

Potentially inappropriate medications in older adults: A review of the 2012 Beers Criteria and the implications in persons with dementia

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ABSTRACT

In 2012, the American Geriatrics Society (AGS), along with a panel of 11 experts, updated the Beers Criteria which has evolved significantly since its inception in 1991. The Beers Criteria, in general, classifies medications/medication classes as: (1) potentially inappropriate for use in all older adults, (2) potentially inappropriate for older adults with certain diseases or symptoms and (3) requiring extra caution when used in older adults. Although each patient must be evaluated individually, the Beers Criteria is a useful clinical tool that can be used when initiating pharmacologic agents in both ambulatory and institutionalized patients. The concept behind use of the Beers Criteria is that it allows prescribers to readily identify, and avoid, medications associated with negative outcomes in older adults therefore decreasing the risk of adverse drug events (ADEs). Within this review article, there will be a highlight of potentially inappropriate medications (PIMs) commonly seen in clinical practice settings such as antipsychotics, benzodiazepines, non-benzodiazepine sedative-hypnotics, anticholinergics and sliding scale insulin. The focus will be to outline the risk-benefits of these drug classes within the context of persons with dementia. Furthermore, the use of PIMs has both clinical and financial implications in Medicare Star ratings and Healthcare Effectiveness Data and Information Set (HEDIS) measures.

KEYWORDS

older adults, Beers Criteria, Dementia

BACKGROUND

In 2013, Alzheimer's disease (AD) is estimated to impact approximately 5.2 million Americans with a patient being diagnosed every 68 seconds.¹ These estimates are expected to increase significantly as the large baby boomer generation ages and their risk increases. This has significant cost implications, noting that in 2013, AD cost the United States approximately \$203 billion.¹ Much work has been done looking at the negative impact of potentially inappropriate prescribing in older adults in terms of healthcare expenditures and impact on quality of life.²⁻⁵ This is even more critical in persons with dementia who have a greater propensity to the deleterious effects of potentially inappropriate medications.

The initial Beers Criteria was published in 1991, targeting the use of potentially inappropriate medications in older adults residing in nursing homes. It was then updated in 1997 to address older adults across all settings of care. This updated criteria was then adopted by the Health Care Finance Administration (HCFA), now known as the

Centers for Medicare and Medicaid Services (CMS), within the Interpretive Guidance for Nursing Homes utilized during the Survey process.⁶⁻⁸ Further updates occurred in 2003, prior to the emergence of Medicare Part D and some of the criteria were then adopted into various quality metrics. It was almost a decade before the Beers Criteria was updated under the direction of the American Geriatrics Society in 2012. The aim was to update the 2003 Beers Criteria using a comprehensive, systematic review and grading of the evidence criteria by an interdisciplinary team.

Within the 2012 AGS Beers Criteria updates, there are key clinical tables that highlight not only potentially problematic medications in older adults but also drug disease and syndrome interactions. Additionally, there are tables that address medications that have been removed or changed since the 2003 updates. Overall, there are a total of 53 medications/medication classes that addressed as well as about 20 medications/

medication classes that have been removed, such as daily fluoxetine.

Ultimately, the goal of the 2012 AGS Beers criteria is to improve care by decreasing exposures to potentially inappropriate medications (PIMs).⁹ The criteria meets its goal by being used as both an educational and research tool as well as use as a measure that can help improve the quality of prescribing.⁹ This review article will highlight common PIMs referred to in the 2012 AGS Beers Criteria and the implications for evaluating the quality of prescribing for older adults.

HIGH RISK MEDICATIONS AND IMPLICATIONS IN PERSONS WITH DEMENTIA

Anticholinergics

Historically, anticholinergics have been a part of the Beers Criteria, and despite their well known impact on older adults, their use persists. There are a variety of scales that assess anticholinergic burden for agents such as antihistamines, antiparkinson agents, and antispasmodics, including the Anticholinergic Drug Scale and the Anticholinergic Cognitive Burden Scale.¹⁰⁻¹¹ The Anticholinergic Drug Scale used by Rudolph, et al., evaluated 249 patients age 65 or greater and assigned a point value to individual anticholinergic medications. Higher cumulative scores were associated with a statistically significant increase in anticholinergic adverse events, with the most common adverse events being falls (40.2%), confusion (38.6%), dizziness (25%), constipation (24.2%), dry eyes (13.6%) and dry mouth (10.6%).¹²

