To see other CME articles, go to: www.cmegeriatrics.ca · www.geriatricsjournal.ca
If you are interested in receiving this publication on a regular basis, please consider **becoming a member**.

Canadian Geriatrics Society

INSOMNIA IN THE ELDERLY: UPDATE ON ASSESSMENT AND MANAGEMENT

Soojin Chun
MSc., MD FRCP(C)
Geriatric Psychiatry Subspecialty Resident (PGY-6), University of Ottawa

Elliott Kyung Lee
MD, FRCP(C), D. ABPN
Sleep Med, Addiction Psych, D. ABSM, F. AASM, F. APA, Sleep Specialist, Royal Ottawa Mental Health Centre, Assistant Professor, University of Ottawa

Corresponding Author:
Elliott Kyung Lee
Elliott.lee@theroyal.ca

Abstract

Insomnia disorder is one of the most common sleep-wake disorders seen in the geriatric population, and is associated with multiple psychiatric and medical consequences. Insomnia is a subjective complaint of difficulty falling and/or staying asleep, or experiencing non-restorative sleep, associated with significant daytime consequences including difficulty concentrating, fatigue and mood disturbances. There is no single diagnostic tool to assess insomnia. Consequently, an insomnia assessment requires thorough history taking including a sleep inquiry, medical history, psychiatric history, substance use history and a relevant physical examination. Insomnia is often multifactorial in origin, and routinely is associated with multiple other psychiatric and medical disorders. Therefore, predisposing, precipitating and perpetuating factors must be carefully examined in the context of an evaluation of insomnia symptoms. Other specific sleep assessments (e.g., overnight polysomnography) can be completed to rule out other sleep-wake disorders. For management, a cognitive-behavioural approach (including sleep restriction therapy, stimulus control therapy) is commonly accepted as an effective, first-line treatment for insomnia disorder. A brief version of CBT-I focusing on behavioural interventions (Brief Behavioural Treatment of Insomnia, BBT-I) has also demonstrated efficacy in the geriatric patient population. Pharmacological treatments can be considered if cognitive-behavioural approaches have failed.

L'insomnie est un des troubles les plus fréquents du sommeil et de l'éveil rencontré chez la population âgée et est associée à de multiples conséquences tant psychiatriques que médicales. L'insomnie est une plainte subjective de difficulté à initier ou maintenir le sommeil ou de sommeil non réparateur, associée à des conséquences diurnes telles que les troubles de la concentration, la fatigue et les troubles de l'humeur. Il n'y a pas d'outil diagnostique simple pour évaluer l'insomnie. En conséquence, l'évaluation de l'insomnie requiert une évaluation globale comprenant un questionnaire concernant le sommeil, l'histoire médicale, l'histoire psychiatrique et les habitudes de vie, ainsi qu'un examen physique ciblé. L'insomnie est souvent multifactorielle, associée à plusieurs comorbidités médicales et psychiatriques. Ainsi, il est important de s'attarder aux facteurs prédisposant à l'insomnie, ainsi qu'à ceux qui précipitent et perpétuent celle-ci. D'autres évaluations ciblées (par exemple une polysomnographie nocturne) peuvent être nécessaires pour éliminer d'autres causes de troubles du sommeil et de l'éveil. En ce qui concerne le traitement, une approche cognitivo-comportementale (incluant par ex. la restriction de sommeil ou le contrôle des stimuli) est favorisée comme approche thérapeutique initiale. Une version brève de cette approche ciblant les aspects comportementaux (Brief Behavioural

Key words:
Sleep, insomnia, sleep disorders, sleep medicine, sleep changes with aging

Treatment of Insomnia, BBT-I) a aussi été prouvée efficace chez les personnes âgées. Les traitements pharmacologiques ne devraient être considérés qu'en cas d'échec des approches cognitivo-comportementales.

This article has been peer reviewed.

Conflict of Interest: None

This article was published in May 2016.

Key points

1. Insomnia is common in the elderly; about 40% of patients over the age of 65 will complain of this symptom.
2. The etiology can be complex, with age, biological and psychosocial factors playing a role.
3. Evaluation should consist of a full history and physical exam, including screening for common sleep disorders such as obstructive sleep apnea, restless legs syndrome and periodic limb movement disorder. If there is a clinical suspicion of a sleep disorder, a referral to a sleep specialist and subsequent polysomnogram should be strongly considered.
4. For insomnia disorder, where there is no suspicion of an underlying sleep disorder or other medical or psychiatric disorder causing insomnia, a non-pharmacological approach, including cognitive-behavioural therapy is preferred.
5. Benzodiazepines and non-benzodiazepine benzodiazepine receptor agonists (Z-drugs) can have acute benefits for insomnia BUT are associated with significant side effects with long term use; consequently long-term use should be avoided.

Case

A 68-year-old male is referred for an evaluation of insomnia. He reports waking up 2-3 times during the night for the last 3 years ever since his mother passed away and his family had been conflicted about the estate. His wife says that he moves around a lot at night and makes funny noises with his breathing. He says: "doesn't everybody do this when they get to my age doctor?"

Introduction

Insomnia is one of the most common sleep-wake disorders with multiple psychiatric and medical comorbidities and consequences. Population-based estimates indicate that one-third of adults report insomnia symptoms[1] and 12-20% have symptoms that meet criteria for insomnia disorder[2]. The prevalence of insomnia increases to up to 40% of people older than 65[3,4].

