presents adjusted odds ratios and Wald χ^2 statistics from the multivariate analyses examining predictors of antipsychotic and benzodiazepine use among residents lacking an appropriate or potentially appropriate indication. Resident traits predictive of higher odds of antipsychotic use among individuals without an appropriate indication included younger age, having a diagnosis of depression or dementia, and having behavioral symptoms. Facility traits predictive of greater odds of antipsychotic use among individuals who had no appropriate indication included greater facility share of Medicaid residents, lower facility share of Medicare residents, and being located in the Northeast (relative to the West or Midwest) and in a metropolitan area.

Resident traits predictive of higher odds of benzodiazepine use among individuals with no appropriate indication included being female, white, younger, and having behavioral symptoms. Facility location in the South (relative to the Northeast) was also associated with greater odds of benzodiazepine use among individuals with no appropriate indication.

DISCUSSION

Using a nationally representative sample of U.S. nursing homes and residents, our results document the prevalence and appropriateness of antipsychotic and benzodiazepine use among nursing home residents. More than one quarter of all nursing home residents received an antipsychotic medication in 2004; nearly 40% had no appropriate indication for such use. A smaller percentage of residents in our sample took benzodiazepines (13%); a similar portion (42%) did not seem to have an appropriate indication for such use. Our results demonstrate that antipsychotics and benzodiazepines are commonly used in nursing homes and seem to be frequently prescribed to residents who lack an appropriate diagnosis to substantiate their use.

Based on our findings, receipt of these drug classes without an appropriate indication for use is significantly more likely for residents with two characteristics—younger age and any behavioral symptoms. In fact, the results from our logistic regression model show that among those with no appropriate indication for use, having any behavioral symptom nearly doubles the odds of antipsychotic use and increases the odds of benzodiazepine use by almost 70%. Our results also show that having dementia and depression raise the odds of antipsychotic use without an appropriate indication by 80% and >30%, respectively, though these characteristics are not significantly associated with the odds of benzodiazepine use without an appropriate indication. The odds of benzodiazepine use without an appropriate indication are significantly increased among female residents and white residents, though this pattern is not found for antipsychotic use. The reasons for these patterns are unclear and merit further research.

In addition to resident characteristics, our analysis examined the association between facility characteristics and receipt of psychotropic drugs. Based on previous work related to nursing home quality of care and to nursing home prescribing in particular,^{7,26,28,37} our hypotheses were that larger, for profit, lower staffed, more Medicaid-dependent facilities would have higher levels of psychotropic use of questionable appropriateness. However, we found that

only a greater facility share of Medicaid residents was associated with greater odds of antipsychotic use among those without any indication for appropriate use. Being located in a metropolitan area was also associated with greater use of antipsychotics without an appropriate indication but not benzodiazepines.

This study has limitations worthy of comment. First, our analysis is based on cross-sectional data, making it difficult to draw any causal inferences. For instance, it is difficult to discern any causality concerning the associations between potentially inappropriate prescribing and adverse outcomes, such as ED visits, hospitalizations, or falls/fractures. Second, medication information in the 2004 NNHS is limited to medication names; the data do not include information about dosing, duration of use (including whether use was regular or emergent), or other medications tried previously (i.e., we are unable to determine compliance with dosing standards, overall duration of use, or previous receipt of other agents among current users). Third, by basing appropriateness coding on documented diagnoses and behavioral symptoms, it is possible that our analytic approach missed potential indications for use that were not documented in the survey data (e.g., CMS guidelines allow for exceptions to survey standards if medical necessity is established) or oversimplified clinical decisions for which there is no clear gold standard. Thus, we categorize some residents as having no appropriate recorded indication for antipsychotic or benzodiazepine use based on the published literature and standard clinical guidelines but cannot necessarily conclude that use is inappropriate. Finally, although based on a large, nationally representative sample, 2004 NNHS data are now 5 years old and may not reflect more recent initiatives and research findings related to use of these drugs in the nursing home.

Several policy and practice changes have occurred since the 2004 NNHS data were collected that could impact utilization of antipsychotics and benzodiazepines. In April 2005, the U.S. Food and Drug Administration issued a “black-box warning” of increased mortality risk in elderly patients with dementia-related psychosis who are treated with atypical antipsychotics. This warning may well provide further impetus for clinicians to seek alternative treatments for patients who received these medications without appropriate indications, especially when accompanied by effective medication review and educational interventions.³⁸

A related development subsequent to the 2004 NNHS is the publication of results from the Clinical Antipsychotic Trials of Intervention Effectiveness—Alzheimer’s Disease study, the impact of which is more difficult to predict. A 2006 report of Phase 1 results showed no difference between medication and placebo in the primary outcome measure (i.e., time to discontinuation of the medication), challenging the effectiveness of these medications when used for psychosis, aggression, or agitation.³⁹ However, a subsequent 2008 report from the study did show improvement in some of the clinical outcome measures for some of the antipsychotic medications studied.⁴⁰

Another development is CMS’s December 2006 revision to survey guidance for Pharmacy Services and Unnecessary Medications regulations for Medicare- and Medicaid-certified nursing homes. These guidelines require facilities to attempt gradual dose reduction for “psychopharmacological” medications—including antipsychotics and benzodiazepines—unless these changes are documented to be clinically contraindicated. More broadly, revised guidelines signal renewed scrutiny of psychotropic drug use in nursing homes and, if effective, could lessen inappropriate use of psychotropic drugs.

