Insomnia in the Elderly: Assessment and Management in a Primary Care Setting

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INTRODUCTION

Insomnia is a common problem in the elderly [1–3]. Population-based surveys reveal that up to 40% of people aged 65 years and older are dissatisfied with their sleep or report trouble sleeping. Twelve percent to 25% of these patients complain of persistent insomnia [4]. Overall, it is estimated that up to one third of patients seen in the primary care setting experience occasional difficulties with sleep.

In the United States, the elderly make up 13% of the total population but receive 35% to 40% of the prescriptions written for sedative hypnotics [5]. Hypnotic medications are the primary agents used in the short-term management of insomnia. Older persons are prescribed hypnotics at twice the rate of younger persons and are more likely to be long-term (> 1 year) users of hypnotic agents [5].

Insomnia and the chronic use of sedating medications cause accidents, loss of productivity, increased morbidity and mortality, greater utilization of health care, alcohol abuse, and depression [6,7]. The National Highway Traffic Safety Administration estimates that 56,000 crashes per year are the result of persons falling asleep at the wheel [8,9]. In persons with dementia, sleep disruption can lead to nursing home placement [8]. The use of certain hypnotics (long-acting benzodiazepines), cyclic antidepressants, and antipsychotics have been shown to increase the rate of hip fracture in the elderly [10–12].

Direct costs (eg, doctors visits, medication) as well as indirect costs (eg, injury due to hip fracture, lost productivity) contribute to the economic burden associated with insomnia. The annual cost of insomnia in the United States has been conservatively estimated at $92.5 to $107.5 billion [7]. When compared with the direct and indirect costs of heart disease and stroke ($259 billion) [13] or asthma ($11.3 billion) [14], the costs of insomnia are extraordinary.

Insomnia is rarely the primary reason patients schedule office visits [6]; only 5% of the estimated 65 million Americans who have insomnia present to their physicians with an insomnia complaint [15,16]. In light of the multiple adverse clinical, economic, and quality-of-life outcomes seen with this disorder, it is important for primary care physicians to be able to detect and effectively manage insomnia in their elderly patients.

CASE STUDY

Initial Presentation

A 77-year-old woman presents to her primary care physician complaining of an inability to sleep and requests a “sleeping pill.”

History

The patient’s chief complaint centers on her inability to stay asleep. She states that she usually falls asleep within a half-hour after going to bed but wakes up 2 hours later and cannot fall back to sleep. She makes frequent trips to the bathroom during the night. In the morning, she feels as if she “has not slept at all.” She has had this problem for at least 2 months. She self-medicates with diphenhydramine 25 mg as needed at bedtime for the management of her sleep complaints. The patient has a history of hypertension, and her current medications are furosemide 40 mg/day and atenolol 50 mg/day. She considers her diet “normal” but drinks 1 to 2 cups of coffee in the morning and 1 to 2 cups of herbal tea “for relaxation” in the evening. Her husband says that the tea provokes irritation rather than relaxation. She quit smoking 25 years ago and denies any substance use. She lives at home with her spouse of 50 years.

Physical Examination

Physical examination is essentially unremarkable. Blood pressure is 140/85 mm Hg and pulse is 70 bpm. There is no evidence of pulmonary congestion, but pedal edema is noted.
• **How is insomnia defined and classified?**

Insomnia is defined by the National Institutes of Health as an experience of inadequate or poor quality of sleep characterized by difficulty falling asleep, difficulty maintaining sleep, waking up too early in the morning, or nonrefreshing sleep. The daytime consequences of insomnia include tiredness, lack of energy, difficulty concentrating, and irritability [6].

Insomnia can be either acute or chronic. Acute insomnia is characterized by periods of sleep difficulty lasting between 1 night and a few weeks. Emotional or physical discomfort, disruptions in daily biological rhythms, or acute illness are causative factors. Chronic insomnia refers to sleep difficulty at least 3 nights per week lasting longer than 1 month. Chronic insomnia can be caused by multiple factors acting singly or in combination and often occurs in conjunction with other health problems.

