

EDITORIAL & PRODUCTION

Senior Vice President Jeff Prescott, PharmD, RPh	Associate Editors Hayley Fahey Jill Pastor
Scientific Director Darrin Zangari, PharmD, BCPS, BCGP	Copy Chief Jennifer Potash
Senior Clinical Project Managers Ida Delmendo Danielle Mroz, MA	Medical & Scientific Quality Review Editor Stacey Abels, PhD
Clinical Project Managers Lauren Burawski, MA Ted Pigeon	Copy Editors Maggie Shaw Rachelle Laliberte Paul Silverman
Senior Manager, Clinical Writing Services Angelia Szwed	Creative Director, Publishing Ray Pelesko
Project Manager Andrea Szeszko	Senior Art Director Melissa Feinen
	Senior Graphic Designer Julianne Costello

SALES & MARKETING

Director, Sales Gil Hernandez	National Account Associate Kevin Georges
National Account Managers Ben Baruch Robert Foti Megan Halsch Ryan O'Leary	

OPERATIONS & FINANCE

Circulation Director Jon Severn circulation@mjhassoc.com	Vice President, Finance Leah Babitz, CPA
	Controller Katherine Wyckoff

CORPORATE

Chairman & Founder Mike Hennessy Sr	Senior Vice President, Development & Enterprise Systems John Paul Uva
Vice Chairman Jack Lepping	Senior Vice President, Audience Generation & Product Fulfillment Joy Puzzo
President & CEO Mike Hennessy Jr	Vice President, Human Resources & Administration Shari Lundenberg
Chief Strategy Officer & President, Agency Services George Glatz	Vice President, Business Intelligence Chris Hennessy
Chief Financial Officer Neil Glasser, CPA/CFE	Vice President, Corporate Branding & B2B Marketing Amy Erdman
Executive Vice President, Operations Tom Tolvé	Executive Creative Director, Creative Services Jeff Brown
Senior Vice President, Content Silas Inman	
Senior Vice President, I.T. & Enterprise Systems John Moricone	



2 Clarke Drive, Suite 100
Cranbury, NJ 08512 • (609) 716-7777

Copyright © 2019 by Managed Care & Healthcare Communications, LLC

The American Journal of Managed Care® ISSN 1088-0224 (print) & ISSN 1936-2692 (online) is published monthly by Managed Care & Healthcare Communications, LLC, 2 Clarke Drive, Suite 100, Cranbury, NJ 08512. Copyright © 2019 by Managed Care & Healthcare Communications, LLC. All rights reserved. As provided by US copyright law, no part of this publication may be reproduced, displayed, or transmitted in any form or by any means, electronic or mechanical, without the prior written permission of the publisher. For subscription inquiries or change of address, please call 888-826-3066. For permission to photocopy or reuse material from this journal, please contact the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923; Tel: 978-750-8400; Web: www.copyright.com. Reprints of articles are available in minimum quantities of 250 copies. To order custom reprints, please contact Gilbert Hernandez, *The American Journal of Managed Care*®, gherandez@ajmc.com; Tel: 609-716-7777. *The American Journal of Managed Care* is a registered trademark of Managed Care & Healthcare Communications, LLC. www.ajmc.com • Printed on acid-free paper.

Examining the Clinical and Economic Impact of Insomnia in Older Adults in the United States

SLEEP DISORDERS ARE COMMON among older adults in the United States. The results of the 2018 Sleep in America poll found that 44% of older (>65 years) adult respondents reported a sleep disorder diagnosis.¹ Furthermore, the National Institute on Aging found in its study of 9000 people aged at least 65 years, the Established Populations for Epidemiological Studies of the Elderly (EPESE), that more than half the participants reported a chronic sleep difficulty. These difficulties included trouble falling asleep or waking up, waking up too early, feeling tired, and requiring a nap.² The prevalence of insomnia among older adults appears to be increasing. An analysis of Medicare data found that the diagnosis of insomnia among beneficiaries increased significantly between 2006 and 2013, from 3.9% to 6.2% ($P < .001$).³

The impact of poor sleep goes far beyond feeling tired. Sleep quality has been associated with negative effects on cognitive function, chronic disease, and mortality risk. In addition to negatively impacting the affected individual, sleep disturbances impact society on a larger scale through their association with accidents and errors at work and home, loss in workplace productivity, and increased healthcare costs.