Finally, the Medicare Part D drug benefit fundamentally altered the nursing home pharmacy market in 2006. The most significant changes concerning nursing homes centered on residents dually eligible for Medicare and Medicaid; the new benefit shifts their drug

coverage from Medicaid to Medicare and requires that they enroll in private prescription drug plans. The new benefit treats antipsychotics and benzodiazepines quite differently. Benzodiazepines were explicitly excluded from coverage under Part D guidelines. Although recent federal legislation requires that benzodiazepines be covered beginning January 2013, the initial exclusion of these drugs could reduce their utilization. In contrast, antipsychotics have been a “protected class” under Part D, requiring that plans cover all or substantially all medications in this class, and thus, antipsychotic use may be less impacted than benzodiazepines by Part D. However, it should be noted that several factors make the impact of Part D on use unclear for both classes, including the impact of utilization management strategies for antipsychotics by private plans, the provision of wrap-around coverage for benzodiazepines by states, and the requirement that nursing homes provide all needed services (including medications listed in residents’ care plans) regardless of financial coverage.

In the context of our findings and the policy changes in the nursing home pharmacy environment that have occurred subsequently, it is important that psychotropic prescribing in nursing homes be monitored closely, especially as our population ages and the number of nursing home residents with dementia and behavioral symptoms increases. Whether the shift of drug coverage for dually eligible nursing home residents from Medicaid to Medicare, along with the increased scrutiny of psychotropic drug use by the frail elderly more generally, will reduce the receipt of these medications by individuals without appropriate indications is unclear. Importantly, the addition of the PM module to NNHS in 2004 will allow these prescribing patterns to be tracked with subsequent survey waves, thus providing a useful barometer of change.

Acknowledgments

This work was supported in part by a pilot grant from the National Institute on Drug Abuse (NIDA), grant number P50 DA010233. The findings and conclusions in this paper are those of the authors and do not necessarily represent the views of the National Center for Health Statistics.

References

1. Avorn J, Gurwitz JH. Drug use in the nursing home. *Ann Intern Med* 1995;123:195–204. [PubMed: 7598302]
2. The Lewin Group. Review of Current Standards of Practice for Long-Term Care Pharmacy Services: Long-Term Care Pharmacy Primer. Baltimore: US Centers for Medicare and Medicaid Services; 2004.
3. Stuart B, Simoni-Wastila L, Baysac F, et al. Coverage and use of prescription drugs in nursing homes: implications for the medicare modernization act. *Med Care* 2006;44:243–249. [PubMed: 16501395]
4. Institute of Medicine (U.S.). Committee on Nursing Home Regulation: Improving the Quality of Care in Nursing Homes. Washington, DC: National Academy Press; 1986.
5. Gurwitz JH, Field TS, Avorn J, et al. Incidence and preventability of adverse drug events in nursing homes. *Am J Med* 2000;109:87–94. [PubMed: 10967148]
6. U.S. Office of the Inspector General. Prescription Drug Use in Nursing Homes. Washington, DC: U.S. Department of Health and Human Services; 1997.
7. Briesacher BA, Limcangco MR, Simoni-Wastila L, et al. The quality of antipsychotic drug prescribing in nursing homes. *Arch Intern Med* 2005;165:1280–1285. [PubMed: 15956008]
8. Gurwitz JH, Field TS, Judge J, et al. The incidence of adverse drug events in two large academic long-term care facilities. *Am J Med* 2005;118:251–258. [PubMed: 15745723]
9. Mendelson, D.; Rajeev, R.; Abramson, R., et al. Prescription Drugs in Nursing Homes: Managing Costs in a Complex Environment. Washington, DC: George Washington University; 2002.