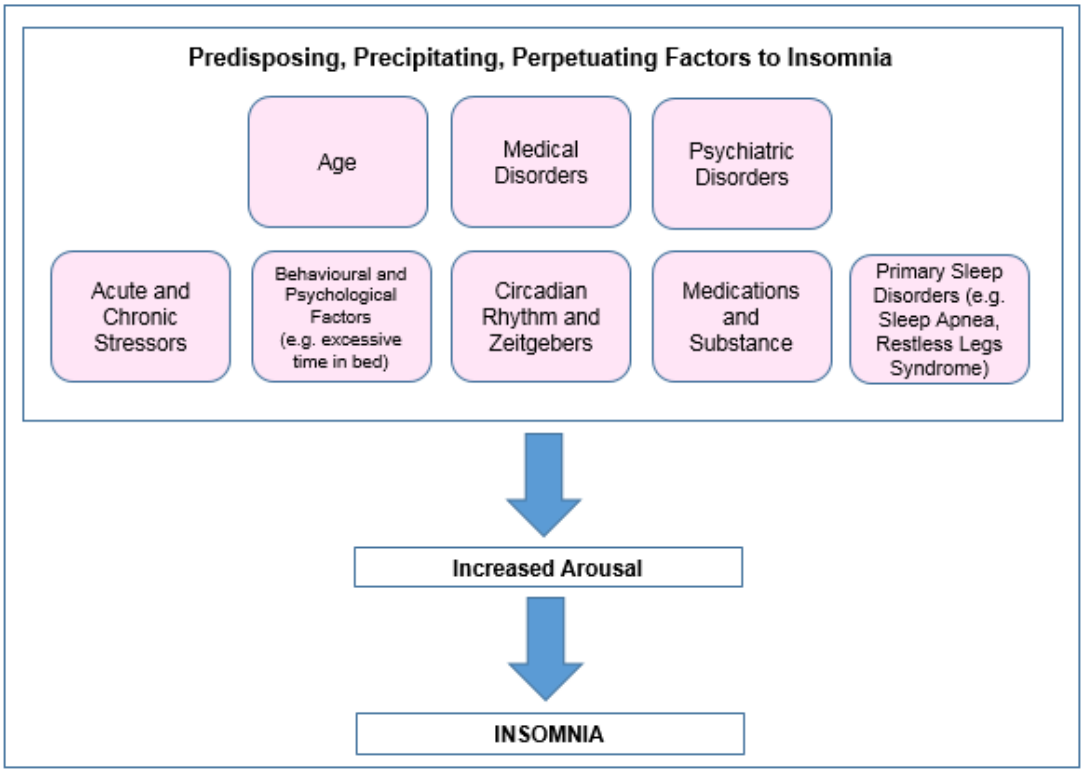
Insomnia disorder presents as a predominant complaint of dissatisfaction with either sleep quantity or quality. Problems may include difficulties with initiating sleep (initial insomnia), maintaining sleep (middle insomnia) or early morning awakenings with an inability to fall back to sleep.[1] DSM-5 also specifies that the sleep difficulty must occur at least 3 nights per week for at least 3 months, that the disorder result in significant distress or functional impairment and that there be no other etiologies (e.g., no other sleep-wake disorder, substance use or mental health/medical conditions that could explain the symptoms)[1]. For a complete review of DSM-5 criteria go to www.dsm5.org/Pages/Default.aspx. Insomnia disorder is diagnosed only if it is severe enough to warrant independent clinical attention, as various medical or psychiatric comorbidities can present with insomnia as a symptom. Most older people with insomnia have one or more comorbid conditions; a review by Foley[5] et al. (1995) demonstrated that

among 6800 elderly patients with insomnia, 93% had one or more comorbid conditions. Common conditions include depression, chronic pain, cancer, chronic obstructive pulmonary disease (COPD) and cardiovascular disease[5].

Untreated insomnia has numerous consequences, including interpersonal, social and occupational problems[1]. These problems may develop as a result of lack of sleep or excessive concern with sleep, increased day time irritability and poor concentration. Older patients with insomnia are more likely to experience impaired daytime functioning and psychomotor impairment. Negative consequences associated with chronic insomnia include an increased risk of depressive disorder, hypertension, myocardial infarction, falls, reduced productivity at work and decreased quality of life[1,6]. Furthermore, recent studies even suggest an association between poor sleep quality and the subsequent development of a neurocognitive disorder.[7] Investigators conjecture that increased beta-amyloid deposition associated with sleep fragmentation may play a role in the development of cognitive impairment[7].

Insomnia frequently is multifactorial in origin. Consequently, a holistic approach is recommended for addressing insomnia, with consideration given to predisposing, precipitating and perpetuating factors (Figure 1)[8]. These factors may directly or indirectly contribute to the hyperarousal that is inherent in insomnia disorder[2]. For example, aging can predispose a person to have insomnia but acute stressors (e.g., recent death of loved one or acute illness) may trigger the onset of the disorder (i.e., precipitating factor). The insomnia disorder of an individual may be perpetuated by factors such as increased cognitive arousal, preoccupation and frustration with lack of sleep as well as ongoing medical and psychiatric conditions.

Figure 1: Predisposing, Precipitating and Perpetuating Factors to Insomnia (medications and substances contributing to insomnia include alcohol, caffeine, nicotine, cholinesterase inhibitors, analgesics, antihypertensives, psychotropics, anti-Parkinsonian medications, bronchodilators etc.)[11,12]



Aging and sleep

Significant changes occur in sleep and circadian rhythms with aging. One of the most striking differences in the sleep of older patients is their frequent nocturnal awakenings (i.e., sleep fragmentation)[10]. Other changes that occur with age include decreases in total sleep, reduced sleep efficiency (time spent asleep as a percentage of time in bed), decreased slow-wave (Stage N3 or deep sleep) and rapid eye movement (REM) sleep and increased stage N1 and N2 sleep[9,10].