Whether in the community or in a hospitalized setting, older individuals are utilizing diphenhydramine as a sleep aide, which has been associated with an increased risk of cognitive decline, altered level of consciousness, and negative effects on the sleep-wake cycle. It was therefore recommended that diphenhydramine not be routinely used as a sleep aide.¹³⁻¹⁴ Overall, the use of anticholinergic medications is even more critical in older individuals with dementia who have limited cognitive reserve which may negate the benefits of cognitive enhancing medications or increase risk for delirium.¹⁵

Antipsychotics

Non-pharmacologic options are consistently recommended first line for the management of behavioral and psychological symptoms of dementia (BPSD). Unfortunately, several limitations exist with non-pharmacologic therapies, which hinder their utility in everyday clinical practice. These limitations include limited access to psychology services, weaker clinical trial

design, modest efficacy, and nonadherence to treatment.¹⁶ When non-pharmacologic options fail, antipsychotics are often used in an attempt to manage these symptoms.¹⁷ The 2012 Beers Criteria state that antipsychotics should be avoided in patients with behavioral problems of dementia unless non-pharmacologic options have failed and the patient is a risk to themselves or others. This conclusion was based on a variety of studies linking antipsychotic use to an increase in cerebrovascular accidents and mortality in patients with dementia.¹⁷⁻¹⁹

Studies published after the 2012 Beers Criteria update continue to examine the risks and benefits of antipsychotics for the management of BPSD. In 2012, a double-blind, placebo-controlled study by Devanand, et al. explored patient response to 0.5-3 mg risperidone daily for psychosis and agitation, then assessed the outcome of risperidone discontinuation in those patients who had responded. Initially, 112 out of 180 patients responded, as seen by a reduction of 30% or more from baseline in their Neuropsychiatric Inventory (NPI) score. After the initial period of response, patients were then switched to placebo for 32 weeks, continued risperidone for 16 weeks then placebo for 16 weeks, or continued risperidone for 32 weeks. A significantly higher relapse rate was seen in patients receiving placebo at 16 weeks ($p=0.004$) and at 32 weeks ($p=0.02$).²⁰ Though this study demonstrates a benefit of antipsychotic use for managing symptoms of psychosis and agitation, it should be noted that risperidone was swiftly discontinued (instead of being tapered), which may have precipitated some relapse symptoms. It should also be noted that several patients in this study dropped out secondary to intolerance of risperidone.

A 2012 observational study by Rosenberg, et al. explored the association of psychotropic medications and decline in cognition and functioning of patients with Alzheimer's disease. Persistency Index (PI) was used to measure time of exposure to psychotropic medications including antidepressants, typical and atypical antipsychotics, and benzodiazepines. Scores ranged from 0-1, with 0 representing no medication use during the defined time period (receiving a psychotropic 0% of the study period) and 1 representing medication use during the entire defined time period (receiving a psychotropic daily, for 100% of the study period). Higher scores were not assigned based on the number of psychotropic medications (i.e., if participants received multiple psychotropic medications in one day). For all medication classes, a higher PI was associated with a more rapid

decline on the Mini Mental State Exam (MMSE). A higher PI for typical antipsychotics was also associated with a more rapid increase in dementia severity (calculated using the Clinical Dementia Rating Scale) and neuropsychiatric symptoms (calculated using NPI).²¹ Though the data showed an association between extended antipsychotic use and a decline in functioning, this study cannot prove a causal relationship. The authors pointed out that Alzheimer's patients with neuropsychiatric symptoms are at risk for poorer outcomes, which could certainly confound the findings.

It is therefore imperative that the clinical practitioner evaluates the ongoing risk and benefits of antipsychotics in individuals with dementia due to the concern for harm and limited efficacy data. This has been a major area of attention with the Centers for Medicare and Medicaid Services National Initiative publically reporting the use of antipsychotics among persons with dementia in attempts to improve prescribing and quality of care provided.²²

Benzodiazepines and Non-Benzodiazepine Sedative Hypnotics

Per the 2012 Beers Criteria, benzodiazepines should be avoided as treatment for insomnia, agitation, or delirium in patients with dementia due to their potential for increased risk of falls, fractures, delirium, and cognitive impairment.²³⁻²⁴ All older adults, not just individuals with dementia, have increased sensitivity to benzodiazepines as well as reduced clearance, making it ever more important to reduce their risk of adverse effects. Despite these recommendations, benzodiazepines are still routinely used in clinical practice for the management of agitation and aggression in patients with dementia.