10. Kuehn BM. FDA: antipsychotics risky for elderly. *JAMA* 2008;300:379–380. [PubMed: 18647971]
11. Wang PS, Bohn RL, Glynn RJ, et al. Hazardous benzodiazepine regimens in the elderly: effects of half-life, dosage, and duration on risk of hip fracture. *Am J Psychiatry* 2001;158:892–898. [PubMed: 11384896]
12. Passmore MJ, Gardner DM, Polak Y, et al. Alternatives to atypical antipsychotics for the management of dementia-related agitation. *Drugs Aging* 2008;25:381–398. [PubMed: 18447403]
13. Mantone, J. Antipsychotic drugs abused as chemical restraints for elderly, [Electronic version]. *Wall Street Journal Health Blog*. [Accessed March 6, 2009]. Available at: <http://blogs.wsj.com/health/2007/12/04/antipsychotic-drugs-abused-as-chemical-restraints-for-elderly/>
14. Svarstad BL, Mount JK. Effects of residents' depression, sleep, and demand for medication on benzodiazepine use in nursing homes. *Psychiatr Serv* 2002;53:1159–1165. [PubMed: 12221316]
15. Simoni-Wastila L, Ryder PT, Qian J, et al. Association of antipsychotic use with hospital events and mortality among medicare beneficiaries residing in long-term care facilities. *Am J Geriatr Psychiatry* 2009;17:417–427. [PubMed: 19390299]
16. Rochon PA, Normand SL, Gomes T, et al. Antipsychotic therapy and short-term serious events in older adults with dementia. *Arch Intern Med* 2008;168:1090–1096. [PubMed: 18504337]
17. Buffett-Jerrott SE, Stewart SH. Cognitive and sedative effects of benzodiazepine use. *Curr Pharm Des* 2002;8:45–58. [PubMed: 11812249]
18. Ray WA, Thapa PB, Gideon P. Benzodiazepines and the risk of falling in nursing home residents. *J Am Geriatr Soc* 2000;48:682–685. [PubMed: 10855607]
19. Fick DM, Cooper JW, Wade WE, et al. Updating the Beers criteria for potentially inappropriate medication use in older adults: results of a US consensus panel of experts. *Arch Intern Med* 2003;163:2716–2724. [PubMed: 14662625]
20. Alexopoulos GS, Streim J, Carpenter D, et al. Using antipsychotic agents in older patients. *J Clin Psychiatry* 2004;65(suppl 2):5–99. discussion 100–102; quiz 103–104. [PubMed: 14994733]
21. Longo LP, Johnson B. Addiction: part I. Benzodiazepines—side effects, abuse risk and alternatives. *Am Fam Physician* 2000;61:2121–2128. [PubMed: 10779253]
22. Gill SS, Bronskill SE, Normand SL, et al. Antipsychotic drug use and mortality in older adults with dementia. *Ann Intern Med* 2007;146:775–786. [PubMed: 17548409]
23. Wu CS, Wang SC, Chang IS, et al. The association between dementia and long-term use of benzodiazepine in the elderly: nested case-control study using claims data. *Am J Geriatr Psychiatry* 2009;17:614–620. [PubMed: 19546656]
24. Chang CM, Wu EC, Chang IS, et al. Benzodiazepine and risk of hip fractures in older people: a nested case-control study in Taiwan. *Am J Geriatr Psychiatry* 2008;16:686–692. [PubMed: 18669947]
25. Gurvich T, Cunningham JA. Appropriate use of psychotropic drugs in nursing homes. *Am Fam Physician* 2000;61:1437–1446. [PubMed: 10735348]
26. Hughes CM, Lapane KL, Mor V. Influence of facility characteristics on use of antipsychotic medications in nursing homes. *Med Care* 2000;38:1164–1173. [PubMed: 11186295]
27. Liperoti R, Mor V, Lapane KL, et al. The use of atypical antipsychotics in nursing homes. *J Clin Psychiatry* 2003;64:1106–1112. [PubMed: 14628988]
28. Svarstad BL, Mount JK. Chronic benzodiazepine use in nursing homes: effects of federal guidelines, resident mix, and nurse staffing. *J Am Geriatr Soc* 2001;49:1673–1678. [PubMed: 11844002]
29. U.S. Centers for Medicare and Medicaid Services. State Operations Manual, Appendix pp—Guidance to Surveyors for Long Term Care Facilities. [Assessed March 1, 2009]. Available at: http://cms.hhs.gov/manuals/Downloads/som107ap_pp_guidelines_ltf.pdf
30. Curtin F, Schulz P. Clonazepam and lorazepam in acute mania: a Bayesian meta-analysis. *J Affect Disord* 2004;78:201–208. [PubMed: 15013244]
31. Mor V, Berg K, Angelelli J, et al. The quality of quality measurement in U.S. nursing homes. *Gerontologist* 2003;43(Spec No 2):37–46. [PubMed: 12711723]

32. U.S. Centers for Medicare and Medicaid Services. Medicare Coverage of Skilled Nursing Facility Care. [Accessed December 15, 2008]. Available at: <http://www.medicare.gov/publications/pubs/pdf/10153.pdf>
33. US Census. Metropolitan and Micropolitan Statistical Areas. Washington, DC: US Census; 2008.
34. Levy, PS.; Lemeshow, S. Sampling of Populations. New York: Wiley; 1999.
35. Williams RL. A note on robust variance estimation for cluster-correlated data. *Biometrics* 2000;56:645–646. [PubMed: 10877330]
36. StataCorp. Stata Statistical Software: Release 10. College Station, TX: StataCorp LP; 2007.
37. Institute of Medicine (U.S.). Committee on improving quality in long-term care. In: Wunderlich, GS.; Kohler, PO., editors. Improving the Quality of Long-Term Care. Washington, DC: National Academy Press; 2001.
38. Nishtala PS, McLachlan AJ, Bell JS, et al. Psychotropic prescribing in long-term care facilities: impact of medication reviews and educational interventions. *Am J Geriatr Psychiatry* 2008;16:621–632. [PubMed: 18669940]
39. Schneider LS, Tariot PN, Dagerman KS, et al. Effectiveness of atypical antipsychotic drugs in patients with Alzheimer's disease. *N Engl J Med* 2006;355:1525–1538. [PubMed: 17035647]
40. Sultzer DL, Davis SM, Tariot PN, et al. Clinical symptom responses to atypical antipsychotic medications in Alzheimer's disease: phase 1 outcomes from the CATIE-AD effectiveness trial. *Am J Psychiatry* 2008;165:844–854. [PubMed: 18519523]