The 24-hour sleep-wake cycle becomes less robust with aging and is accompanied by a decreased diurnal 24-hour body temperature rhythm[13,14]. Older adults are more likely to have a temporally advanced sleep phase (falling asleep early and waking up early[15]). Furthermore, earlier awakening may result in frequent naps during the day, which may further perpetuate nocturnal insomnia[9].

In addition to the inherent biological changes that occur with aging, elderly patients may experience a deterioration of their daily routines that entrain an individual's biological day-night rhythm. Important *zeitgebers* ("time makers") for the circadian rhythm may erode (e.g., no fixed work schedule, irregular meal time) with aging, which may contribute to further sleep difficulty.

Evaluation/investigation

Diagnosis of insomnia is based on a thorough clinical interview of both the patient and their bed partner. Important sleep questions include: onset and duration of the insomnia, sleep routine (time of sleep onset, wake up time, number of awakenings at night), daytime somnolence, and impact on functioning, including the effect on driving. In many instances the history provided by the partner is dramatically different from the patient, underlining the importance of the bed partner history. History can include a review of the **6 Ps**: **P**ain, Paroxysmal Nocturnal Dyspnea (**P**ND), **P**harmaceuticals/Pills (see Figure 1), **P**ee (ensure the patient is not on a late day diuretic and is restricting PM oral fluids), **P**artner (with sleep issues), **P**hysical environment not conducive to sleeping. The clinical evaluation should include screening questions for obstructive sleep apnea and restless legs syndrome (see Table 1). Any precipitating factors, such as acute stressors and acute/chronic pain should be reviewed. It is important to include an inquiry for any psychiatric disorders, such as major depressive disorder and any anxiety disorder as well as for medical/neurological disorders (e.g., Parkinson's disease). Medications should be reviewed as certain medications are known to contribute to insomnia, including cholinesterase inhibitors, analgesics, anti-Parkinsonian medications, antihypertensives, psychotropics and bronchodilators (Figure 1). Additionally, it is important to obtain a substance use history, evaluating the consumption of alcohol, cigarettes, caffeinated drinks and any over the counter medications that can affect the quality and quantity of sleep. Other habits and social history can provide additional information – for example, excessive nightly use of electronic devices (e.g., i-Pad, computer games) at bedtime can suppress nocturnal melatonin production and adversely affect circadian rhythm[16]. Sleep diaries can be helpful to assess circadian patterns as well as helpful and detrimental sleep habits. Collateral information from the bed partner is important particularly to rule out any other sleep disorders (see Table 1).

Table 1. Common sleep disorders, screening tools/questions and action plans for positive screening

Sleep Disorder	Screening Questions/Assessment	If Screen is Positive…	Extra Comments
Obstructive sleep apnea (OSA)	**STOP BANG**[17] ≥2/4 in **STOP**, or ≥3/4 of **STOP BANG** has high sensitivity/specificity for OSA **S** – Do you **S**NORE? **T** – Are you **T**IRED in the day? **O** – Any **O**BSERVED apneas? **P** – Do you have high blood **P**RESSURE? **B**MI >35 kg/m^2 **A**ge >50 **N**ECK circumference over 40 cm? **G**ENDER – Male	Referral to a sleep clinic for a polysomnogram to confirm suspicions Consider driving safety as per CMA driving guidelines	Important to ask patient's partner if the patient snores, and if they have evidence of any unusual breathing. Patients themselves are often unaware of potential issues.
Restless Legs Syndrome (RLS)	**URGE** Criteria[18,19] (4/4 symptoms strongly suggests RLS) **U** – Do you have the **U**RGE to move your legs at night? **R** – Are they worse at **R**EST? (e.g. prolonged inactivity, long car rides, airplane, sitting in a theatre) **G** – Do symptoms **G**ET BETTER with movement? **E** – Are symptoms worse in the **E**VENINGS?	Check ferritin – if <50 mcg/L, initiate iron replacement. If no contraindications, and no secondary causes of RLS are seen, and symptoms are occurring ≥3 x per week, consider pramipexole at 0.125 mg by mouth 2 hours before bedtime, and increasing by 0.125 mg by mouth every 2 days until symptoms resolve, or until maximum of 0.5 mg. Common potential side effects include nasal congestion and stomach upset. Rare, but more serious side effects include impulse control problems (e.g., pathological gambling, sexual indiscretions), sleep attacks (caution for driving) and psychotic symptoms. If problems persist, consider referral to a sleep specialist.	
Periodic Limb Movement Disorder (PLM-D)	Does your partner ever complain that you kick your legs at night? Are your covers messy in mornings?	Referral to sleep specialist for possible polysomnography.	Important to ask the patient's partner if they notice any kicking.

If indicated, a focused physical exam (see Table 2) should be performed along with appropriate investigations (e.g., blood work to rule out thyroid disease). No investigation is gold standard or diagnostic. Overnight sleep assessment (polysomnography) and other studies can be used to rule out other sleep disorders but are never solely indicated to diagnose a patient with insomnia. While the level I (attended, in laboratory, >7 channel) polysomnography is considered the gold standard for assessing for sleep disordered breathing, level III polysomnography studies ("home sleep studies") have been assessed to have reasonable sensitivity and specificity for screening for sleep disordered breathing when the pretest probability is considered high for moderate or severe obstructive sleep apnea and there are no significant comorbidities. For more information regarding home sleep studies see www.aasmnet.org/resources/clinicalguidelines/030713.pdf and www.ncbi.nlm.nih.gov/pmc/articles/PMC2975504/. The point about the absence of significant medical comorbidities may limit the utility of the level III polysomnography study in the elderly population, since this group frequently has significant medical comorbidities. See Table 1 for screening questions for common sleep disorders associated with insomnia and action plans.

