

The Cost of Insomnia and the Benefit of Increased Access to Evidence-Based Treatment Cognitive Behavioral Therapy for Insomnia



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KEYWORDS

• Insomnia • Prevalence • Cost • Pharmacology • CBT-I • Patient access

KEY POINTS

- Insomnia is a costly condition associated with direct and indirect costs estimated at more than \$150 billion in the US annually.
- Most insomnia-related expenses are indirect costs. Given that insomnia is inexpensive to treat, increased access to treatment has the potential to generate substantial cost savings.
- Behavioral treatments for insomnia are favorable because they address the underlying problem and do not have many of the health risks associated with sedative-hypnotic use.
- CBT-I is a nonpharmacologic intervention that safely and cost-effectively treats insomnia.
- In the interest of minimizing cost and the lack of CBT-I providers, self-administered, group, and stepped care delivery of this intervention have been developed.

PREVALENCE AND COST OF INSOMNIA

The prevalence of insomnia is high, between 4.7% and 22.1% depending on the diagnostic criteria used.¹⁻⁴ Insomnia is associated with decreased quality of life, accidents, increased psychiatric and somatic comorbidities, and problems with work performance.⁵ There is also a large financial cost associated with insomnia, although it is difficult to estimate because most of the expense is from indirect costs, and the criteria for insomnia-related expenses vary between studies. The cost of direct insomnia treatment has been estimated to account for only 4% to 16.7% of the total cost.^{6,7}

Stoller's⁷ 1994 analysis remains one of the most frequently cited estimates of annual costs associated with insomnia in US dollars. Based

on her calculations, the annual cost associated with insomnia in the United States has been estimated to be \$92.45 to \$107.53 billion. To achieve this figure, Stoller⁷ combines the estimated expenses of direct medical costs, lost productivity, insomnia-related depression and alcohol abuse, and accidents. The main critique of this estimate is that it may have overestimated costs based on the high prevalence rate used for the calculations. However, it must be noted that estimated indirect costs associated with absenteeism and increased health care utilization were not included in the total cost. Subsequent research has found these expenses to be substantial.⁸ Given that all indirect costs of insomnia were not accounted for, it is fair to consider Stoller's⁷ estimate as an equivalent or conservative estimate of overall costs.

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Assuming that insomnia-related expenses are steady, Stoller's⁷ figures can be adjusted to an annual cost of \$150.36 to \$174.89 billion when adjusted for inflation to 2016 US dollars (inflation calculated using online calculator: http://www.bls.gov/data/inflation_calculator.htm). This is 0.95% of the predicted US gross domestic product for 2016, based on the predicted figure of \$18,494 billion (<http://www.statista.com/statistics/216985/forecast-of-us-gross-domestic-product/>).

Other calculations of the financial costs of insomnia have been done. Daley and colleagues⁶ estimated the total direct and indirect costs of insomnia in Quebec to be equivalent to 1% of the province's gross domestic product. In this study, the three greatest costs associated with insomnia were lost productivity, absenteeism, and use of alcohol as a sleep aid. Together, these three indirect costs comprised 96% of the total cost of insomnia in the population over 1 year. This reinforces the importance of including indirect costs in assessing the true price of insomnia to society. A 2011 study estimated the annual cost of decreased productivity caused by insomnia in the United States to be \$63.2 billion.⁹ Insomnia-related accidents and errors in the workplace in the United States were estimated to have an annual cost of \$31.1 billion.¹⁰ Anyone either suffering from or seeing patients suffering from insomnia can understand how easily reduced focus caused by lack of sleep can translate into reduced productivity and increased workplace errors.