TABLE 1**Antipsychotic and Benzodiazepine Use and Appropriateness**

	Portion of Sample (%)	Appropriate (%)	Potentially Appropriate (%)	No Appropriate Indication (%)
Antipsychotics				
Distribution of appropriateness, by antipsychotic use				
Antipsychotic users	25.7	34.7	25.6	39.7
Antipsychotic nonusers	74.3	5.5	13.0	81.5
Entire sample	100.0	13.4	16.3	70.3
Fraction using antipsychotics, by appropriateness status	25.7	66.7	40.3	14.5
	Portion of Sample (%)	Appropriate or Potentially Appropriate (%)		No Appropriate Indication (%)
Benzodiazepines				
Distribution of appropriateness, by benzodiazepine use				
Benzodiazapine users	13.1		58.1	41.9
Benzodiazapine nonusers	86.9		12.5	87.5
Entire sample	100.0		17.9	82.1
Fraction using benzodiazepines, by appropriateness status	13.1		30.6	9.3

Notes: The table reports weighted characteristics of the sample. The sample consists of 12,090 residents aged 60 years and older.

Source: 2004 National Nursing Home Survey.

TABLE 2

Antipsychotic Use by Resident and Facility Characteristics

	Percent of Sample	Appropriate (%)	Wald χ^2 (p) [df]	Fraction Taking Antipsychotics			Wald χ^2 (p) [df]	No Appropriate Indication (%)	Wald χ^2 (p) [df]
				Potentially Appropriate (%)	Wald χ^2 (p) [df]	No Appropriate Indication (%)			
All	100	66.7	—	40.3	—	14.5	—	—	—
Resident characteristics									
Gender									
Male	26.4	72.1	(0.01) [1]	42.3	(0.38) [1]	16.1	(0.05) [1]		
Female	73.6	64.5		39.5		13.9			
Race									
Nonwhite	13.1	61.5	(0.16) [1]	40.3	(1.00) [1]	13.9	(0.65) [1]		
White	86.9	67.5		40.3		14.6			
Age group									
60–79 years	30.2	74.3	(<0.01) [2]	44.6	(0.12) [2]	16.4	(<0.01) [2]		
80–89 years	43.6	63.5		39.9		15.2			
90 years and older	26.2	55.0		36.9		11.4			
Primary source of payment in the month before interview									
Self-pay/private	19.5	62.0	(0.53) [3]	37.5	(0.6) [3]	12.8	(0.02) [3]		
Medicaid	59.4	67.7		41.6		15.7			
Medicare	9.5	68.9		38.6		12.3			
Unknown	11.7	64.9		39.2		13.6			
Marital status at admission									
Not married	79.2	66.5	(0.78) [1]	39.3	(0.14) [1]	14.0	(0.05) [1]		
Married	20.8	67.5		43.9		16.2			
Dementia									
No	74.7	67.8	(0.26) [1]	39.2	(0.38) [1]	13.0	(<0.01) [1]		
Yes	25.3	64.2		41.6		20.7			
Depression									
No	63.7	67.3	(0.70) [1]	38.7	(0.12) [1]	13.2	(<0.01) [1]		
Yes	36.3	66.1		42.9		17.0			
Any behavioral symptoms									

	Percent of Sample	Fraction Taking Antipsychotics					
		Appropriate (%)	Wald χ^2 (p) [df]	Potentially Appropriate (%)	Wald χ^2 (p) [df]	No Appropriate Indication (%)	Wald χ^2 (p) [df]
No	72.1	63.9	(0.02) [1]	19.3	(<0.01) [1]	13.7	(<0.01) [1]
Yes	27.9	70.6		41.3		21.8	
Activities of daily living limitations							
0–3	19.7	73.9	(<0.01) [2]	43.2	(0.65) [2]	14.4	(0.024) [2]
4	28.0	72.6		39.4		12.7	
5	52.4	59.7		39.9		15.6	
Length of stay (days)							
≤100	20.2	66.3	(0.70) [2]	37.4	(0.03) [2]	13.1	(0.095) [2]
101–730	41.9	68.2		44.1		15.5	
731+	38.0	65.7		37.2		14.2	
Emergency department visit in the past 90 days							
No	91.8	66.9	(0.62) [1]	40.3	(0.99) [1]	14.0	(<0.01) [1]
Yes	8.2	64.3		40.3		19.8	
Hospital admission in the past 90 days							
No	93.5	67.1	(0.20) [1]	39.8	(0.22) [1]	14.2	(0.06) [1]
Yes	6.5	59.2		47.1		18.2	
Any falls/fractures in past 6 months							
No	63.6	65.9	(0.45) [1]	38.7	(0.19) [1]	13.3	(<0.01) [1]
Yes	36.4	68.0		42.1		16.8	
Facility characteristics							
Chain							
No	46.1	67.3	(0.78) [1]	40.2	(0.95) [1]	14.6	(0.68) [1]
Yes	53.9	66.5		40.4		14.2	
Ownership							
Nonprofit	30.3	59.3	(0.02) [2]	39.2	(0.15) [2]	13.9	(0.737) [2]
For profit	59.7	68.2		39.3		14.7	
Government	10.0	72.4		47.8		14.8	
Number of beds							
≤100	35.8	69.7	(0.24) [2]	39.0	(0.51) [2]	13.9	(0.607) [2]
101–150	32.8	66.4		39.1		14.9	

