

## Nonpharmacologic Approaches to the Management of Insomnia

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Insomnia is one of the more common complaints patients present to their physicians. Sleep problems affect up to one-third of all Americans, and the loss of workplace productivity and increased healthcare utilization result in costs approaching \$100 billion a year. Patients with acute insomnia generally respond well to various sedative hypnotic medications, but chronic insomnia is a different challenge. Physicians and patients may raise concerns about the long-term use of sedative hypnotic medications. Even in light of these concerns, however, the chronic insomnia remains, ostensibly leaving the physician few choices. A number of promising nonpharmacologic strategies are available that physicians can easily implement. Through the use of self-rating instruments and a sleep log, physicians can bring the sleep problem into better focus and monitor the efficacy of clinical interventions. Certain behavioral techniques, such as sleep hygiene, stimulus control, and sleep restriction, can be effective remedies for chronic insomnia. The use of cranial electric stimulation for insomnia is also showing promising results. Through careful assessment and the adoption of simple nonpharmacologic strategies, the physician's interventions may result in a good night's sleep.

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“Doctor, I can’t get to sleep!” Sleep problems represent one of the most common complaints heard by primary care providers. Providers’ responses tend to vary broadly depending on the acuity of the complaint. On one hand, a sleep problem with an acute onset and little in the way of antecedents will typically prompt the prescription of some sleep aid. On the other hand, a patient with a chronic sleep problem probably presents with an extensive past history of ineffective, or at best partially effective, pharmacologic management. As the physician quickly lists the patient’s prior medications and in return learns of the patient’s poor response, a sense of gloom may descend on the interview. At this point, many healthcare providers may feel boxed in. Typical interventions at this juncture might include a consultative referral to a psychiatrist or a sleep medicine specialist. The former can search for contributing emotional problems, while the latter can recommend more sophisticated diagnostic procedures—perhaps, for example, a test for obstructive sleep apnea.

Of course, medical consultation is the bedrock of good clinical practice, but another, complementary pathway exists. This alternate approach involves the consideration of and, when appropriate, the use of nonpharmacologic treatment strategies for the management of sleep disorders. We conducted this review of published literature on the nonpharmacologic treatment of patients with insomnia by querying the Cochrane Database of Systematic Reviews, PubMed, and PsycINFO. The following search terms were used with each database: insomnia, sleep problems, and sleep disorders.

### Prevalence and Economic Implications

Insomnia is common, affecting 10% to 35% of the US population.<sup>1</sup> Women, older adults, and individuals with physical or emotional problems report insomnia more frequently.<sup>2</sup> Although women are more likely than men to report sleep difficulties, when examined objectively women in the general population have a better quality of sleep than men do.<sup>3</sup>

Sleep disorders are economically and socially expensive. Some of the impairments associated with poor sleep include chronic fatigue, inattention, irritability, diminished productivity, emotional problems, absenteeism, more frequent health complaints, increased alcohol use, and accidents. Individuals

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with insomnia have more contacts with the health system and more days absent from work than do those without insomnia.<sup>4</sup> Taken together, the economic toll in terms of employment and healthcare utilization could approach \$100 billion per year.<sup>5</sup>

Insomnia is a persistent condition in that it is subject to frequent recurrences. In a study<sup>6</sup> to examine the natural history of insomnia, the authors discovered that nearly three-fourths of the study group had experienced a 1-year course of sleep difficulties. Slightly less than half of the study group remained symptomatic for the duration of the 3-year study.<sup>6</sup>

Chronic sleep problems are associated with a number of physical disorders, chief among which are cardiopulmonary disease, musculoskeletal problems, and any disorder accompanied by frequent urination.<sup>7</sup> Aside from physical problems, the single strongest correlate with insomnia is concurrent clinical depression.<sup>8</sup> Research also suggests a chronic state of physiologic arousal may contribute to some types of insomnia, a condition commonly encountered in patients with posttraumatic stress disorder.<sup>9</sup>