Pollack and colleagues¹¹ compared the health care utilization and productivity costs between patients with a diagnosis of insomnia and/or a prescription for a sleep medication with patients with neither, and found that costs were 24% greater for the insomnia and/or sleep medication group when controlling for comorbidities. Prescription of a sleep medication served as a proxy for an actual insomnia diagnosis in this study because of the frequent association of insomnia with other conditions for which a visit may be billed. The difference in cost within the insomnia group between those being prescribed medications and those not was not reported; therefore, this study did not determine whether being prescribed a sleep medication was associated with any change in cost. However, another study that looked at health care utilization costs of people newly diagnosed with insomnia found that, among the insomnia group, patients who were prescribed sleep medication actually had a higher increase in cost over the course of 1 year when compared with those who were not prescribed medication.¹² Whether patients

used any other treatments is not known. The expenses associated with insomnia are a catch 22. Untreated insomnia results in the high direct and indirect costs mentioned previously. However, if insomnia is treated with prescription medication, to the extent to which patients need to continue pharmacotherapy to receive lasting benefit, the cost of medication becomes an ongoing expenditure. Insomnia tends to be a persistent condition, which can significantly contribute to its price tag. A 3-year survey of people reporting insomnia at baseline found 74% of respondents to have insomnia after 1 year and 46% still had insomnia after 3 years.¹³ Of the 54% of respondents who had remission, 27% had a relapse by the time of the 3-year follow-up. Another longitudinal survey found that, of the people who had insomnia at baseline, more than half of them reported having insomnia 10 years later.¹⁴

GOALS OF TREATMENT

Although insomnia is characterized by poor sleep quality and/or inadequate time spent sleeping because of difficulty falling asleep or remaining asleep within the desired sleep period, it is often, in a broader sense, a state of psychophysiological hyperarousal that persists during daytime and nighttime.¹⁵ People suffering from insomnia also experience impaired daytime functioning and often fatigue.¹⁶ Often, the impaired sleep at night becomes the primary focus of efforts by the sufferer to correct. This often leads to behaviors that inadvertently perpetuate insomnia, such as devoting excessive time, effort, and thought to trying to attain more sleep.¹⁷

The main goals of treating insomnia are to improve sleep quality and daytime function.¹⁸ In many studies of insomnia treatment with patients reporting subjective improvement in sleep quality and an increase in subjective sleep time, a significant increase in objectively measured sleep time is not usually seen.¹⁹ Still, the benefits of improved subjective sleep have been associated with improvement in other objectively tested variables. Belief that one had good quality sleep, regardless of actual sleep quality, was associated with better performance on cognitive function tests the following day.²⁰

The secondary goals of treatment are to lessen the risk of somatic and psychiatric comorbidities and injuries and accidents associated with insomnia. A third goal of insomnia treatment is to lessen the associated financial losses to the individual and society.

LIMITATIONS OF SEDATIVE-HYPNOTIC USE

The predominant treatment of insomnia is sedative-hypnotics.²¹ Although the number of outpatient visits to physicians with a primary complaint of insomnia increased by 13% from 1999 to 2010, the number of prescriptions for sleep medications increased by 293% over the same time period.²² This indicates a disproportionate increase in hypnotic use in insomnia sufferers. Part of this increase may be caused by the release of blockbuster drugs, such as eszopiclone (Lunesta), ramelteon (Rozerem), and zolpidem controlled release (Ambien CR), and the availability of generic zolpidem during this time period in the United States. However, it is worth noting that drastic increase in prescription sleep aid use may reflect an increase in the use of prescription sleep aids for occasional sleeplessness in addition to treating persistent insomnia.²³ However, anyone who watched television in the United States around the time eszopiclone, ramelteon, and zolpidem controlled release were released can likely remember the advertisements, which probably had an effect on prescribing trends.

In terms of the treatment efficacy of medication for difficulty sleeping, a meta-analysis on pharmacologic treatment of chronic insomnia determined that benzodiazepines and nonbenzodiazepines were effective treatments. However, they were both found to have significantly higher adverse events when compared with placebo. There continues to be a lack of evidence that sleep medication use improves daytime function or health-related quality of life.^{24,25} Of note, only 18 of the 105 studies analyzed had a duration greater than or equal to 30 days and only three studies were 12 weeks or longer.²⁶ Therefore, little is known about tolerance and the long-term effects of hypnotics.

Given the high persistence and relapse rate of insomnia, longer studies are ideal in assessing the effectiveness of any intervention. The actual use of sleep medications in people with chronic insomnia can last for years. One small survey of patients who had been treated for insomnia at a multidisciplinary sleep center found that 53% of the respondents continued to use sleep medications for the 3 to 5 years that had lapsed since their initial treatment.²⁷ A Japanese study of psychiatric outpatients with comorbid insomnia who were regular benzodiazepine receptor agonist users found that 30.5% of their sample used these medications for 1 to 5 years and 46.6% used them for greater than 5 years.²⁸ Many patients continue to take sleep medications for many years even when the drug has not improved their sleep.