• **What factors may be contributing to this patient’s insomnia?**

Insomnia can be associated with a number of psychiatric, medical, and neurologic disorders (Table 1). Mood and anxiety disorders are the most common psychiatric diagnoses associated with insomnia [17,18]. Medication and substance use may contribute to difficulty sleeping. In addition, sleep disorders such as restless legs syndrome, periodic limb movement disorder, and sleep apnea can interfere with sleep. Management strategies should be directed toward identifying and treating the underlying condition. When other causes of insomnia are ruled out or treated, primary insomnia may account for difficulty with sleep. Chronic stress, hyperarousal, poor sleep hygiene, and behavioral conditioning may be factors contributing to primary insomnia [6]. Napping during the day can exacerbate insomnia by reducing the ability to fall asleep at the “usual” bedtime [9].

Insomnia is not a normal consequence of aging; however, sleep patterns do change over a person’s lifetime. In older individuals, the sleep-wake cycle may be fragmented and the deepest stages of non-REM (rapid eye movement) sleep are reduced or nonexistent, resulting in more frequent nighttime arousals and awakenings. REM sleep seems to be preserved. In elderly persons, there is a shift in circadian rhythm that may cause disruptions in the desired sleep-wake cycle. Older people tend to fall asleep earlier in the evening and awaken earlier in the morning (advanced sleep phase syndrome). This may or may not be a source of patient complaint. Although sleep efficiency (the ratio of time spent sleeping to total time spent in bed) is lower in elderly compared with younger persons, it should not be assumed the elderly require less sleep.

• **What questions can help identify and characterize sleep problems?**

Following a complaint of insomnia, patients should be asked about specific sleep/wake habits and activities. Some example questions that can be asked during a sleep history are shown in Table 2. Information may also be gleaned from questioning family members. Patients should further be instructed to keep a sleep diary for 1 to 2 weeks. In addition to providing a useful account of the patient’s symptoms and activities, the diary may serve as a baseline for assessment of treatment effects [6]. A sample sleep diary form is shown in the Figure.

Often, patients underestimate their own degree of sleep difficulty. Therefore, incorporating a question about sleep into the review of systems (eg, “Do you have any difficulty initiating or maintaining sleep?”) may be helpful in identifying older patients with insomnia.

Sleep studies are not used routinely in the evaluation of insomnia but may be indicated in the elderly patient if the patient has excessive daytime sleepiness or to rule out

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**Table 1. Conditions Associated with Chronic Insomnia**

<table>
<thead>
<tr>
<th>Psychiatric disorders</th>
<th>Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical/neurologic disorders</td>
<td>Osteoarthritis</td>
</tr>
<tr>
<td>Medication or substance use</td>
<td>Certain hypertensives</td>
</tr>
<tr>
<td></td>
<td>Decongestants</td>
</tr>
<tr>
<td></td>
<td>Diuretics</td>
</tr>
<tr>
<td></td>
<td>Caffeine (eg, coffee, tea, soft drinks, chocolate)</td>
</tr>
<tr>
<td></td>
<td>Nicotine</td>
</tr>
<tr>
<td></td>
<td>Stimulants</td>
</tr>
<tr>
<td>Specific sleep disorders</td>
<td>Circadian rhythm sleep disorders</td>
</tr>
<tr>
<td></td>
<td>Obstructive sleep apnea</td>
</tr>
<tr>
<td></td>
<td>Periodic limb movement disorder</td>
</tr>
<tr>
<td>Restless legs syndrome</td>
<td>Primary insomnia</td>
</tr>
</tbody>
</table>

breathing-related sleep disorders, periodic limb movement disorder, or narcolepsy [19].

Additional History

The physician inquires about symptoms of depression, anxiety, and specific sleep disorders. No underlying psychiatric or sleep disorders are identified.

- What are management strategies for patients with insomnia?