Individuals with alcohol misuse disorders may continue to experience sleep problems many months after achieving abstinence. In the beginning, alcohol's sedative effect promotes the initiation of sleep, but longer term alcohol use results in a decline in total sleep time and a substantial impairment in rapid eye movement, or REM, sleep. The etiology of alcohol-related insomnia might be physiologic or simply a lingering consequence of poor sleep habits adopted during periods of heavy drinking.<sup>10</sup> A careful history of sleep problems must include attention to substance misuse. Compared with normal sleepers, individuals with insomnia are more likely to use

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alcohol as a sleep aid, by a margin of nearly two to one.<sup>11</sup> Persistent insomnia also helps predict relapse among individuals with alcohol dependence, again by a two to one margin.<sup>11</sup> Individuals with a combination of stressful life events and insomnia had a risk of developing an alcohol problem that was two times greater than the risk in normal sleepers.<sup>12</sup> This finding was limited to patients with preexisting clinical anxiety or depression.<sup>12</sup>

Among older adults with a prior history of depression, insomnia may be an independent risk factor heralding a return of the dysphoric mood.<sup>13</sup> Nightmares, independent of insomnia, may also indicate individuals who are more likely to be suicidal.<sup>14</sup> Obesity also interferes with sleep; researchers have reported a progressive decrease in total sleep time as the body mass index increases.<sup>15</sup>

As might be expected, the use of tobacco products has a

### KEY POINTS

**CHRONIC INSOMNIA IS ASSOCIATED WITH PHYSICAL** disorders (eg, cardiopulmonary disease, musculoskeletal problems), as well as clinical depression.

**DIAGNOSIS SHOULD BE BASED ON FINDINGS FROM** complete history, a physical examination, and a detailed sleep examination, including a completed sleep diary.

**FOR PATIENTS WITH CHRONIC INSOMNIA, USE OF** nonpharmacologic, evidence-based behavioral interventions—such as sleep hygiene, stimulus control, and sleep restriction—can be effective.

**LIGHT TO MODERATE EXERCISE, COMPLETED NO LATER** than 4 hours before bedtime, has been shown to be effective, as has cranial electric stimulation.

negative influence on the initiation and maintenance of sleep.<sup>16</sup> Impaired sleep also lowers the body's resistance to common rhinoviral infections.<sup>17</sup> Shorter duration of sleep correlates with higher blood pressure levels.<sup>18</sup> Among young adults, shorter periods of sleep were associated with higher self-reports of poor health.<sup>19</sup>

### Diagnosis

The nomenclature of sleep disorders can be found in several publications. The *International Classification of Sleep Disorders: Diagnostic and Coding Manual* identifies approximately 90 different sleep disorders.<sup>20</sup> The *Diagnostic and Statistical Manual of Mental Disorders* recognizes primary sleep disorders, dys-somnias, parasomnias, sleep disorders related to other mental disorders, sleep disorders related to general medical conditions, and substance-induced sleep disorders.<sup>21</sup>

### Assessment of Insomnia

The assessment of any sleep disorder begins with a comprehensive history and physical examination. This history should include the onset, duration, and impairment associated with the sleep problem. An effort should be made to identify whether the sleep problem is one of initiation or of maintenance. If sleep onset is delayed, the clinician should probe the possible causes, such as excessive worry. If sleep is repeatedly interrupted, the clinician should inquire about dreams, nightmares, and snoring. A history of habits associated with the sleep routine, such as reading in bed, is important. The clinician should ask about other patient behaviors that might occur just before going to bed, such as eating a meal, consuming alcohol or caffeine, using over-the-counter sleep aids, and exercising. If possible, a collateral history from the bed partner could provide valuable clues, such as restlessness, talking, or possible breathing difficulties the patient might

experience. The high correlation between emotional disorders and sleep problems necessitates a screening interview for depression and anxiety. The physical examination might include a review of the person's medical history to look for any contributing conditions such as a chronic pain disorder. A review of medications might unearth possible culprits that are interfering with the patient's sleep.<sup>22</sup>