Among a group of patients who had moderate to severe insomnia for an average of almost 10 years, 60.4% were regular users of sleep medications and 13.9% used sleep medications occasionally.²⁹ All who were on prescription or nonprescription sleep aids were determined to have pharmacotherapeutic failure.²⁹

Multiple health risks and increased mortality have been associated with sleep medication use.²⁴ People taking sedatives are at increased risk for adverse cognitive and psychomotor events and daytime fatigue.³⁰ An increased risk of developing psychiatric disorders has been linked with sleep medication use,³¹ which is problematic because there is a high association of psychiatric comorbidity with insomnia. Insomnia is often comorbid with sleep-disordered breathing and the common symptoms of awakenings in the night and nonrestorative sleep make it easy for sleep-disordered breathing to be misinterpreted as insomnia. Among a group of patients with chronic, drug resistant insomnia, polysomnography (PSG) found that 77.6% had obstructive sleep apnea and 22.4% had upper airway resistance syndrome.²⁹ Use of sedating medications with uncontrolled sleep-disordered breathing can worsen its severity. Use of sleep medication has also been associated with increased risk for infections and cancer.^{24,32}

COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA

Cognitive behavioral therapy for insomnia (CBT-I) is an intervention that helps the patient improve their sleep by teaching them to change dysfunctional thought patterns and behaviors, which are contributing to their poor sleep. The components of CBT-I are stimulus control, sleep-restriction therapy, cognitive therapy for dysfunctional thoughts, sleep hygiene, and relaxation techniques.³³

The National Institutes of Health, American Academy of Sleep Medicine, and the American College of Physicians all recommend CBT-I as first-line treatment of insomnia.¹⁻³ Multiple meta-analyses have found CBT-I to be an effective treatment of insomnia.^{19,34} A meta-analysis has also found that CBT-I is effective in treating insomnia that is comorbid with psychiatric and medical conditions.³⁵ Although the clinical phase of the intervention typically lasts no more than several weeks, improvement in sleep time has been seen to continue to improve for up to 1 year.¹⁹ The treatment effects of CBT-I have been found to be sustained for up to 3 years.³⁶

A study of the effect of CBT-I for comorbid insomnia and posttraumatic stress disorder showed that CBT-I, when compared with a waitlist

control, yielded improvements in sleep time by sleep diary and PSG. The CBT-I group also had a decrease in disruptive nocturnal behaviors and an improvement in interpersonal functioning. Of note, all treatment benefits were maintained at 6-month follow-up. Improvements were also seen in posttraumatic stress disorder symptoms and nightmares; however, these variables improved equally in the control group.³⁷ There is also evidence that the risk for medical comorbidities associated with insomnia can be reduced. A randomized controlled trial on older adults with chronic insomnia and elevated risk for diabetes and cardiovascular disease showed improvement in sleep and biomarker levels associated with comorbid disease risk with CBT-I.³⁸

There is little risk associated with CBT-I. There is usually a period of acute sleep deprivation associated with the sleep-restriction therapy during which the patient may be at increased risk for accident or errors.³⁹ This sleep deprivation is contraindicated in bipolar disorder with mania and may not be appropriate in people with severe illness.

COST EFFECTIVENESS OF INSOMNIA TREATMENT

CBT-I is an intervention that alleviates suffering (over the long-term, but often creates short-term discomfort), increases safety, diminishes a risk factor for chronic disease, has minimal potential for harm, and requires nothing more than the time of a skilled professional and the determination of the patient. Discussion of the cost effectiveness of treating insomnia, however, adds to the support for CBT-I. Three studies^{40–42} have shown evidence that CBT-I is cost effective solely on the savings in health care utilization costs. Lost productivity may be the greatest indirect cost associated with insomnia.⁶ To illustrate the productivity savings that CBT-I treatment would yield would potentially make a stronger case for payers to allocate more resources toward making CBT-I accessible. A study of an Internet-delivered CBT-I program estimated at costing \$245 per person yielded a net cost savings of \$512 per person over 6 months because of increased productivity and decreased absenteeism.⁴³