Treatment

Although changes in sleep are known to occur with age, insomnia is not an inevitable consequence of aging. Untreated persistent insomnia may lead to multiple medical and psychosocial consequences – therefore, treatment of insomnia is not only encouraged but warranted. There are two main types of treatment for insomnia: 1) psychological treatments for insomnia, including cognitive behavioural therapy for insomnia (CBT-I) and 2) pharmacological approaches. Due to the paucity of data on pharmacological soporific agents and their known side effects, a cognitive-behavioural approach is accepted as the first-line treatment for insomnia at any age according to the most recent practice parameters published by the American Academy of Sleep Medicine (AASM – www.aasmnet.org/PracticeGuidelines.aspx)[20].

Psychological Treatments for Insomnia, including Stimulus Control, Sleep Restriction and Cognitive-Behavioural Therapy for Insomnia (CBT-I).

Psychological approaches are summarized in Table 3**.** Behavioural and cognitive approaches to insomnia are safe and effective ways to treat insomnia in older adults[20,21]. One of the most common first steps in addressing insomnia is called stimulus-control-therapy (SCT). SCT is especially useful for those who have a cycle of excessive daytime napping and resultant night time insomnia. See Table 3 for specific techniques and instructions for patients. Instructions can be given in one visit but a follow-up visit should be scheduled to assess compliance and to solve problems. Many elements of SCT are commonly referred to as "sleep hygiene."

Sleep-restriction-therapy (SRT)[22] is another common approach to insomnia in older adults. Elderly patients have a reduced homeostatic sleep drive and may spend excessive time in bed "trying to sleep." SRT aims at minimizing time spent in bed awake and helps patients accumulate sleep debt (see Table 3). This therapy requires multiple follow-up visits to adjust time-in-bed (TIB) prescriptions and ensure patient compliance.

More recently, the term cognitive-behavioural therapy for insomnia (CBT-I) has been used to refer to a combination of SCT, SRT and cognitive strategies to address maladaptive sleep-related beliefs (i.e., cognitive distortions). Some common sleep related cognitive distortions include, "everyone should sleep at least 8 hours every night, otherwise there will be serious day time consequences," and "poor sleep is normal in older adults."

Table 2. A focused physical exam for the assessment of sleep disorders (Note: physical exam must be personalized considering the individual's medical history)

Systems	Focused Examination
General	Body weight and height (calculate Body Mass Index (BMI); ≥35 kg/m^2 has high risk for OSA, but in the elderly, BMI may be poorly predictive for OSA[23])
Head, Nose and Neck	Nasal patency and alignment Mouth exam (assess for tonsillar hypertrophy and tongue enlargement, +/- mallampati score (emedicine.medscape.com/article/2172419-overview), overbite, loose teeth, dentures) Neck circumference, goitre or any mass Micrognathia/retrognathia
Cardiovascular including peripheral vascular disease	Hypertension Arrhythmia, murmurs Peripheral edema
Neurological	Gait (Parkinsonism), evidence of peripheral neuropathy

Cognitive approaches will identify these maladaptive beliefs about sleep and help patients generate more balanced or alternative beliefs about sleep using techniques such as thought records. This treatment is ideally administered by trained psychologists, though several elements can be delivered by primary care physicians and/or psychiatrists. Access to CBT-I can be challenging due to financial constraints and a paucity of available psychological resources. Due to these limitations, a shorter form of CBT-I called Brief Behavioural Therapy for Insomnia (BBT-I) has been developed[24] as a simplified and shortened version of CBT-I that focuses on the behavioural elements of CBT-I based on the circadian and homeostatic regulation of sleep. BBT-I can be delivered over 2 sessions by a nurse, and has been shown to be effective for insomnia treatment in the geriatric population, with benefits persisting even after 6 months[24]. Several online resources and applications ("apps" – see Table 4) have been developed recently in an effort to improve accessibility.

Pharmacological Treatment Options for Insomnia in the Elderly.

There are extensive pharmacological treatment options available for insomnia in the elderly and a full review of these is beyond the scope of this paper. Nonetheless, if other comorbidities are excluded and the insomnia disorder is chronic and persistent, general guidelines regarding pharmacological options should be considered. In the US, 4 medications are FDA approved for the treatment of chronic insomnia: non-benzodiazepine benzodiazepine receptor agonists (e.g., zolpidem), benzodiazepines, melatonin receptor agonists (not available in Canada) and the hypocretin receptor antagonist suvorexant (not available in Canada). Health Canada consequently only has the first 2 agents approved as sleep aids (Healthy Canadians). Other agents that are frequently considered for chronic insomnia in the elderly include alpha 2 delta drugs, sedating antidepressants, antihistamines, melatonin and atypical antipsychotics.

Non-Benzodiazepine Benzodiazepine Receptor Agonists: Z Drugs – zolpidem, zopiclone.