Large parts of the sleep assessment can be standardized through the use of various instruments. A sleep diary is particularly useful, since research suggests most people with insomnia miscalculate their sleep history.<sup>23</sup> A properly completed sleep diary can provide a wealth of information. Typical diaries includes sections on medication use, ingestion of caffeinated beverages, time at which the subject went to bed, the amount of time it took to fall asleep, total hours in bed, total sleep hours, number of interruptions and type, and time and manner of awakening. The clinician should ask the patient to complete the diary on a daily basis for at least 1 week. The sleep diary serves other purposes, as well. It shows that the clinician is serious about gathering additional information, and the patient's response, in terms of willingness to participate and daily compliance, may provide information about the patient's motivations.<sup>24</sup>

The Pre-Sleep Arousal Scale is a 16-item self-report instrument designed to assess cognitive and physiologic factors that may contribute to sleep initiation.<sup>25</sup> The Epworth Sleepi-

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ness Scale measures the impairment of a sleep disorder in terms of daytime fatigue.<sup>26</sup> Scores higher than 11 are clinically significant. The Pittsburgh Insomnia Rating Scale is designed for the patient to complete and comes in two versions, one form with 65 questions and another, abbreviated form with 20 questions. Both are designed to assess the quality of sleep during a 7-day period. The 20-item questionnaire may be particularly useful for tracking the impact of clinical interventions.<sup>27</sup>

### Rationale for Nonpharmacologic Clinical Interventions

The physician can prescribe a variety of medications to improve sleep.<sup>28</sup> Many of these medications target the  $\gamma$ -aminobutyric acid receptors but are associated with accompanying adverse effects such as rebound insomnia and chemical dependence. Ramelteon is a novel medication that attempts to overcome these concerns by acting as an agonist at the

melatonin receptor.<sup>29</sup> Unfortunately, despite the plethora of sleep medications available, a substantial number of patients with chronic insomnia do not achieve a full remission.<sup>30</sup> At this point, the physician might consider a number of nonpharmacologic treatments. Nonpharmacologic clinical interventions offer several potential advantages. Physicians concerned about prescription drug misuse can replace medications with evidence-based behavioral treatments. Such treatment is also cost-effective. Despite substantial research and practical clinical experience, many physicians remain unfamiliar with the wide range of nonpharmacologic options available to treat insomnia. Among this group of nonpharmacologic treatments, behavioral interventions—which are simple, inexpensive, and effective—lead the list.

### Nonpharmacologic, Evidence-Based Behavioral Treatment

Behavioral techniques broadly consist of sleep hygiene, stimulus control, and sleep restriction. These are simple, effective clinical interventions that physicians can use alone or in combination with medications to improve the patient's sleep. Among this group, physicians will find sleep hygiene the easiest strategy to implement.

#### Sleep Hygiene

The effectiveness of sleep hygiene education rests on the physician's education of the patient about the myriad environmental factors that disturb sleep. Patients develop and sustain bad habits, which chronically interfere with a restful night's sleep. Practices that promote better sleep can be reduced to a factual handout (*Figure 1*).

Sometimes the burdens of the day return with a vengeance at bedtime. Few things prevent sleep like a night of ceaseless mental flagellations. For a patient in these circumstances, the physician could suggest the patient keep a worry journal. The worry journal is a special diary in which the patient records the trials and tribulations of the day, along with possible solutions. Just prior to turning in for the night, the patient can spend a few minutes logging the entries and then, with a symbolic significance, close the book and set it aside until the morning.

Sleep hygiene can be remarkably effective in promoting sleep. Rigorous application of the basic tenets of sleep hygiene (*Figure 1*) can increase total sleep time and improve sleep efficiency.<sup>32</sup> Reducing the mental stimulation that accompanies a singular preoccupation can promote the quicker initiation of sleep.<sup>33</sup>

#### Stimulus Control

Stimulus control is a particularly effective behavioral treatment.<sup>34</sup> In many cases, the physician can trace the patient's sleep problems to bad habits. Common activities include eating, watching TV, or reading a stimulating novel while in bed. Any number of activities are incompatible with a good