The need for treatment is usually determined by the severity of daytime symptoms, duration of insomnia, and predictability of the episodes. Chronic insomnia often has a multifactorial etiology and therefore may require more than one treatment modality. Pharmacologic therapy usually predominates; however, nonpharmacologic therapy has also been shown to improve symptoms. A meta-analysis by Morin et al [4] examined the effect and durability of nonpharmacologic treatments for the clinical management of chronic insomnia. The nonpharmacologic interventions produced reliable and durable changes in sleep patterns, and results were maintained at follow-up averaging 6 months in duration. In a 1999 randomized controlled trial [20], a combination of behavioral therapy and pharmacotherapy was effective for short-term management of insomnia late in life. However, sleep improvements were better sustained over time with behavioral therapy alone. Furthermore, behavioral treatment, either alone or combined, was rated more effective than pharmacotherapy by subjects, their significant others, and clinicians.

Nonpharmacologic Therapy

Sleep Hygiene Education

Sleep hygiene education primarily focuses on identifying and modifying lifestyle behaviors and environmental factors that affect sleep. Sleep hygiene education should be incorporated into all treatment modalities when treating an elderly patient [4]. Good sleep hygiene measures are listed in Table 3.

Stimulus Control Therapy

Stimulus control therapy is based on the premise that insomnia is a conditioned response to temporal and environmental cues usually associated with sleep. The main objective of stimulus control therapy is to reassociate the bed and bedroom with rapid sleep onset. Stimulus control therapy includes:

• Going to bed only when sleepy
• Leaving the bed and going into another room when unable to fall asleep and returning only when sleep is imminent
• Arising at the same time every morning regardless of the amount of sleep obtained
• Reserving the bed and bedroom for sleep and sexual activities
• Minimizing daytime napping

Elderly patients may be reluctant to follow all the instructions involved in stimulus control therapy. For example, a patient may worry about falling when getting out of bed. Participating in an activity after they get out of bed (e.g., reading) will help patients take their mind off their sleep problem.
# SLEEP DIARY

**Name**

<table>
<thead>
<tr>
<th>Date</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed time (previous night)</td>
<td>10:45 P.M.</td>
</tr>
<tr>
<td>Rise time</td>
<td>7:00 A.M.</td>
</tr>
<tr>
<td>Estimated time to fall asleep (previous night)</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Estimated number of awakenings and total time awake (previous night)</td>
<td>5 times 2 hours</td>
</tr>
<tr>
<td>Estimated amount of sleep obtained (previous night)</td>
<td>4 hours</td>
</tr>
<tr>
<td>Naps (time and duration)</td>
<td>3:30 45 minutes</td>
</tr>
<tr>
<td>Alcoholic drinks (number and time)</td>
<td>1 drink at 8:00 P.M.</td>
</tr>
<tr>
<td>List stresses experienced today</td>
<td>Flat tire Argued w/ son</td>
</tr>
<tr>
<td>Rate how you felt today</td>
<td>2</td>
</tr>
<tr>
<td>1. Very tired/ sleepy</td>
<td></td>
</tr>
<tr>
<td>2. Somewhat tired/ sleepy</td>
<td></td>
</tr>
<tr>
<td>3. Fairly alert</td>
<td></td>
</tr>
<tr>
<td>4. Wide awake</td>
<td></td>
</tr>
<tr>
<td>Irritability</td>
<td>5</td>
</tr>
<tr>
<td>1 = not at all; 5 = very</td>
<td></td>
</tr>
<tr>
<td>Medications</td>
<td></td>
</tr>
</tbody>
</table>

Sleep Restriction Therapy
Sleep restriction therapy may help insomniacs by consolidating sleep and creating sleep efficiency. Individuals are instructed to decrease the amount of time they spend in bed. Initially, the time allowed sleeping is obtained by averaging the amount of time spent sleeping for 1 week. Weekly adjustments are made in 15- to 20-minute increments depending on the sleep efficiency for that week. If the patient exceeds 90% efficiency, the time spent in bed is increased. If the patient falls below 80% efficiency, the time spent in bed is decreased. One study demonstrated that sleep restriction therapy improved sleep efficiency in as little as 1 week in some patients [21]. Fatigue and sleepiness is likely seen in early treatment; however, changes in sleep are well maintained in the future.