The observational study by Rosenberg, et al. previously described explored the PI and outcomes of benzodiazepine use. Approximately 25% of the study subjects were prescribed a benzodiazepine, though the majority of these patients were receiving the benzodiazepine for less than 50% of the study duration, as represented by a PI of ≤ 0.5 . Despite this short-term use, benzodiazepines were associated with a more rapid decline in functioning and a more rapid increase in dementia severity. Moreover, there was no change in the NPI, representing no improvements in neuropsychiatric symptoms with the use of benzodiazepines.²¹

Similar to benzodiazepines, non-benzodiazepine hypnotics have also been shown to place older patients at risk for falls, fractures, and delirium.²⁴⁻²⁵ Despite these risks, there have been studies that show sleep benefits in geriatric patients. In a study by Cotroneo, et al., patients

reported sufficient quality of sleep after receiving zolpidem. It should be noted that the authors did not report adverse effects in this study.²⁶ A review by McCrae, et al. highlighted the beneficial effects of eszopiclone, including reduced sleep latency, morning sleepiness, and time awake after sleep onset.²⁷ However, these two studies citing efficacy of these agents in the treatment of insomnia were studied in a general geriatric population, not specifically patients with dementia.²⁶⁻²⁷ The Beers Criteria recommend that non-benzodiazepine hypnotics be used for no more than 90 days in older adults. Furthermore, it is important to ensure that older patients are appropriately tapered off of benzodiazepines and non-benzodiazepine hypnotics as needed to avoid withdrawal symptoms and adverse events.

CLINICAL IMPLICATION FOR PRACTITIONERS

With the current updates of the AGS 2012 Beers Criteria, there has been additional attention given to potentially inappropriate medications in older adults and using these as quality measures. The National Committee for Quality Assurance (NCQA) creates the Healthcare Effectiveness Data and Information Set (HEDIS) measures, which are used for various initiatives such as the Medicare Star rating as well as monitoring health plan performance. The Patient Protection and Affordable Care Act of 2010 ties federal reimbursement rates for insurance carriers administering Medicare Advantage products to performance, as measured by the Stars rating system. This mandate was put in place in part to improve quality and transparency of data to consumers. For instance starting in 2014, a star rating will include updates to drug-disease interactions based on the 2012 Beers Criteria focusing on falls and the use of anticonvulsants, selective serotonin reuptake inhibitors, benzodiazepines, antipsychotics and non-benzodiazepine hypnotics as well as dementia and the use of H₂ receptor antagonists, non-benzodiazepine hypnotics, antipsychotics, benzodiazepines, tricyclic antidepressants or anticholinergic agents.²⁸ This may impact the access to medications for patients as well as performance measures and payments for healthcare systems and providers. As a practitioner, it will be imperative to evaluate and document the ongoing risk/benefit of these medications to ensure appropriate treatment goals are being achieved.

REFERENCES

1. Alzheimer's Association. Alzheimer's Facts and Figures. 2013. Accessed on Sep 01, 2013. Available from http://www.alz.org/alzheimers_disease_facts_and_figures.asp#quickFacts
2. Lund BC, Steinman MA, Chrischilles EA, Kaboli PJ. Beers criteria as a proxy for inappropriate prescribing of other medications among older