- Avoid caffeinated products, alcohol, and nicotine before bedtime.
- Minimize noise, light, and excessive temperature. Use a “white noise” device to block out extraneous noises, if necessary.
- Ensure that your bedroom is properly ventilated.
- Experiment with different bedding and pillow sizes. Ensure that you have a proper mattress and bed size.
- Avoid large meals and/or skipping meals in the evening.
- Try to resolve emotional dilemmas prior to bedtime or make resolution a priority the following day. A “worry journal” can be helpful.
- Keep a regular exercise regimen (do not exercise less than 4-5 hours prior to bedtime).
- Avoid too many fluids prior to bedtime.
- Cover your clock, so that you do not focus on the time during the night.
- Take a warm (not hot) bath before bedtime.
- Avoid highly spiced, heavy, or sugary foods at nighttime and instead opt for carbohydrate snacks or magnesium-rich foods. For example, carbohydrate snacks include celery, hard-boiled eggs, nuts, beef or turkey jerky, cottage cheese, crackers, popcorn, and rice cakes. Magnesium-rich snacks include black beans, broccoli, nuts, oysters, rockfish, scallops, squash, and wheat bread.
- Develop a sleep ritual that would allow you to make a transition from regular activity to sleep, to slow down, to unwind. For example, spend 15-20 minutes in a relaxing activity (listen to music, a relaxation tape, or a CD; meditate).
- Drink a calming cup of herbal tea, such as chamomile or peppermint.
- Consider keeping pets on the floor (not in the bed) during bedtime.

**Figure 1.** Sample patient handout provides practices that promote better sleep. **Source:** National Heart, Lung, and Blood Institute Working Group on Insomnia. *Insomnia: Assessment and Management in Primary Care.* Bethesda, MD: National Heart, Lung, and Blood Institute. NIH publication 98-4088. [http://www.nhlbi.nih.gov/guidelines/archives/insom\\_pc/insom\\_pc\\_archive.pdf](http://www.nhlbi.nih.gov/guidelines/archives/insom_pc/insom_pc_archive.pdf). Published September 1998. Accessed May 31, 2010.<sup>31</sup>

night's rest. The goal of stimulus control is to break the bad habits and behaviorally associate the bedroom with sleep. To be effective, stimulus control strategies require considerable diligence on the part of the patient.

The physician should ask the patient to keep a sleep log to monitor and reinforce stimulus control practices (Figure 2). Stimulus control requires that the patient adopt specific routines.<sup>35</sup> The patient should set and maintain a regular sleep pattern and avoid the temptation to oversleep on the week-

ends. A regular rise time must be enforced regardless of the quality of the previous night's sleep. The bed should be used only for sleeping and sex. With that in mind, the patient should go to bed only when sleepy. If a restful repose eludes the patient, he or she should be instructed to leave the bed and pursue some nonstimulating activity. The patient should return to bed only when fatigue returns. Despite a restless night and the resulting tiredness, the patient should make every effort to avoid napping.

### Sleep Restriction

Many patients do not sleep efficiently. Sleep efficiency is the relationship between the amount of time spent actually sleeping and the amount of time spent in bed. For example, a person may lie in bed for 10 hours but spend only 5 hours asleep. This person's sleep efficiency is a rather abysmal 50%. The behavioral technique referred to as sleep restriction aims to reduce the gap so that time in bed closely approximates time asleep. Sleep restriction achieves this outcome by decreasing sleep onset latency and improving total sleep time.<sup>36</sup>

Although sleep restriction can be remarkably effective in improving the amount of time spent sleeping, it is difficult to apply. In part, this is due to an erroneous belief that equates greater time spent in bed with higher quality sleep. Another difficulty in applying sleep restriction is the need to induce mild sleep deprivation to reset the sleep cycle. Unfortunately, the time spent in bed not sleeping contributes to a variety of sleep disturbances. A sleep restriction program works with a sleep log to methodically reduce the amount of inefficient time in bed (Figure 3).