In general these medications have been shown to be efficacious for the treatment of insomnia in the elderly, but no head to head trials exist regarding comparative efficacy. These medications have more selectivity in targeting the alpha 1 subunit of the gamma amino butyric acid (GABA) receptors compared to benzodiazepines (which target the cleft between the alpha and gamma subunit)[25], and this may help explain the decreased potential for some adverse events compared to benzodiazepines. For instance,

these drugs have less liability for falls and fractures compared to benzodiazepines, though they still contribute to elevated risk[26]. There is also risk for complex sleep related behaviours[27] and abuse potential[28]. Zolpidem has a shorter half-life ($T_{½}$ = 2.5-3 hours, time to maximal concentration = 1-2 hours*) and consequently may have less potential for residual daytime adverse effects than zopiclone ($T_{½}$=5-6 hours, time to maximal concentration = 1.5-2 hours*). Soporific effects for both of these drugs are expected to begin within 15-30 minutes of ingestion and consequently these can be helpful for initial insomnia[25]. The shorter half-life of zolpidem, however, may limit this drug's utility for sleep maintenance insomnia, although a controlled release (CR) formulation was recently introduced in Canada modestly addressing this issue ($T_{½}$=2.5-3 hours, time to maximal concentration = 1.5-2.5 hours*). Zopiclone has been shown to have more risk for activities requiring daytime vigilance such as driving[29,30], and these effects may be greater than those seen with the shorter acting benzodiazepine temazepam[31]. As a result of these concerns, the maximum recommended dose per Health Canada for those over 65 years of age for zopiclone is 5.0 mg as of November 2014, with a recommended starting dose of 3.75 mg (Health Canada) Some studies suggest zopiclone is less effective than CBT-I for the treatment of chronic insomnia[32]. Although evidence suggests these drugs have efficacy for insomnia, data for use in the elderly is limited. Consequently these agents should be used cautiously if pursued, with the lowest dose possible, and for the shortest time, preferably less than 4 weeks[8,33].

* Numbers are determined for healthy young adults. These numbers may need to be adjusted in the elderly population and so should be considered with caution in the geriatric population.

Table 3. Psychological therapies for insomnia

Therapy	Techniques used
Sleep Hygiene	• Maintain a regular sleep pattern • Avoid napping in the day • Avoid substances that can impair sleep, including caffeine, alcohol, nicotine • Establish a relaxing bedtime routine • Associate the bed with sleep (avoid watching TV, working on the computer etc. in bed)
Stimulus-Control Therapy (SCT) (Incorporates elements of sleep hygiene and builds on associating bed with sleep)	• Only go to bed when sleepy • Establish a standard wake-up time • Get out of bed whenever he or she is awake for more than 15-20 minutes • Avoid reading, watching TV, eating, worrying and engaging in sleep incompatible behaviours in the bed and bedroom • Avoid clock watching • Maximize daylight exposure and minimize light exposure in evening • Avoid day time napping
Sleep Restriction Therapy (SRT)	• Step 1: Sleep log for 2-3 weeks • Step 2: Calculate the average total sleep time (TST) • Step 3: Prescribe initial time-in-bed (TIB) at the average TST or average TST plus amount of time that is deemed to be normal nocturnal wakefulness (e.g., 30 min). TIB should not be more than 7.5 hours per night in the elderly population • Step 4: At follow-up sessions, typically weekly, increase TIB in 15-20 minute increments when sleep efficiency exceeds 85%. Sleep efficiency = time asleep/TIB. Note that wake-up time is fixed, so bedtime is advanced by 15-20 minutes, and bedtime should not be later than 2 a.m.

	• Sleep Restriction Therapy • sleepanddreams.com/?p=170
Cognitive-Behavioural Therapy for Insomnia (CBT-I)	• Cognitive therapy, sleep hygiene, relaxation training, SCT and SRT are important elements of CBT-I • Cognitive therapy: Identifying sleep-related maladaptive beliefs (cognitive distortion) and evaluating them using various tools, such as thought record CBTI

Health Canada recommends not using zopiclone for more than 7-10 days. The Beers criteria is a list of potentially inappropriate medications for elderly patients that is maintained and updated by the American Geriatric Society. The most recent Beers criteria in 2015 strongly suggest the non-benzodiazepine benzodiazepine receptor agonists should be avoided for treatment of insomnia in the elderly because of their unfavourable side effect profile relative to their effects for insomnia[34].

Benzodiazepines

These medications have been used for decades for the treatment of insomnia in the elderly, but have been associated with several adverse consequences including an increased risk for falls, motor vehicle crashes, residual daytime sedation, anterograde amnesia and rebound insomnia[35-37]. Novel studies have even implicated benzodiazepine use in the subsequent development of neurocognitive disorders[38]. The sleep induction effects of most of the benzodiazepines are expected to begin within 30 minutes, with oxazepam and temazepam having an onset of action of up to 60 minutes[25]. Although some studies have suggested short or intermediate acting agents such as temazepam are preferred in the elderly compared to longer acting agents such as flurazepam[20,39], the recent 2015 Beers criteria strongly suggested avoiding chronic benzodiazepine use altogether in the elderly[34], and this has been echoed by others[33].

Sedating antidepressants

Trazodone is perhaps the most frequently used medication among the sedating antidepressants, but data demonstrating efficacy are limited with no evidence of sustained efficacy[12,40]. Potential side effects including sedation, dizziness, cardiac arrhythmias, orthostatic hypotension and potential priapism can be significant in the elderly population[40,41]. Mirtazapine, another sedating antidepressant, has demonstrated benefits for insomnia in patients with a major depressive disorder but requires monitoring for somnolence and weight gain[42,43]. Onset of soporific effects for both of these drugs is expected to begin within 30 minutes of ingestion[25]. Doxepin, a tricyclic antidepressant with significant sedative properties as a result of significant antihistaminergic actions, has recently been demonstrated to have efficacy without significant adverse events in the treatment of primary insomnia in elderly patients in low doses (1-6 mg)[44,45], but further study is needed to replicate these results. Onset of action was seen within 30 minutes of ingestion. Potential complications of tricyclic antidepressants including sedation, weight gain, postural hypotension, cardiac arrhythmias (QTc prolongation), urinary retention and anticholinergic side effects. These effects generally limit the utility of these medications for treatment of insomnia disorder in elderly patients in the absence of a comorbid mood disorder[43]. Use of other antihistaminergic agents (e.g., dimenhydrinate) including over the counter agents is not recommended in the elderly population[20,46].