The Impact of Insomnia at Work

In addition to negatively impacting an individual's quality of life, disordered sleep affects the ability to perform basic daily functions. In a study of Medicare enrollees, those who reported difficulty falling asleep were more likely to have 2 or more limitations to instrumental activities of daily living, which includes day-to-day activities such as shopping, personal financial management, cooking, and housework.⁴ In turn, this can affect job performance and contribute to workplace accidents and errors.⁵

The results of an analysis of data from the America Insomnia Survey, which included 4991 employed and healthcare-insured respondents and was administered October 29, 2008, through July 31, 2009, indicated that the total costs of insomnia-related workplace errors and accidents were greater than the costs of other workplace errors and accidents. Errors associated with insomnia were more costly on average (+\$20,976), and a combined average estimated an increased cost of errors and accidents of \$10,428 per incident. Although the population of older adult workers in the analysis was relatively small, the rate of insomnia-related accidents and/or errors in the older working adult population was significant ($P < .05$).⁵

In addition to workplace accidents and errors, insomnia contributes to loss of work due to presenteeism—estimated work lost due to underperformance at work—and absenteeism. The results of a telephone survey of 7428 employed health plan subscribers in which an estimated 23.2% of respondents had insomnia, indicated that presenteeism accounted for approximately two-thirds of all work performance lost compared with one-third for absenteeism. When focused on the older adult worker, however, absenteeism was the primary reason for lost work from insomnia to ($P = .006$).⁶

The authors of that same study also analyzed work loss in terms of cost and found that on an individual basis, US workers with insomnia lost 11.3 days of

work annually, before adjusting for comorbidity. After controlling for comorbidity, US workers with insomnia lost 7.8 days of work annually. These values translate into \$3274 loss in human capital value before controlling for comorbidity and \$2280 after, respectively. If these findings were extrapolated to the total US labor force, they would amount to \$91.7 billion and 367.0 million days lost from work before controlling for comorbidity and \$63.2 billion and 252.7 million days after adjustment.⁶

Insomnia and Patient Health

In addition to having an immediate impact on a person's well-being, sleep disorders also affect a person's health, particularly in older adults. In a cohort study of older women, those with sleep debt were more likely to be obese, to be less active, and to have diabetes and hypertension than those with no sleep debt. Older women with sleep debt also were significantly more likely to have poor (odds ratio [OR], 1.61; 95% CI, 1.23-2.10; $P < .05$) and intermediate (OR, 1.28; 95% CI, 1.04-1.59; $P < .05$) cardiovascular health.⁷

Sleep disorders in older adults are also associated with falls. Older adults who reported falling at least once in the previous 2 years reported more symptoms of insomnia than those who had not fallen, and a higher percentage of older adults who had fallen also reported using sleep medication (both prescribed and nonprescribed).⁸

The impact on an individual's health is not limited to physical health; sleep disorders are also associated with mental health in older adults. In a survey of older patients from primary care facilities, disturbed sleep correlated with decreased physical and mental health scores.⁹ Another study of Medicare data found that the incidence of psychological disorders, pain, fibromyalgia, and migraine, was higher in people with sleep disorders.¹⁰ And in the EPESE study, insomnia was found to be more common in those with symptoms of depression.²

Sleep disorders are also associated with dementia, delirium, and declining memory in older adults. In an observational sleep study of 16 nursing home residents with cognitive impairment and frequent agitation, requests for attention, erratic movements, and odd sounds were more common in patients with disrupted sleep.¹¹ Conversely, agitation (screaming, picking at objects) decreased immediately following sleep.¹¹ Furthermore, the results of the Women's Health Initiative Memory Study from 1995-2008 showed that compared with those who slept 7 hours a night, women who slept 6 or fewer hours had a 35% higher risk of dementia or mild cognitive impairment; those who slept 8 hours or more had a 22% increased risk ($P < .01$).¹²

An association between insomnia and Alzheimer disease (AD) has also been suggested. The results of a prospective cohort study of 737 older adults without dementia found that the risk of developing AD was significantly

associated with sleep fragmentation (hazard ratio [HR], 1.22; 95% CI, 1.03-1.44; $P = .02$). Sleep fragmentation was assessed through continuous actigraphy recordings over an average of 9.3 days (SD, 0.9 days). Patients in the study were followed for a mean of 3.3 years (SD, 1.7 years) and were tested for AD and cognitive decline through different neuropsychological tests. High (90th percentile) sleep fragmentation was associated with a 1.5-times increased risk of developing AD compared with an individual with low (10th percentile) sleep fragmentation.¹³