Comparing the cost effectiveness of behavioral versus pharmacologic interventions for insomnia is complicated because of the number of indirect costs that are associated with both. Pharmacologic and behavioral treatments for insomnia have been found to be cost-effective with analysis of direct costs and utilization of health care, but inclusion of the cost of adverse effects of sleep medications is lacking.⁴⁴ When formulating a true

cost-effectiveness analysis of treatment options for insomnia, the variables that must be considered go far beyond improvement of sleep and daytime function. Measuring the impact on indirect costs in relation to specific interventions further supports the use of CBT-I. McCrae and coworkers⁴² conducted a small experiment comparing subsequent health care utilization costs between people completing a brief CBT-I series and people who did not complete treatment and found that the health care utilization expenses were lower in the group that completed the treatment. For insomnia with comorbid depression there is evidence that including CBT-I plus standard treatment is more cost effective than standard treatment alone.⁴⁵

Only one study, thus far, has compared the cost-effectiveness of CBT-I versus sedative-hypnotic use for insomnia treatment with consideration of indirect costs.⁴⁶ Tannenbaum and colleagues⁴⁶ compared the cost effectiveness of CBT-I versus sedative hypnotic use in Medicare patients. When including the expenses associated with falls for insomnia treated with CBT-I, insomnia treated with sedative-hypnotics, and untreated insomnia, they found that sedative-hypnotic treatment is 1.669 times more costly than CBT-I and no treatment is 1.741 times more costly than CBT-I.

RE-EVALUATION OF DIRECT COSTS OF INSOMNIA TREATMENT

The practice of placing a monetary value on all health care interventions has unfortunately created the drive to minimize the reliance on what may be perceived as a high utilization of clinician hours. This certainly adds to the explanation of why sedative-hypnotics are so highly used versus CBT-I. Because of the common presumption that the direct cost of CBT-I is more expensive than pharmacotherapy, it is worthwhile to re-examine this in terms of chronicity. A very conservative hypothetical scenario is presented.

It is difficult to describe the cost of CBT-I sessions in the United States because of variations in payer reimbursement. The 2016 Medicare reimbursement for psychotherapy sessions is \$60.03 for a 30-minute session and \$119.39 for a 60-minute session. Based on a 60-minute initial session and five 30-minute follow-up sessions, the average Medicare cost for in-person CBT-I is \$419.54 (**Table 1**).

The direct expense of medication use is variable, although it is thought to be low, because the most common agents used are available as generics. Generic zolpidem is available at a low cost, with a 30-day supply costing from \$6.90 (with use of an Internet-available coupon) to \$159.00 at major

Table 1
Insomnia treatment estimated direct costs

Pharmacologic	3 y
Generic zolpidem, 10 mg at \$6.90 per 30-d supply	36.5 prescriptions = \$251.85
Level 3 initial visit at \$77.75	× 1 = \$77.75
Level 2 follow-up visit at \$25.80	× 2 = \$51.60
Total	\$381.20
CBT-I	3 y
60-min psychotherapy session at \$119.39	× 1 = \$119.39
30-min psychotherapy session at \$60.03	× 5 = \$300.15
Total	\$419.54

Adapted from <http://www.goodrx.com/ambien>. Accessed August 7, 2016; and <http://gi.org/wp-content/uploads/2016/01/Medicare-2016-RVU-breakdown-Nov-20152.pdf>. Accessed August 7, 2016.

chain retailers.⁴⁷ The newer medication suvorexant, which is not available in the generic form, costs \$291.87 to \$376.00 for a 30-day supply of 20-mg tablets at major chain retailers.⁴⁸

Based on the lowest prescription cost for generic zolpidem, 10-mg tablets, 3 years of nightly usage would add up to \$251.85. The addition of minimal monitoring office visits (one level 3 initial visit and two level 2 follow-up visits) based on the 2016 Medicare reimbursement schedule⁴⁹ adds \$129.35 to the 3-year direct expense cost for a total of \$381.20 (see **Table 1**). A 3-year period was used because that is the longest amount of time that CBT-I treatment effects have been found to be sustained. The effects of CBT-I for periods longer than 3 years have not been reported. Were nightly zolpidem use to continue for 5 years with an additional two level 2 follow-up visits, the combined costs would be \$600.70. Therefore, based on our rough cost estimate, CBT-I is likely to be more cost effective over time than hypnotic medication for the treatment of insomnia. However, pharmacotherapy is likely to have less direct treatment costs for acute insomnia (as long as maladaptive behaviors do not occur causing the insomnia to become chronic).