	Percent of Sample	Fraction Taking Antipsychotics					
		Appropriate (%)	Wald χ^2 (p) [df]	Potentially Appropriate (%)	Wald χ^2 (p) [df]	No Appropriate Indication (%)	Wald χ^2 (p) [df]
>150	31.4	63.9		42.6		14.6	
Registered nurse full-time equivalents per resident							
≤0.05	27.7	68.2	(0.76) [2]	44.3	(0.19) [2]	16.2	(0.074) [2]
>0.05, ≤0.10	36.0	65.7		38.1		14.3	
>0.10	36.3	66.3		39.6		13.5	
Certified nursing assistant full-time equivalents per resident							
≤0.4	40.4	67.8	(0.53) [2]	39.0	(0.59) [2]	14.9	(0.435) [2]
>0.4, ≤0.6	36.3	67.6		42.0		13.7	
>0.6	23.2	63.6		39.2		15.0	
Facility share of Medicaid residents							
≤0.60	34.2	66.6	(0.88) [2]	39.2	(0.25) [2]	13.3	(0.01) [2]
>0.60, ≤0.75	33.3	65.7		38.2		13.8	
>0.75	32.5	67.4		43.6		16.7	
Facility share of Medicare residents							
≤0.05	21.7	67.0	(0.59) [2]	39.7	(0.67) [2]	15.2	(0.773) [2]
>0.05, ≤0.1	28.2	68.7		38.9		14.4	
>0.1	50.0	65.2		41.7		14.3	
Census region							
Northeast	22.5	67.9	(0.80) [3]	41.7	(0.02) [3]	15.6	(<0.01) [3]
Midwest	29.9	64.5		36.8		12.2	
South	33.7	67.8		44.9		16.4	
West	13.8	37.2		24.2		12.3	
In Nonmetropolitan area							
No	88.8	66.7	(0.93) [1]	40.6	(0.38) [1]	14.7	(0.01) [1]
Yes	11.2	66.4		38.0		12.4	

Notes: Weighted characteristics of the sample. The sample consists of 12,090 residents aged 60 years and older (1,569 appropriate, 1,967 potentially appropriate, and 8,554 not appropriate). Wald χ^2 test for differences in use across variable values within each appropriateness category. p values <5% are in bold.

Source: 2004 National Nursing Home Survey.

TABLE 3**Benzodiazepine Use by Resident and Facility Characteristics**

	Fraction Taking Benzodiazepines			
	Appropriate or Potentially Appropriate (%)	Wald χ^2 (p) [df]	No Appropriate Indication (%)	Wald χ^2 (p) [df]
All	30.6	—	9.3	—
Resident characteristics				
Gender				
Male	24.4	(<0.01) [1]	8.3	0.072 [1]
Female	32.6		9.7	
Race				
Nonwhite	20.0	(<0.01) [1]	6.4	(<0.01) [1]
White	31.8		9.8	
Age Group				
60–79 years	35.4	(<0.01) [2]	12.2	(<0.01) [2]
80–89 years	29.8		8.5	
90 years and older	25.8		7.4	
Primary source of payment in the month before interview				
Self-pay/private	28.5	(0.74) [3]	9.2	(0.19) [3]
Medicaid	30.7		8.8	
Any Medicare	31.2		11.7	
Unknown	33.3		9.8	
Marital status at admission				
Not married	31.3	(0.21) [1]	9.2	(0.63) [1]
Married	27.7		9.6	
Dementia				
No	31.0	(0.51) [1]	9.5	(0.26) [1]
Yes	29.3		8.7	
Depression				
No	26.7	(<0.01) [1]	9.6	(0.13) [1]
Yes	34.2		8.6	
Any behavioral symptoms				
No	29.7	(0.27) [1]	8.3	(<0.01) [1]
Yes	32.4		12.1	
Activities of daily living limitations				
0–3	34.3	(0.14) [2]	10.3	(0.29) [2]
4	28.9		9.5	
5	29.7		8.9	
Length of stay (days)				
≤100	35.4	(0.04) [2]	11.0	(0.03) [2]
101–730	31.8		9.3	
731+	27.9		8.4	
Emergency department visit in the past 90 days				