- adults. *Annals of Pharmacotherapy*. 2011;45(11):1363-70. DOI: [10.1345/aph.1O361](https://doi.org/10.1345/aph.1O361). PubMed PMID: [21972251](https://pubmed.ncbi.nlm.nih.gov/21972251/).
3. Stockl KM, Le L, Zhang S, Harada AS. Clinical and economic outcomes associated with potentially inappropriate prescribing in the elderly. *Am J Manag Care*. 2010;16(1):e1-10. PubMed PMID: [20059286](https://pubmed.ncbi.nlm.nih.gov/20059286/).
 4. Dimitrow MS, Airaksinen MSA, Kivelä S-L, Lyles A, Leikola SNS. Comparison of prescribing criteria to evaluate the appropriateness of drug treatment in individuals aged 65 and older: a systematic review. *J Am Geriatr Soc*. 2011;59(8):1521-30. DOI: [10.1111/j.1532-5415.2011.03497.x](https://doi.org/10.1111/j.1532-5415.2011.03497.x). PubMed PMID: [21797829](https://pubmed.ncbi.nlm.nih.gov/21797829/).
 5. Jano E, Aparasu RR. Healthcare outcomes associated with beers' criteria: a systematic review. *Ann Pharmacother*. 2007;41(3):438-47. DOI: [10.1345/aph.1H473](https://doi.org/10.1345/aph.1H473). PubMed PMID: [17311835](https://pubmed.ncbi.nlm.nih.gov/17311835/).
 6. Beers MH, Ouslander JG, Rollingher I, Reuben DB, Brooks J, Beck JC. Explicit criteria for determining inappropriate medication use in nursing home residents. UCLA Division of Geriatric Medicine. *Arch Intern Med*. 1991;151(9):1825-32. PubMed PMID: [1888249](https://pubmed.ncbi.nlm.nih.gov/1888249/).
 7. Beers MH. Explicit criteria for determining potentially inappropriate medication use by the elderly. An update. *Arch Intern Med*. 1997;157(14):1531-6. PubMed PMID: [9236554](https://pubmed.ncbi.nlm.nih.gov/9236554/).
 8. Fick DM, Cooper JW, Wade WE, Waller JL, Maclean JR, Beers MH. 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(22):2716-24. DOI: [10.1001/archinte.163.22.2716](https://doi.org/10.1001/archinte.163.22.2716). PubMed PMID: [14662625](https://pubmed.ncbi.nlm.nih.gov/14662625/).
 9. American Geriatrics Society updated Beers Criteria for potentially inappropriate medication use in older adults. *J Am Geriatr Soc*. 2012;60(4):616-31. DOI: [10.1111/j.1532-5415.2012.03923.x](https://doi.org/10.1111/j.1532-5415.2012.03923.x). PubMed PMID: [22376048](https://pubmed.ncbi.nlm.nih.gov/22376048/).
 10. Carnahan RM, Lund BC, Perry PJ, Pollock BG, Culp KR. The anticholinergic drug scale as a measure of drug-related anticholinergic burden: associations with serum anticholinergic activity. *J Clin Pharmacol*. 2006;46(12):1481-1486.
 11. The Anticholinergic Cognitive Burden Scale. Accessed on September 9, 2013. Available from: <http://www.indydiscoverynetwork.org/anticholinergiccognitiveburdenscale.html>.
 12. Rudolph JL, Salow MJ, Angelini MC, McGlinchey RE. The anticholinergic risk scale and anticholinergic adverse effects in older persons. *Arch Intern Med*. 2008;168(5):508-13. DOI: [10.1001/archinternmed.2007.106](https://doi.org/10.1001/archinternmed.2007.106). PubMed PMID: [18332297](https://pubmed.ncbi.nlm.nih.gov/18332297/).
 13. Agostini JV, Leo-Summers LS, Inouye SK. Cognitive and other adverse effects of diphenhydramine use in hospitalized older patients. *Arch Intern Med*. 2001;161(17):2091-7. PubMed PMID: [11570937](https://pubmed.ncbi.nlm.nih.gov/11570937/).
 14. Boustani M, Hall KS, Lane KA, Aljadhey H, Gao S, Unverzagt F, et al. The association between cognition and histamine-2 receptor antagonists in African Americans. *J Am Geriatr Soc*. 2007;55(8):1248-53. DOI: [10.1111/j.1532-5415.2007.01270.x](https://doi.org/10.1111/j.1532-5415.2007.01270.x). PubMed PMID: [17661965](https://pubmed.ncbi.nlm.nih.gov/17661965/).
 15. Campbell N, Boustani M, Limbil T, Ott C, Fox C, Maidment I, et al. The cognitive impact of anticholinergics: a clinical review. *Clin Interv Aging*. 2009;4:225-33. PubMed PMID: [19554093](https://pubmed.ncbi.nlm.nih.gov/19554093/).
 16. Seitz DP, Gill SS, Herrmann NJ, Brisbin S, Rapoport MJ, Rines J, et al. Pharmacological treatments for neuropsychiatric symptoms of dementia in long-term care: a systematic review. *Int Psychogeriatr*. 2013;25(2):185-203. DOI: [10.1017/S1041610212001627](https://doi.org/10.1017/S1041610212001627). PubMed PMID: [23083438](https://pubmed.ncbi.nlm.nih.gov/23083438/).