Other drugs: atypical antipsychotics, alpha 2 delta drugs, melatonin

Although use of the atypical antipsychotics may have some benefits for sleep initiation and maintenance in certain circumstances where a comorbid psychiatric disorder is present[47], their adverse side effect profile (including increased risk of stroke, sudden cardiac death) and lack of efficacy data in the geriatric

population argue against their use for chronic primary insomnia in this group of patients[20,33]. Similarly, there are no data available on the use of alpha 2 delta drugs such as gabapentin or pregabalin for treatment of insomnia disorder in the elderly population. However, these medications may have some utility if insomnia symptoms may be related to anxiety[48], alcohol withdrawal[49], neuropathic pain[50] or restless legs syndrome[51,52]. Our clinical experience has suggested rarely if ever needing to go beyond 600 mg a night with gabapentin for insomnia, or 150 mg at night with pregabalin, and in most instances elderly patients can get benefits from far smaller doses. Onset of sleep induction effects is anticipated to begin within 30 minutes of consumption. Patients should be cautioned about potential cognitive side effects, dizziness and potential psychiatric symptoms including suicidal thoughts[50,53,54]. Melatonin has been demonstrated to have some modest benefits for primary insomnia in the elderly population[55,56]. Even a 0.3 mg dose can be effective and provides a physiologic quantity of melatonin[57]. Doses above 3 mg for elderly already result in supraphysiologic melatonin levels, which can persist into the day, leading to potential daytime impairment; therefore, doses above 3 mg are not recommended[57]. Side effects can include daytime sedation, headaches and dizziness, but long-term studies in the elderly are lacking[58,59]. While generally considered safe, significant adverse events can include impairment in glucose tolerance[60] and interactions with warfarin[61].

Table 4. Self-help applications ("apps") available to deliver CBT-I.
Note all apps in Table 4 are free to download.

Application	Comments
CBT-I Coach 	Developed in Stanford for patients with insomnia. Has suggestions for patients troubled by trauma in the past. Ideally used in conjunction with CBT-I. Gives tips on sleep hygiene and strengthening cues for sleep.
Sleepio 	Developed in Oxford. Six week online course offering users personalized feedback based on information inputted by users. Can extract data from tracking devices.
Go!to Sleep 	Developed in Cleveland Clinic. Six week interactive mobile app. Users register and enter sleep data and get a sleep efficiency report and suggestions for sleep improvement.

Case Follow-up

Elderly patients will have age related biological changes, as well as medical issues and psychosocial factors that may predispose patients to experiencing insomnia. Given the wife's recollection of breathing issues and restlessness at night, a polysomnogram would be prudent to consider. A full history and evaluation including an evaluation of the patient's sleep routine as well as an interview with his wife would be indicated. If sleep disordered breathing and other potential sleep disorders such as restless legs syndrome or periodic limb movement disorder are treated or ruled out, a non-pharmacological approach including cognitive behavioural therapy is the treatment of choice. Medications can be considered in selected circumstances, and if used are generally indicated for only short-term use. If obstructive sleep apnea is diagnosed then the Canadian Medical Association fitness-to-drive guidelines should be followed with respect to counselling temporary driving cessation (or permanent driving cessation if OSA is severe

enough and patient is not responding or resistant to treatment as per CMA guidelines) and reporting to the Ministry of Transportation as per provincial regulations.

Summary

Insomnia disorder is a complex disorder that is common in the elderly. Various factors may play a role including biological, psychiatric and psychosocial factors. Some patients are more predisposed to experiencing chronic insomnia difficulties, including women and those with more psychiatric or medical comorbidities. Diagnostic evaluation should consist of a thorough history, including a detailed sleep enquiry, a partner interview, and focused physical exam. Treatment options should then be directed at the underlying contributing factors to insomnia symptoms. The insomnia disorder diagnosis is a paradigm shift in the DSM-5, in recognition of the fact that insomnia often co-occurs with other medical and psychiatric issues and that it needs to be treated in its own right to assure optimal outcomes. Concurrent treatment of insomnia disorder with comorbid treatment of medical/psychiatric disorders can lead to improved clinical outcomes, while failure to address this disorder can lead to diminished quality of life and increase the risk of (re)lapse to a psychiatric disorder. If the diagnostic suspicion is insomnia disorder, a Cognitive-behavioural approach is generally favored over a pharmacologic approach. Should a pharmacological approach be considered, there is limited data to support use of short acting benzodiazepine receptor agonists (Z drugs), as well as melatonin and doxepin but long term studies are lacking and these agents should be used cautiously if use is necessary. Benzodiazepine use is discouraged due to their unfavourable side effect profile. The paucity of data on other pharmacologic agents with putative sedative properties limits support for utility of other agents though in circumstances with significant comorbidities their use may be helpful (e.g., sedating antidepressant use such as mirtazapine in the presence of a mood disorder). If insomnia problems persist despite treatment efforts, referral to a sleep specialist should be considered, particularly if there is an elevated suspicion for a sleep disorder that contributes to treatment resistance, such as a sleep related breathing disorder or underlying neurologic disorder such as restless legs syndrome.

Acknowledgements: We would like to thank Dr. Lisa McMurray and Dr. Charles F. Reynolds III for their thoughtful suggestions for this manuscript.

REFERENCES:

1. Association AP. Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5). Arlington, VA: American Psychiatric Publishing; 2013.