Insomnia and Healthcare Costs

The impact of sleep disturbances on the health system can be substantial, as evidenced by data from the 2006 and 2008 waves of the Health and Retirement Study, which investigated the link between insomnia symptoms and health service use among a study population comprising 14,355 adults 55 years and older.¹⁴

At baseline in 2006, 24% of the population reported having 1 symptom of insomnia, and 18% reported having 2 or more symptoms. In 2008, the population was questioned about health service use during the past 2 years, and responses showed that 27% had been hospitalized, 8% had used home healthcare, 4% had used nursing homes, and 29% had used any of these 3 services.¹⁴ After adjusting for demographic factors, the investigators found that insomnia was linked with increased use of costly healthcare services. Compared with respondents without insomnia, those who reported 1 symptom of insomnia were more likely to be hospitalized (adjusted OR [aOR], 1.28; 95% CI, 1.15-1.43; $P < .001$), use home healthcare (aOR, 1.29; 95% CI, 1.09-1.52; $P = .004$), and use any health service (aOR, 1.28; 95% CI, 1.15-1.41; $P < .001$). Respondents with 2 or more symptoms were more likely to be hospitalized (aOR, 1.71; 95% CI, 1.50-1.96; $P < .001$), use home healthcare (aOR, 1.64; 95% CI, 1.32-2.04; $P < .001$), use nursing homes (aOR, 1.45; 95% CI, 1.10-1.90; $P = .009$), and use any health service (aOR, 1.72; 95% CI, 1.51-1.95; $P < .001$).¹⁴

Several economic studies have also highlighted the substantial cost burden associated with insomnia. One study of data from employer-sponsored health insurance plans found that 6-month direct healthcare costs among patients (≥ 65 years) with untreated insomnia (indicated as ≥ 1 claim with an *International Classification of Diseases, Ninth Revision, Clinical Modification* diagnosis code for insomnia) were approximately \$1143 greater than for matched patients without insomnia.¹⁵

Another study assessed the inpatient costs of 484,707 Medicare beneficiaries (151,668 of whom had insomnia), over 11 months. The results indicated that beneficiaries with insomnia had higher rates of healthcare use across all point-of-service locations than beneficiaries without insomnia. Untreated insomnia was associated with an increase of

\$63,607 in all-cause healthcare costs over 11 months. In particular, the increase in healthcare costs was found to be related to costs linked with inpatient care. Because insomnia and use of some insomnia medications have been linked with a greater risk for fall-associated injuries, the authors noted that these factors could have contributed to inpatient costs. Patients with insomnia in the study were also more likely to be women and to have more comorbidities, of which psychological and pain conditions such as depression, anxiety, fibromyalgia, and migraine were reported at double the rates compared with participants without insomnia.¹⁰

Another recent study also assessed the economic effect of insomnia medication treatment among 23,079 Medicare beneficiaries with diagnosed insomnia. Of these, 22% were taking at least 1 FDA-approved medication for insomnia, while 78% were not taking any medication for the condition. The findings showed that all-cause healthcare costs rose among both the treated and untreated groups during the 12 months leading up to an insomnia diagnosis but ultimately stabilized after diagnosis; however, total costs during these 12 months were higher among the untreated patients. Healthcare use also increased among both groups during this time period. Inpatient costs predominantly contributed to total healthcare costs, a finding that deserves further investigation in future studies, the authors emphasized.¹⁶

Finally, a retrospective cohort study that analyzed data from a Midwestern health plan found that compared with matched controls (mean age, 49.37 years), patients with insomnia (mean age, 48.47 years) had 26% higher healthcare costs at baseline and 46% higher costs at a 12-month follow-up (n = 7647). These patients also had higher healthcare resource utilization and costs at baseline (\$5485) versus controls (\$3937). At the 12-month follow-up, these costs increased to \$11,206 and \$6939, respectively.¹⁷

Conclusions

Sleep disorders among older adults are associated with decreased productivity, poor physical and mental health, and accidents. Because the expense to the individual and the healthcare system as a result of insomnia in older adults can be substantial, a focus on diagnosing and treating the disorder could lead to improved patient health, fewer workplace accidents and errors, and decreased healthcare costs. ♦