 17. Maher AR, Maglione M, Bagley S, Suttrop M, Hu J-H, Ewing B, et al. Efficacy and comparative effectiveness of atypical antipsychotic medications for off-label uses in adults: a systematic review and meta-analysis. *JAMA*. 2011;306(12):1359-69. DOI: [10.1001/jama.2011.1360](https://doi.org/10.1001/jama.2011.1360). PubMed PMID: [21954480](https://pubmed.ncbi.nlm.nih.gov/21954480/).
 18. Schneider LS, Dagerman KS, Insel P. Risk of death with atypical antipsychotic drug treatment for dementia: meta-analysis of randomized placebo-controlled trials. *JAMA*. 2005;294(15):1934-43. DOI: [10.1001/jama.294.15.1934](https://doi.org/10.1001/jama.294.15.1934). PubMed PMID: [16234500](https://pubmed.ncbi.nlm.nih.gov/16234500/).
 19. Schneider LS, Dagerman K, Insel PS. Efficacy and adverse effects of atypical antipsychotics for dementia: meta-analysis of randomized, placebo-controlled trials. *Am J Geriatr Psychiatry*. 2006;14(3):191-210. DOI: [10.1097/01.JGP.0000200589.01396.6d](https://doi.org/10.1097/01.JGP.0000200589.01396.6d). PubMed PMID: [16505124](https://pubmed.ncbi.nlm.nih.gov/16505124/).
 20. Devanand DP, Mintzer J, Schultz SK, Andrews HF, Sultzer DL, de la Pena D, et al. Relapse risk after discontinuation of risperidone in Alzheimer's disease. *N Engl J Med*. 2012;367(16):1497-507. DOI: [10.1056/NEJMoa1114058](https://doi.org/10.1056/NEJMoa1114058). PubMed PMID: [23075176](https://pubmed.ncbi.nlm.nih.gov/23075176/); PubMed Central PMCID: [PMC3490406](https://pubmed.ncbi.nlm.nih.gov/PMC3490406/).
 21. Centers for Medicare and Medicaid Survey And Certification Group. Improving dementia care and reducing unnecessary antipsychotic medications in nursing homes. 2013; Accessed September 8th, 2013. Available at: <http://surveyortraining.coms.hhs.gov/pubs/AntiPsychoticMedHome.aspx>
 22. Rosenberg PB, Mielke MM, Han D, Leoutsakos JS, Lyketsos CG, Rabins PV, et al. The association of psychotropic medication use with the cognitive, functional, and neuropsychiatric trajectory of Alzheimer's disease. *Int J Geriatr Psychiatry*. 2012;27(12):1248-57. DOI: [10.1002/gps.3769](https://doi.org/10.1002/gps.3769). PubMed PMID: [22374884](https://pubmed.ncbi.nlm.nih.gov/22374884/).
 23. Allain H, Bentué-Ferrer D, Polard E, Akwa Y, Patat A. Postural instability and consequent falls and hip fractures associated with use of hypnotics in the elderly: a comparative review. *Drugs Aging*. 2005;22(9):749-65. PubMed PMID: [16156679](https://pubmed.ncbi.nlm.nih.gov/16156679/).
 24. Finkle WD, Der JS, Greenland S, Adams JL, Ridgeway G, Blaschke T, et al. Risk of fractures requiring hospitalization after an initial prescription for zolpidem, alprazolam, lorazepam, or diazepam in older adults. *J Am Geriatr Soc*. 2011;59(10):1883-90. DOI: [10.1111/j.1532-5415.2011.03591.x](https://doi.org/10.1111/j.1532-5415.2011.03591.x). PubMed PMID: [22091502](https://pubmed.ncbi.nlm.nih.gov/22091502/).
 25. Paterniti S, Dufouil C, Alépovitch A. Long-term benzodiazepine use and cognitive decline in the elderly: the Epidemiology of Vascular Aging Study. *J Clin Psychopharmacol*. 2002;22(3):285-93. PubMed PMID: [12006899](https://pubmed.ncbi.nlm.nih.gov/12006899/).
 26. Cotroneo A, Gareri P, Nicoletti N, Lacava R, Grassone D, Maina E, et al. Effectiveness and safety of hypnotic drugs in the treatment of insomnia in over 70-year old people. *Archives of Gerontology and Geriatrics*. 2007;44:121-124. DOI: [10.1016/j.archger.2007.01.018](https://doi.org/10.1016/j.archger.2007.01.018).
 27. McCrae CS, Ross A, Stripling A, Dautovich ND. Eszopiclone for late-life insomnia. *Clin Interv Aging*. 2007;2(3):313-26. PubMed PMID: [18044182](https://pubmed.ncbi.nlm.nih.gov/18044182/).
 28. National Committee for Quality Assurance (NCQA) Updates HEDIS Measures accessed September 20, 2013. Available at <http://www.ncqa.org/Newsroom/2013NewsArchives/NewsReleaseJuly2013.aspx>.

How to cite this editor-reviewed article
 Brandt NJ, Turner T. Potentially inappropriate medications in older adults: A review of the 2012 Beers Criteria and the implications in persons with dementia. *Ment Health Clin [Internet]*. 2014;4(4):166-9. Available from: <http://dx.doi.org/10.9740/mhc.n204331>