Relaxation Therapy
Relaxation therapy is an approach to treating insomnia based on the observation that hyperarousal interferes with sleep. It is the most common nonpharmacologic treatment for insomnia. Progressive muscle relaxation, autogenic training, and imagery training or meditation are examples of methods used. Stimulus control and sleep restriction therapy may be more effective than relaxation therapy [22]. Older adults may find relaxation therapy difficult. Although not a good candidate for first-line therapy in this population, it may serve as a useful adjunct.

Exercise
Regular aerobic exercise has been shown to deepen sleep [6]. In a study of older adults with moderate sleep complaints, regular moderate-intensity exercise was beneficial for improving subjective quality of sleep [23]. More controlled studies are needed to determine whether or not exercise improves insomnia in the elderly.

Light Therapy
Many practitioners are beginning to use or recommend light therapy for their elderly patients with insomnia. Various studies indicate light therapy may improve sleep efficacy, sleep quality, insomnia due to delayed sleep phase syndrome (difficulty falling asleep and difficulty waking at desired times), and insomnia due to advanced sleep phase syndrome (difficult staying awake and waking too early) [24–26]. However, specific recommendations on light therapy are rapidly changing, and current literature should be consulted for specific treatment guidelines for elderly patients with insomnia.

Pharmacotherapy

Hypnotic Agents
The primary indication for hypnotic medication use is for the short-term treatment of insomnia, alone or as an adjunct agent. The most common hypnotics used in the treatment of insomnia are benzodiazepines. In general, benzodiazepines shorten sleep latency (time it takes to fall asleep), reduce the number and duration of nighttime awakenings, and increase total sleep time. Benzodiazepines also prolong latency to REM sleep, decrease REM sleep, and disrupt deep sleep stages. Estimates indicate that 15% of patients using benzodiazepines take them for longer than 1 year. No studies have shown the benefit of long-term benzodiazepine use, and few studies have evaluated the safety and efficacy of use longer than a few months [6].

Benzodiazepines are classified according to their half-life and duration of action [5,27,28]. The prototypical short-acting benzodiazepine, triazolam, has rapid therapeutic effects and a decreased adverse effect profile versus the longer-acting agents. Triazolam has a half-life of approximately 2 to 6 hours, has clinically significant metabolites, and is rapidly absorbed. However, this medication has been associated with severe rebound insomnia [5], and its short action may not be optimal for treating early morning awakenings seen in the elderly population. Temazepam is the prototypical intermediate-acting benzodiazepine, with a half-life of approximately 10 to 17 hours. It is absorbed quickly and reaches a peak plasma concentration in 2 hours. It is metabolized by the conjugation (phase II metabolism) pathway and has no clinically significant active metabolites [5,29,30]. Because the intermediate-acting benzodiazepines (temazepam, estazolam, alprazolam, oxazepam, lorazepam, halazepam, chlordiazepoxide) have a slower onset of action and a longer elimination half-life than the shorter-acting agents, caution is necessary when prescribing these agents. Long-acting benzodiazepines (diazepam, flurazepam, clonazepam, quazepam) have a slower onset than both the short- and intermediate-acting agents. They have high lipid solubility, a large volume of distribution, active metabolites, and a long half-life (> 24 hours) that causes accumulation resulting in daytime somnolence, confusion, and an increased risk of hip fractures [10,11]. These agents should be avoided in the elderly.