2. Buysse DJ. Insomnia. Jama 2013;309:706-16.

3. Crowley K. Sleep and sleep disorders in older adults. Neuropsychology review 2011;21:41-53.

4. Foley D, Ancoli-Israel S, Britz P, Walsh J. Sleep disturbances and chronic disease in older adults: results of the 2003 National Sleep Foundation Sleep in America Survey. Journal of psychosomatic research 2004;56:497-502.

5. 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;18:425-32.

6. Cooke JR, Ancoli-Israel S. Sleep and its disorders in older adults. The Psychiatric clinics of North America 2006;29:1077-93; abstract x-xi.

7. Yaffe K, Falvey CM, Hoang T. Connections between sleep and cognition in older adults. The Lancet Neurology 2014;13:1017-28.

8. Morgan K, Kucharczyk E, Gregory P. Insomnia: evidence-based approaches to assessment and management. Clin Med 2011;11:278-81.

9. Ancoli-Israel S, Ayalon L, Salzman C. Sleep in the elderly: normal variations and common sleep disorders. Harvard review of psychiatry 2008;16:279-86.

10. Ohayon MM, Carskadon MA, Guilleminault C, Vitiello MV. Meta-analysis of quantitative sleep parameters from childhood to old age in healthy individuals: developing normative sleep values across the human lifespan. Sleep 2004;27:1255-73.

11. Paniagua MA, Paniagua EW. The demented elder with insomnia. Clinics in geriatric medicine 2008;24:69-81, vii.

12. McCall WV. Diagnosis and management of insomnia in older people. Journal of the American Geriatrics Society 2005;53:S272-7.

13. Czeisler CA, Duffy JF, Shanahan TL, et al. Stability, precision, and near-24-hour period of the human circadian pacemaker. Science 1999;284:2177-81.

14. Richardson GS, Carskadon MA, Orav EJ, Dement WC. Circadian variation of sleep tendency in elderly and young adult subjects. Sleep 1982;5 Suppl 2:S82-94.

15. Monk TH. Aging human circadian rhythms: conventional wisdom may not always be right. J Biol Rhythms 2005;20:366-74.

16. Wood B, Rea MS, Plitnick B, Figueiro MG. Light level and duration of exposure determine the impact of self-luminous tablets on melatonin suppression. Appl Ergon 2013;44:237-40.

17. Chung F, Yegneswaran B, Liao P, et al. STOP questionnaire: a tool to screen patients for obstructive sleep apnea. Anesthesiology 2008;108:812-21.

18. Allen RP, Picchietti D, Hening WA, et al. Restless legs syndrome: diagnostic criteria, special considerations, and epidemiology. A report from the restless legs syndrome diagnosis and epidemiology workshop at the National Institutes of Health. Sleep medicine 2003;4:101-19.

19. Bogan RK, Cheray JA. Restless legs syndrome: a review of diagnosis and management in primary care. Postgrad Med 2013;125:99-111.

20. Schutte-Rodin S, Broch L, Buysse D, Dorsey C, Sateia M. Clinical guideline for the evaluation and management of chronic insomnia in adults. Journal of clinical sleep medicine : JCSM : official publication of the American Academy of Sleep Medicine 2008;4:487-504.

21. Smith MT, Perlis ML, Park A, et al. Comparative meta-analysis of pharmacotherapy and behaviour therapy for persistent insomnia. Am J Psychiatry 2002;159:5-11.

22. Spielman AJ, Saskin P, Thorpy MJ. Treatment of chronic insomnia by restriction of time in bed. Sleep 1987;10:45-56.

23. Young T, Shahar E, Nieto FJ, et al. Predictors of sleep-disordered breathing in community-dwelling adults: the Sleep Heart Health Study. Archives of internal medicine 2002;162:893-900.

24. Buysse DJ, Germain A, Moul DE, et al. Efficacy of brief behavioural treatment for chronic insomnia in older adults. Archives of internal medicine 2011;171:887-95.

25. Jacobson SA. Clinical Manual of Geriatric Psychopharmacology. 2nd ed. Washington, DC: American Psychiatric Publishing; 2014.

26. Allain H, Bentue-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;22:749-65.

27. Gunja N. In the Zzz zone: the effects of Z-drugs on human performance and driving. J Med Toxicol 2013;9:163-71.

28. McCrae CS. Late-life comorbid insomnia: diagnosis and treatment. The American journal of managed care 2009;15 Suppl:S14-23.

29. Verster JC, Spence DW, Shahid A, Pandi-Perumal SR, Roth T. Zopiclone as positive control in studies examining the residual effects of hypnotic drugs on driving ability. Curr Drug Saf 2011;6:209-18.

30. Leufkens TR, Ramaekers JG, de Weerd AW, Riedel WJ, Vermeeren A. Residual effects of zopiclone 7.5 mg on highway driving performance in insomnia patients and healthy controls: a placebo controlled crossover study. Psychopharmacology (Berl) 2014;231:2785-98.

31. Leufkens TR, Vermeeren A. Highway driving in the elderly the morning after bedtime use of hypnotics: a comparison between temazepam 20 mg, zopiclone 7.5 mg, and placebo. J Clin Psychopharmacol 2009;29:432-8.

32. Sivertsen B, Omvik S, Pallesen S, et al. Cognitive behavioural therapy vs zopiclone for treatment of chronic primary insomnia in older adults: a randomized controlled trial. Jama 2006;295:2851-8.
33. McMillan JM, Aitken E, Holroyd-Leduc JM. Management of insomnia and long-term use of sedative-hypnotic drugs in older patients. CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne 2013;185:1499-505.