Fraction Taking Benzodiazepines				
	Appropriate or Potentially Appropriate (%)	Wald χ^2 (p) [df]	No Appropriate Indication (%)	Wald χ^2 (p) [df]
No	30.0	(0.09) [1]	9.2	(0.30) [1]
Yes	37.1		10.6	
Hospital admission in the past 90 days				
No	30.0	(0.09) [1]	9.3	(0.72) [1]
Yes	37.6		9.8	
Any falls/fractures in past 6 months				
No	29.9	(0.43) [1]	8.4	(<0.01) [1]
Yes	31.8		10.8	
Facility characteristics				
Chain				
No	26.9	(0.01) [1]	9.8	(0.20) [1]
Yes	33.1		8.8	
Ownership				
Nonprofit	29.0	(0.67) [2]	8.8	(0.62) [2]
For profit	31.0		9.5	
Government	32.5		9.8	
Number of beds				
≤100	30.7	(0.99) [2]	10.1	(0.19) [2]
101–150	30.8		8.6	
>150	30.2		9.1	
Registered nurse full-time equivalents per resident				
≤0.05	29.2	(0.63) [2]	10.5	(0.01) [2]
>0.05, ≤0.10	30.6		7.9	
>0.10	32.0		9.8	
Certified nursing assistant full-time equivalents per resident				
≤0.4	30.1	(0.62) [2]	8.6	(0.26) [2]
>0.4, ≤0.6	29.9		9.5	
>0.6	33.0		10.2	
Facility share of Medicaid residents				
≤0.60	32.1	(0.55) [2]	9.9	(0.10) [2]
>0.60, ≤0.75	30.9		8.2	
>0.75	28.9		9.8	
Facility share of Medicare residents				
≤0.05	28.7	(0.51) [2]	10.8	(0.02) [2]
>0.05, ≤0.1	32.6		8.0	
>0.1	30.4		9.4	
Census region				
Northeast	29.2	(0.12) [3]	7.4	(<0.01) [3]
Midwest	31.5		7.5	
South	32.3		12.8	

	Fraction Taking Benzodiazepines			
	Appropriate or Potentially Appropriate (%)	Wald χ^2 (p) [df]	No Appropriate Indication (%)	Wald χ^2 (p) [df]
West	23.7		8.1	
In Nonmetropolitan area				
No	29.7	(0.01) [1]	9.3	(0.71) [1]
Yes	36.8		9.6	

Notes: Weighted characteristics of the sample. The sample consists of 12,090 residents aged 60 years and older (2,238 appropriate or potentially appropriate and 9,852 not appropriate). Wald χ^2 test for differences in use across variable values within each appropriateness category. p values <5% are in bold.

Source: 2004 National Nursing Home Survey.

TABLE 4

Logistic Regression—Predicted Odds of Antipsychotic and Benzodiazepine Use Among Those Without Any Indication for Appropriate Use

	Antipsychotics		Benzodiazapines	
	Wald χ^2 (p) [df]	Odds Ratio [CI]	Wald χ^2 (p) [df]	Odds Ratio [CI]
Resident characteristics				
Gender (relative to male)				
Female	(0.26) [1]	0.90 [0.75–1.08]	(<0.01) [1]	1.44 [1.18–1.75]^a
Race (relative to nonwhite)				
White	(0.27) [1]	1.14 [0.90–1.46]	(<0.01) [1]	1.95 [1.47–2.59]^a
Age, years	(<0.01) [1]	0.99 [0.98–0.99]^a	(<0.01) [1]	0.97 [0.96–0.98]^a
Primary payment source (relative to self-pay/private)				
Medicaid	(0.25) [3]	1.22 [0.99–1.50]	(0.32) [3]	0.89 [0.72–1.11]
Medicare		1.03 [0.75–1.43]		1.16 [0.85–1.60]
Unknown		1.11 [0.842–1.46]		0.99 [0.74–1.33]
Marital status at admission (relative to not married)				
Married	(0.37) [1]	1.09 [0.91–1.31]	(0.67) [1]	1.04 [0.86–1.27]
Indicator for diagnoses				
Dementia	(<0.01) [1]	1.82 [1.52–2.18]^a	(0.11) [1]	0.86 [0.71–1.04]
Depression	(<0.01) [1]	1.31 [1.12–1.53]^a	(0.06) [1]	0.85 [0.71–1.01] ^b
Any behavioral symptoms				
Yes	(<0.01) [1]	1.97 [1.56–2.50]^a	(<0.01) [1]	1.69 [1.41–2.01]^a
Number of activities of daily living limitations (relative to 0–3 limitations)				
4	(0.23) [2]	0.89 [0.72–1.10]	(0.62) [2]	0.94 [0.74–1.18]
5		1.04 [0.85–1.28]		0.90 [0.74–1.11]
Length-of-Stay (days)	(0.16) [1]	1.00 [1.00–1.00]	(0.21) [1]	1.00 [1.00–1.00]
Facility characteristics				
Chain (relative to not a chain)				
Chain	(0.57) [1]	0.95 [0.81–1.13]	(0.05) [1]	0.82 [0.66–0.99]^c
Ownership (relative to nonprofit)				
For profit	(0.78) [2]	1.03 [0.85–1.24]	(0.80) [2]	1.06 [0.84–1.34]
Government		0.92 [0.68–1.25]		1.11 [0.81–1.53]
Beds, N	(0.71) [1]	1.00 [1.00–1.00]	(0.86) [1]	1.00 [1.00–1.00]
Registered nurse full-time equivalents per resident, N	(0.17) [1]	0.98 [0.95–1.01]	(0.69) [1]	1.01 [0.97–1.05]
Certified nursing assistant full-time equivalents per resident, N	(0.28) [1]	1.00 [1.00–1.00]	(0.90) [1]	1.00 [1.00–1.00]
Facility share of Medicaid residents (%)	(0.01) [1]	1.08 [1.02–1.15]^a	(0.95) [1]	1.00 [0.94–1.06]
Facility share of Medicare residents (%)	(0.01) [1]	0.46 [0.25–0.83]^a	(0.90) [1]	1.04 [0.59–1.81]
Census region (relative to northeast)				
Midwest		0.77 [0.61–0.96]^c		1.05 [0.77–1.43]
South	(<0.01) [3]	1.08 [0.86–1.34]	(<0.01) [3]	1.95 [1.484–2.55]^a
West		0.75 [0.58–0.98]^c		1.15 [0.83–1.59]