The most common adverse effects associated with the use of benzodiazepines in the elderly include residual daytime sedation, decreased mental acuity, coordination impairment,
Nonbenzodiazepine Hypnotics
Zolpidem. Zolpidem is a nonbenzodiazepine imidazopyridine hypnotic lacking any muscle relaxant, anxiolytic, and anticonvulsant properties. The half-life of this short-acting agent is 1.5 to 2.4 hours, with a rapid onset of action of 2 hours following oral ingestion, and is without active metabolites. In the elderly, the half-life is prolonged to 2.5 hours, requiring a decrease in dosage when used in this population [33]. Zolpidem is absent of tolerance or withdrawal symptoms, and it lacks respiratory suppressant activity in patients with pulmonary disease. Furthermore, it induces a sleep pattern similar to physiologic sleep [33]. Zolpidem also appears to lack any associated daytime sleepiness (study results may be inconsistent) or effects on memory. It is well tolerated, but adverse reactions such as dizziness or lightheadedness, somnolence, gastrointestinal upset, and pain have been observed [21]. Confusion and falls also have been reported while using zolpidem. The extent of adverse effects is dose-related and occurs at a higher frequency in patients older than 65 years using nightly doses more than 5 mg. Its use should be cautioned in patients with hepatic or renal disease. Alcohol potentiates the effects of zolpidem but lacks any other significant drug-drug interactions. When switching a patient to zolpidem from a benzodiazepine, it is advisable to taper the benzodiazepine over 1 to 2 weeks and include a washout period of 2 to 3 days before beginning zolpidem [5,31].

Zaleplon. Zaleplon belongs to a novel new class of sedatives unrelated to any other hypnotic agent on the market, the pyrazolopyrimidines. It was approved by the U.S. Food and Drug Administration (FDA) in August 1999 and is indicated for short-term treatment of insomnia in adults, including elderly patients. Studies show that it binds selectively to the GABA<sub>A</sub> receptor complex and potentiates t-butylbicyclophosphorothionate binding. Zaleplon is rapidly absorbed, with a terminal half-life of approximately 1 hour, and does not accumulate with once-daily dosing. After oral administration, zaleplon is extensively metabolized without any active metabolites. In the elderly, the pharmacokinetics are not significantly different; however, the dose should be reduced in patients with mild to moderate hepatic impairment and avoided in those with severe impairment [34]. Memory impairment, sedative/psychomotor effects, withdrawal-emergent anxiety and insomnia, and other withdrawal-emergent phenomena while using zaleplon have been studied during clinical trials. In normal subjects, memory impairment and sedative/psychomotor effects were not present at 2 hours in one study and in none of the studies at 3 to 4 hours. No increase in withdrawal-emergent daytime anxiety was detected. When using 5- or 10-mg doses, zaleplon had minimal subjective and no objective evidence of rebound insomnia after the first night following discontinuation. But when using the 20-mg doses, both subjective and objective rebound insomnia occurred on the first night following discontinuation. Furthermore, rebound insomnia apparently resolved by the second night following withdrawal [34].

Antidepressants
The National Heart, Lung, and Blood Institute Working Group on Insomnia concluded that little data are available to recommend the use of antidepressants for insomnia in non-depressed patients [6]. But when prescribed for patients with major depression, sedating antidepressants (eg, amitriptyline, doxepin, imipramine) improved subjective and objective measures of insomnia, and the sleep symptoms of depression improved more quickly than other symptoms [35]. Antidepressants cause anticholinergic side effects (ie, constipation, blurred vision, nausea, dryness of the mouth,
confusion), cardiac toxicity, orthostatic hypertension, and sexual dysfunction (selective serotonin reuptake inhibitors [SSRIs]). In some individuals, tricyclic antidepressants (eg, amitriptyline, desipramine) and SSRIs can exacerbate restless leg syndrome and periodic limb movement disorder [6]. The use of antidepressants in the treatment of insomnia should be reserved for individuals with concomitant depression or other psychiatric disorders.

Antihistamines
Antihistamines are known to have sedative effects, but they also cause daytime sedation, cognitive impairment, and anticholinergic side effects. The elderly are especially susceptible to these undesirable effects; therefore, the use of antihistamines in this population should be avoided.

Melatonin
Melatonin plays an important role in the regulation of the sleep/wake cycle in humans [36]. It is released by the pineal gland in a higher concentration at night, and changes in its secretion cycle are associated with sleep disturbances in older individuals [36]. Elderly patients with insomnia who are deficient in melatonin and have been administered a sustained-release or fast-release formulation generally have improved initiation and maintenance of sleep. Sustained-release products are indicated for the individual who has difficulties maintaining sleep, while the fast-release formulations improve sleep initiation. Melatonin therapy decreased sleep latency and/or increased sleep efficiency and wake time after sleep onset. In one study, pruritus was reported but resolved spontaneously. Tolerance may not develop, but sleep quality may diminish when melatonin therapy is discontinued. Melatonin may also play a role in assisting chronic benzodiazepine users discontinue their use [36]. The FDA has not approved melatonin; therefore, the safety and purity can not be ensured. Furthermore, the use of melatonin to treat insomnia is still under investigation and for now its use should be cautioned.