34. By the American Geriatrics Society Beers Criteria Update Expert P. American Geriatrics Society 2015 Updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults. Journal of the American Geriatrics Society 2015;63:2227-46.

35. Taylor SR, Weiss JS. Review of insomnia pharmacotherapy options for the elderly: implications for managed care. Popul Health Manag 2009;12:317-23.

36. Hemmelgarn B, Suissa S, Huang A, Boivin JF, Pinard G. Benzodiazepine use and the risk of motor vehicle crash in the elderly. Jama 1997;278:27-31.

37. Meuleners LB, Duke J, Lee AH, Palamara P, Hildebrand J, Ng JQ. Psychoactive medications and crash involvement requiring hospitalization for older drivers: a population-based study. Journal of the American Geriatrics Society 2011;59:1575-80.

38. Billioti de Gage S, Moride Y, Ducruet T, et al. Benzodiazepine use and risk of Alzheimer's disease: case-control study. BMJ 2014;349:g5205.

39. Bloom HG, Ahmed I, Alessi CA, et al. Evidence-based recommendations for the assessment and management of sleep disorders in older persons. Journal of the American Geriatrics Society 2009;57: 761-89.

40. Mendelson WB. A review of the evidence for the efficacy and safety of trazodone in insomnia. The Journal of clinical psychiatry 2005;66:469-76.

41. James SP, Mendelson WB. The use of trazodone as a hypnotic: a critical review. The Journal of clinical psychiatry 2004;65:752-5.

42. Winokur A, DeMartinis NA, 3rd, McNally DP, Gary EM, Cormier JL, Gary KA. Comparative effects of mirtazapine and fluoxetine on sleep physiology measures in patients with major depression and insomnia. The Journal of clinical psychiatry 2003;64:1224-9.

43. Bain KT. Management of chronic insomnia in elderly persons. Am J Geriatr Pharmacother 2006;4: 168-92.

44. Krystal AD, Durrence HH, Scharf M, et al. Efficacy and Safety of Doxepin 1 mg and 3 mg in a 12-week Sleep Laboratory and Outpatient Trial of Elderly Subjects with Chronic Primary Insomnia. Sleep 2010;33:1553-61.

45. Lankford A, Rogowski R, Essink B, Ludington E, Heith Durrence H, Roth T. Efficacy and safety of doxepin 6 mg in a four-week outpatient trial of elderly adults with chronic primary insomnia. Sleep medicine 2012;13:133-8.

46. American Geriatrics Society Beers Criteria Update Expert P. American Geriatrics Society updated Beers Criteria for potentially inappropriate medication use in older adults. Journal of the American Geriatrics Society 2012;60:616-31.

47. Kyung Lee E, Douglass AB. Sleep in psychiatric disorders: where are we now? Can J Psychiatry 2010;55:403-12.

48. Altamura AC, Moliterno D, Paletta S, Maffini M, Mauri MC, Bareggi S. Understanding the pharmacokinetics of anxiolytic drugs. Expert Opin Drug Metab Toxicol 2013;9:423-40.

49. Leung JG, Hall-Flavin D, Nelson S, Schmidt KA, Schak KM. The Role of Gabapentin in the Management of Alcohol Withdrawal and Dependence. Ann Pharmacother 2015;49:897-906.

50. Moore RA, Wiffen PJ, Derry S, Toelle T, Rice AS. Gabapentin for chronic neuropathic pain and fibromyalgia in adults. Cochrane Database Syst Rev 2014;4:CD007938.

51. Ferini-Strambi L, Marelli S. Pharmacotherapy for restless legs syndrome. Expert Opin Pharmacother 2014;15:1127-38.

52. Ramar K, Olson EJ. Management of common sleep disorders. Am Fam Physician 2013;88:231-8.

53. Gabapentin for Adults with Neuropathic Pain: A Review of the Clinical Efficacy and Safety. Ottawa (ON)2015.

54. Gibbons RD, Hur K, Brown CH, Mann JJ. Relationship between antiepileptic drugs and suicide attempts in patients with bipolar disorder. Arch Gen Psychiatry 2009;66:1354-60.

55. Lemoine P, Wade AG, Katz A, Nir T, Zisapel N. Efficacy and safety of prolonged-release melatonin for insomnia in middle-aged and elderly patients with hypertension: a combined analysis of controlled clinical trials. Integr Blood Press Control 2012;5:9-17.

56. Riemersma-van der Lek RF, Swaab DF, Twisk J, Hol EM, Hoogendijk WJ, Van Someren EJ. Effect of bright light and melatonin on cognitive and noncognitive function in elderly residents of group care facilities: a randomized controlled trial. Jama 2008;299:2642-55.

57. Vural EM, van Munster BC, de Rooij SE. Optimal dosages for melatonin supplementation therapy in older adults: a systematic review of current literature. Drugs Aging 2014;31:441-51.

58. Buscemi N, Vandermeer B, Hooton N, et al. The efficacy and safety of exogenous melatonin for primary sleep disorders. A meta-analysis. J Gen Intern Med 2005;20:1151-8.

59. Lyseng-Williamson KA. Melatonin prolonged release: in the treatment of insomnia in patients aged >/=55 years. Drugs Aging 2012;29:911-23.

60. Rubio-Sastre P, Scheer FA, Gomez-Abellan P, Madrid JA, Garaulet M. Acute melatonin administration in humans impairs glucose tolerance in both the morning and evening. Sleep 2014;37:1715-9.

61. Herxheimer A, Petrie KJ. Melatonin for the prevention and treatment of jet lag. Cochrane Database Syst Rev 2002:CD001520.