	Antipsychotics		Benzodiazapines	
	Wald χ^2 (p) [df]	Odds Ratio [CI]	Wald χ^2 (p) [df]	Odds Ratio [CI]
Metropolitan status (relative to metropolitan)				
Nonmetropolitan	(< 0.01) [1]	0.77 [0.65–0.92]^a	(0.65) [1]	0.95 [0.76–1.19]

Notes: p values from Wald χ^2 tests (and degrees of freedom) and odds ratios [and confidence intervals (CIs)] from logistic regression. The sample consists of 8,554 residents aged 60 years and older for whom antipsychotic prescribing may not be appropriate and 9,852 for whom benzodiazepine prescribing may not be appropriate.

The symbols a, b, and c refer to significance at the 1, 5, and 10 percent level, respectively. Results that are statistically significant at <5% level are in bold.

Source: 2004 National Nursing Home Survey.

APPENDIX A

Listing of Drugs (by Class) Included in the Analyses

Antipsychotics			Benzodiazepines		
Typicals	Atypicals	Other	Short Acting	Mid Acting	Long Acting
Amiripryline/perphenazine	Clozapine	Abilify	Alprazolam	Ativan	Amiripryline/chlordiazepoxide
Chlorpromazine	Clozaril	Abilify discmelt			
Compazine	FazaClo ODT		Halcion	Estazolam	Chlordiazepoxide
Fluphenazine	Geodon		Midazolam	Lorazepam	Clonazepam
Fluphenazine decanoate	Invega		Niravam	Prosom	Clorazepate
Haldol	Risperdal		Oxazepam	Restoril	Dalmane
Haldol Decanoate	Risperdal consta		Triazolam	Temazepam	Diazepam
Haldol Lactate	Risperdal M-Tab		Versed		Flurazepam
Haloperidol	Seroquel		Xanax		Klonopin
Haloperidol decanoate	Seroquel XR		Xanax XR		Klonopin wafers
Loxapine	Zyprexa				Librium
Loxitane	Zyprexa zydis				Limbital
Mellaril					Limbital DS
Moban					Tranxene SD
Navane					Tranxene T-Tab
Orap					Valium
Perphenazine					
Prochlorperazine edisylate					
Prochlorperazine maleate					
Prochlorperazine rectal					
Prolixin					
Stelazine					
Thioridazine					
Thiothixene					
Thorazine					
Trifluoperazine					
Trilafon					

APPENDIX B

Diagnoses Coded as Appropriate or Potentially Appropriate for Antipsychotic Use

ICD9	Clinical Code Description	Appropriateness Code (0 = Inappropriate; 1 = Appropriate; and 2 = Potentially Appropriate)
290.00	Dementia of the Alzheimers type with late onset uncomplicated	0 if BEHAVE = "NO"; 2 if BEHAVE = "YES" or "DK" or "NA"
290.20	Dementia of the Alzheimers type with late onset with delusions	1
290.21	Dementia of the Alzheimers type with late onset with depressed mood	0 if BEHAVE = "NO"; 2 if BEHAVE = "YES" or "DK" or "NA"
290.40	Vascular dementia uncomplicated	0 if BEHAVE = "NO"; 2 if BEHAVE = "YES" or "DK" or "NA"
291.10	Alcohol-induced persisting amnesic disorder	1
291.20	Alcohol-induced persisting dementia	1
291.50	Alcohol-induced psychotic disorder with delusions	1
291.81	Alcohol withdrawal	2
293.00	Delirium due to general medical condition	1
293.81	Psychotic disorder due to general medical condition with delusions	1
293.83	Mood disorder due to general medical condition	1
293.89	Catatonic disorder due to general medical condition	1
294.80	Dementia NOS or amnesic disorder NOS	0 if BEHAVE = "NO"; 2 if BEHAVE = "YES" or "DK" or "NA"
295.10	Schizophrenia disorganised type	1
295.30	Schizophrenia paranoid type	1
295.70	Schizoaffective disorder bipolar type/depressive type	1
295.90	Schizophrenia undifferentiated type	1
296.40	Bipolar I disorder most recent episode manic or hypomanic	1
296.50	Bipolar I disorder most recent episode depressed unspecified	1
296.60	Bipolar I disorder most recent episode mixed unspecified	1
296.70	Bipolar I disorder, most recent episode unspecified	1
296.80	Bipolar disorder NOS	1
296.90	Mood disorder NOS	1
297.10	Delusional disorder	1
298.90	Psychotic disorder NOS	1
299.00	Autistic disorder	2
300.70	Hypochondriasis or body dysmorphic disorder	2
301.83	Borderline personality disorder	2
301.90	Personality disorder NOS	2
312.90	Disruptive behavior disorder NOS	2
317.00	Mild mental retardation	2
319.00	Mental retardation, severity unspecified	2
290.0	Senile dementia uncomplicated	0 if Behave = "NO"; 2 if BEHAVE = "YES" or "DK" or "NA"
290.12	Presenile dementia with delusional features	1
290.13	Presenile dementia with depressive features	1
290.42	Vascular dementia with delusions	1