Other Agents
Older drugs such as chloral hydrate, methyprylon, and meprobamate are not recommended for treatment of insomnia because of their narrow therapeutic ratio, rapid development of tolerance, high potential for abuse, and complications associated with withdrawal [6]. One review article concluded that valerian (Valeriana officinalis), a popular herbal product, may be useful in alleviating mild, short-term insomnia [31]. However, further clinical trials are required to evaluate the safety and efficacy of this over-the-counter agent, and its use should be cautioned until more evidence is available on its role in insomnia in the elderly.

- What are caveats in selecting therapy for elderly patients with insomnia?

Prescribing in the Elderly
The physiologic changes of aging include increased adipose tissue and reduced total body water, lean body mass, concentration of plasma proteins, number of functioning hepatocytes, liver mass, renal function, and renal plasma flow. The clinical effect of these changes varies according to the physical properties of the drug prescribed. When an elderly person is using an agent that is metabolized through processes in the liver, the half-life of the agent may be increased. It is also important to recognize that the lipophilicity and active metabolites of these agents greatly contribute to their effects in the elderly (ie, prolonged duration of activity, accumulation, and/or increases in adverse effects). Therefore, it is important for practitioners to review the pharmacokinetic and pharmacodynamic changes that occur

Technology in the Treatment of Insomnia: Partners for Healthy Aging

Systematic, computerized approaches to improving pharmacy care may be an effective way to reduce potentially inappropriate medication use, including medication use for the treatment of insomnia. The Partners for Healthy Aging program developed by Merck-Medco Managed Care, L.L.C., for example, uses a computerized drug utilization review database linked to a telepharmacy intervention to improve medication use in the elderly. An independent medical advisory board consisting of geriatric specialists in pharmacy, medicine, and nursing developed a set of criteria addressing age-related, drug-related, and disease-related recommendations. When a prescription is written, a concurrent review applies the criteria to the patient’s prescription and medical history. The physician and pharmacist are alerted if there is any potentially inappropriate prescribing, and recommendations for appropriate agents are made [37]. The program has helped to improve prescribing patterns and quality of care in the community-based geriatric population [38].
in the elderly when choosing therapy. For example, the risk of hip fracture increases substantially when using benzodiazepines with a longer half-life compared with short-acting agents and when using doses too large for this population [11,39].

Treatment

The physician tells the patient that several factors may be contributing to her insomnia. The patient has been self-medicating with an over-the-counter sleeping agent, drinks 2 cups of herbal tea in the evening, and has been taking her diuretic at dinner time. The patient is advised to check to see whether the tea contains caffeine and, if it does, to switch to a caffeine-free variety. She is advised to take her diuretic early in the morning to reduce the number of nighttime bathroom trips. In addition, the patient is educated about sleep hygiene measures and is told to stop taking over-the-counter products for her sleeping difficulties. No pharmacologic therapy is prescribed.

Six Months Later

At a follow-up visit 6 months later, the patient reports that she is sleeping much better. She states that she wakes much less frequently during the night, if at all, and in the morning feels well-rested and ready for a new day.

Summary

Insomnia is a common problem in the elderly. Chronic insomnia is usually multifactorial in nature. First-line management should be directed at identifying and treating the underlying problem. The decision to treat an elderly patient with pharmacologic therapy must be carefully evaluated. Dosing reductions are necessary to avoid any adverse drug or long-term consequences and to minimize rebound insomnia in patients who undergo drug tapering. When drug therapy is used, short-term use is recommended. Many patients prefer and do better on nonpharmacologic therapy; employing a non-drug approach should initially be attempted.

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References