REFERENCES

- National Sleep Foundation's 2018 Sleep in America Poll shows Americans failing to prioritize sleep. National Sleep Foundation website. [sleepfoundation.org/press-release/national-sleep-foundations-2018-sleep-american-poll-shows-americans-failing](https://www.sleepfoundation.org/press-release/national-sleep-foundations-2018-sleep-american-poll-shows-americans-failing). Accessed September 9, 2019.
- Foley DJ, Monjan AA, Brown SL, Simonsick EM, Wallace RB, Blazer DG. Sleep complaints among elderly persons: an epidemiologic study of three communities. *Sleep*. 1995;18(6):425-432. doi: 10.1093/sleep/18.6.425.
- Albrecht JS, Wickwire EM, Vadlamani A, Scharf SM, Tom SE. Trends in insomnia diagnosis and treatment among Medicare beneficiaries, 2006-2013. *Am J Geriatr Psychiatry*. 2019;27(3):301-309. doi: 10.1016/j.jagp.2018.10.017.
- Newman AB, Enright PL, Manolio TA, Haponik EF, Wahl PW. Sleep disturbance, psychosocial correlates, and cardiovascular disease in 5201 older adults: the Cardiovascular Health Study. *J Am Geriatr Soc*. 1997;45(1):1-7. doi: 10.1111/j.1532-5415.1997.tb00970.x.
- Shahly V, Berglund PA, Coulouvrat C, et al. The associations of insomnia with costly workplace accidents and errors: results from the America Insomnia Survey. *Arch Gen Psychiatry*. 2012;69(10):1054-1063. doi: 10.1001/archgenpsychiatry.2011.2188.
- Kessler RC, Berglund PA, Coulouvrat C, et al. Insomnia and the performance of US workers: results from the America insomnia survey. *Sleep*. 2011;34(9):1161-1171. doi: 10.5665/SLEEP.1230.
- Cabeza de Baca T, Chayama KL, Redline S, et al. Sleep debt: the impact of weekday sleep deprivation on cardiovascular health in older women. *Sleep*. 2019;42(10); doi: 10.1093/sleep/zsz149.
- Chen TY, Lee S, Buxton OM. A greater extent of insomnia symptoms and physician-recommended sleep medication use predict fall risk in community-dwelling older adults. *Sleep*. 2017;40(11). doi: 10.1093/sleep/zsx142.
- Reid KJ, Martinovich Z, Finkel S, et al. Sleep: a marker of physical and mental health in the elderly. *Am J Geriatr Psychiatry*. 2006;14(10):860-866. doi: 10.1097/01.JGP.0000206164.56404.ba.
- Wickwire EM, Tom SE, Scharf SM, Vadlamani A, Bulatao IG, Albrecht JS. Untreated insomnia increases all-cause health care utilization and costs among Medicare beneficiaries. *Sleep*. 2019;42(4):1-8. doi: 10.1093/sleep/zsz007.
- Cohen-Mansfield J, Werner P, Freedman L. Sleep and agitation in agitated nursing home residents: an observational study. *Sleep*. 1995;18(8):674-680.
- Chen JC, Espeland MA, Brunner RL, et al. Sleep duration, cognitive decline, and dementia risk in older women. *Alzheimers Dement*. 2016;12(1):21-33. doi: 10.1016/j.jalz.2015.03.004.
- Lim AS, Kowgier M, Yu L, Buchman AS, Bennett DA. Sleep fragmentation and the risk of incident Alzheimer's disease and cognitive decline in older persons. *Sleep*. 2013;36(7):1027-1032. doi: 10.5665/sleep.2802.
- Kaufmann CN, Canham SL, Mojtabei R, et al. Insomnia and health services utilization in middle-aged and older adults: results from the Health and Retirement Study. *J Gerontol A Biol Sci Med Sci*. 2013;68(12):1512-1517. doi: 10.1093/geron/glt050.
- Ozminowski RJ, Wang S, Walsh JK. The direct and indirect costs of untreated insomnia in adults in the United States. *Sleep*. 2007;30(3):263-273. doi: 10.1093/sleep/30.3.263.
- Wickwire EM, Vadlamani A, Tom SE, Johnson AM, Scharf SM, Albrecht JS. Economic aspects of insomnia medication treatment among Medicare beneficiaries [published online August 16, 2019]. *Sleep*. doi: 10.1093/sleep/zsz192. [Epub ahead of print]
- Anderson LH, Whitebird RR, Schultz J, McEvoy CE, Kreitzer MJ, Gross CR. Healthcare utilization and costs in persons with insomnia in a managed care population. *Am J Manag Care*. 2014;20(5):e157-e165.