BARRIERS TO COGNITIVE BEHAVIORAL THERAPY FOR INSOMNIA AND EFFORTS TO INCREASE ACCESS

Although CBT-I is the gold standard^{1–3} for treatment of primary and comorbid insomnia, there is

a need to increase its availability to patients. The two major barriers to more widespread use of CBT-I are the lack of CBT-I practitioners and that many physicians are not aware of its efficacy.⁵⁰ Despite the expectations of many patients and referring providers, not all sleep clinics offer CBT-I. For example, of all the sleep programs within the Veterans Affairs system, only 54% of these programs offer CBT-I.⁵¹

In the interest of increasing access and reducing cost, many groups have developed simplified or abbreviated versions of CBT-I, training more master's level practitioners including nurse practitioners and physician assistants,⁵² and/or using technology, such as Internet-based programs.

A randomized controlled trial of Internet-based CBT-I intervention showed that the improvements were sustained for 3 years, and the intervention group used less sleep medications than the control group.⁵³ A meta-analysis on 15 studies of CBT-I found that it is effective in improving total sleep time, sleep efficiency, insomnia severity, and depression severity when compared with control subjects, and all but total sleep time were maintained at up to 48 weeks posttreatment.⁵⁴

Community-based workshops have also been demonstrated to be effective and cost effective.^{12,41} A small study on sleep-restriction therapy alone on patients with an objective total sleep time of less than 6 hours by PSG found improvements in subjective insomnia severity and subjective total sleep time at 3 months.³⁹ However, this study did not include a PSG measurement at the 3-month mark.

A stepped care model of behavioral insomnia treatment has been proposed as a way to quickly increase access to cost-effective, evidence-based care.⁵⁵ Most patients would be triaged to self-administered CBT-I as the first step, which can be made readily available for anyone who needs it, and sessions with trained providers and behavioral specialists would be arranged for those who self-administered care is not suitable or has not yielded adequate improvement.⁵⁵ Stepped care models have been tested in other psychiatric disorders. A meta-analysis has found that stepped care is equal to care as usual for depression and superior to care as usual for anxiety.⁵⁶ Payers should cover the cost of access to evidence-based self-administered CBT-I. However, it is also important that they do not turn coverage of online CBT-I into a barrier for clinician-administered treatment.

SUMMARY

The recognition of insomnia as a separate comorbid condition rather than a secondary condition of

mood and anxiety disorders and other health problems points to the need for a durable treatment rather than temporary symptomatic relief. Insomnia medications are most suitable for alleviation of transient sleep disturbances in people who otherwise have a low degree of dysfunctional sleep-related thoughts and behaviors.

Based on current data available, CBT-I is more effective, safer, and more cost-effective than pharmacotherapy or nontreatment of insomnia. Despite this, and recommendations from multiple national and international institutions for CBT-I as first-line therapy, nontreatment and pharmacotherapy continue to be the predominant treatment approach for insomnia sufferers. The main reasons for this are lack of awareness of CBT-I and lack of treatment providers. A more comprehensive cost-effectiveness analysis on insomnia treatment can be expected to demonstrate that CBT-I is less expensive than pharmacologic treatment. This is because of a reduction in indirect and long-term costs of insomnia.

Several therapy sessions of CBT-I are probably not more expensive than pharmacotherapy (based on our rough calculations). However, self-administered, group, and stepped care models of CBT-I are being developed and evaluated as a means to make this intervention have a lower direct cost, and more critically, available to meet the needs of the population. A large initial investment would expedite the availability of evidence-based programs. The stakeholders, aside from the sufferers themselves, who stand to reap the most financial benefit from improved treatment of insomnia are employers and health insurance companies. Growing evidence of the superiority of CBT-I over nontreatment and pharmacotherapy with regard to recovery of the financial losses associated with indirect costs of lost productivity, absenteeism, and increased health care utilization because of comorbidities and injuries can help influence key stakeholders.

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