ICD9	Clinical Code Description	Appropriateness Code (0 = Inappropriate; 1 = Appropriate; and 2 = Potentially Appropriate)
290.43	Vascular dementia with depressed mood	1
290.8	Other specified senile psychotic conditions	1
291.9	Unspecified alcohol-induced mental disorders	1
292.0	Drug withdrawal	2
293.82	Psychotic disorder with hallucinations in condition	1
294.8	Other persistent mental disorders due to condition	0 if BEHAVE = "NO"; 2 if BEHAVE = "YES" or "DK" or "NA"
295.32	Paranoid type schizophrenia chronic state	1
295.62	Schizophrenic disorders residual type chronic	1
296.99	Other specified episodic mood disorder	1
297.9	Unspecified paranoid state	1
298.4	Psychogenic paranoid psychosis	1
331.0	Alzheimer's Disease	0 if BEHAVE = "NO"; 2 if BEHAVE = "YES" or "DK" or "NA"
331.1	Picks disease	0 if BEHAVE = "NO"; 2 if BEHAVE = "YES" or "DK" or "NA"
331.89	Other cerebral degeneration	0 if BEHAVE = "NO"; 2 if BEHAVE = "YES" or "DK" or "NA"
331.9	Cerebral degeneration unspecified	0 if BEHAVE = "NO"; 2 if BEHAVE = "YES" or "DK" or "NA"
333.4	Huntington's chorea	1
780.09	Alteration of consciousness other	1
780.1	Hallucinations	1
797.0	Senility without psychosis	0 if BEHAVE = "NO"; 2 if BEHAVE = "YES" or "DK" or "NA"

Notes: Appropriateness categorizations were determined a priori based primarily on CMS survey and certification protocols and interpretive guidelines for defining unnecessary drug use in nursing homes and the published literature on clinical guidelines for use of these drugs. BEHAVE" refers to the following survey question: "Does [RESIDENT] display any behavioral symptoms, such as wandering, verbally abusive language, physically abusive actions, socially inappropriate or disruptive symptoms, or resisting care?" DK: "Don't know"; NA: "Not applicable"; NOS, not otherwise specified.

APPENDIX C

Diagnoses Coded as Appropriate or Potentially Appropriate for Benzodiazepine Use

ICD9	Clinical Code Description	Appropriateness Code (0 = Inappropriate; 1 = Appropriate; and 2 = Potentially Appropriate)
296.70	Bipolar I disorder, most recent episode unspecified	1 if drug = klonopin; 0 otherwise
296.50	Bipolar I disorder most recent episode depressed unspecified	1 if drug = klonopin; 0 otherwise
296.80	Bipolar disorder NOS	1 if drug = klonopin; 0 otherwise
296.60	Bipolar I disorder most recent episode mixed unspecified	1 if drug = klonopin; 0 otherwise
296.40	Bipolar I disorder most recent episode manic or hypomanic	1 if drug = klonopin; 0 otherwise
310.90	Unspecified nonpsychotic mental disorder following	2
303.90	Alcohol dependence	2
312.90	Disruptive behavior disorder NOS	2
303.91	Other and unspecified alcohol dependence continuous	2
301.30	Explosive personality disorder	2
303.93	Other and unspecified alcohol dependence in remission	2
304.90	Other (or unknown) substance dependence	2
305.00	Alcohol abuse	2
312.35	Isolated explosive disorder	2
799.20	Nervousness	2
300.00	Anxiety disorder NOS	1
780.52	Other insomnia	1
300.30	Obsessive-compulsive disorder	1
300.01	Panic disorder without agoraphobia	1
308.30	Acute stress disorder	1
300.02	Generalised anxiety disorder	1
780.50	Unspecified sleep disturbance	1
300.22	Agoraphobia without history of panic disorder	1
292.00	Substance withdrawal	1
293.84	Anxiety disorder due to general medical condition	1
300.23	Social phobia	1
300.09	Other anxiety states	1
300.20	Phobia unspecified	1
301.40	Obsessive-compulsive personality disorder	1
308.90	Unspecified acute reaction to stress	1
309.28	Adjustment disorder with mixed anxiety and depressed mood	1

Notes: Appropriateness categorizations were determined a priori based primarily on CMS survey and certification protocols and interpretive guidelines for defining unnecessary drug use in nursing homes and the published literature on clinical guidelines for use of these drugs. DK: "Don't know"; NA: "Not applicable"; NOS, not otherwise specified.