### Nonpharmacologic Alternative Treatments Cranial Electric Stimulation

Ongoing research suggests a role for cranial electric stimulation (CES) in the treatment of patients with insomnia. Cranial electric stimulation is the term the US Food and Drug Administration uses to recognize medical devices that deliver tiny amounts of transdermal electricity, in some cases through the attachment of bilateral earlobe electrodes. The means by which CES improves sleep is not fully understood.<sup>38</sup> Researchers speculate that the application of microcurrents modulates the production of central nervous system alpha rhythms. Enhanced alpha rhythms are associated with relaxation, sharpened mental focus, and mood stability. Cranial electric stimulation may also influence certain neurotransmitters, such as serotonin and acetylcholine, both of which are instrumental in various human mood states. Cranial electric stimulation is an alternative treatment and, while not the standard of care for insomnia, offers an adjunctive clinical intervention when conventional methods fail. We are conducting a randomized controlled trial, approved by the institutional review board of Walter Reed Army Medical Center, to explore the efficacy of CES for insomnia.

Authors of a meta-analysis of 20 published studies con-

Patient Name							
Date	dd/mm/yyyy						
Bed time							
Minutes spent falling asleep							
Number of awakenings							
Total minutes of awakenings							
Number of nightmares							
Rise time							
Minutes of daytime naps							

Figure 2. Example of a sleep log used to monitor and reinforce stimulus control practices.

cluded that “CES can be an excellent treatment for insomnia in those patients who can accept and adapt to the modality.”<sup>39</sup> Cranial electric stimulation is generally well tolerated, non-invasive, cost-effective, and relatively benign in its adverse events.<sup>40</sup>

Cranial electric stimulation is simple to use and necessitates minimal training. A typical application involves placing electrodes on the patient’s earlobes. The microcurrent is then adjusted to a level at which the patient feels “heavy” or dizzy. At that point, the operator reduces the current until no further

## A properly completed sleep diary can provide a wealth of information.

sensations exist. The duration of treatment varies considerably, although daily 30-60-minute sessions for several weeks produce better results.<sup>41</sup>

### Exercise

Routine exercise is another simple remedy for chronic insomnia. Participants in a randomized controlled trial<sup>42</sup> who engaged in brisk walking or low-impact aerobic exercise fell asleep faster, increased their total sleep time, and awoke feeling more refreshed than did the control subjects. A more recent study<sup>43</sup> produced similar results; study subjects experienced reduced sleep-onset latency and improved sleep efficiency.

The timing and intensity of exercise are important. As the findings in both studies suggest, physicians should recommend 20 minutes of light to moderate exercise three or four

times a week and no later than about 4 hours before bedtime.

### Clinical Referral for Nonpharmacologic Evidence-Based, Cognitive Treatment

In some patients, sleep is disturbed because of unrealistic expectations. A person’s rigid thoughts, such as “I need 10 hours of sleep to function properly,” “I will never get a good night’s sleep,” or “I am going to have nightmares again,” all conspire against a restful night. Cognitive treatments work through identification of faulty thoughts that interfere with sleep. The cognitive therapist challenges the validity of these beliefs and, through the therapeutic process, helps the patient learn new approaches.<sup>44</sup> Cognitive therapy is a mainstay of psychological treatment and as such would require a referral to a competent clinician. Cognitive therapists use a number of approaches, such as cognitive restructuring, paradoxical treatment, and symptom prescription. In each case, the therapist works with the patient to eliminate intrusive thoughts that impede sleep. Although most physicians do not directly employ cognitive therapy, it is useful to understand the validity of the practice.

When provided by a skilled therapist, cognitive treatments are equal to sedative hypnotic medications in terms of effectiveness in treating patients with insomnia.<sup>45</sup> A 6-month follow-up study demonstrated the durability of cognitive treatment in reducing numerous sleep problems, including a reduction in troubling nightmares.<sup>46</sup> Reduction of anxiety through the successful application of cognitive therapy may also reduce the need for sleep medications.<sup>47</sup>

### Conclusion

Medications remain the physician’s first choice for the treatment of patients with acute insomnia. That choice makes sense given the quick relief and relatively safe profile many

1. Use a sleep log to track your sleep/wake cycles.
2. Determine the time you usually awake in the morning.
3. Determine the average number of hours you spend asleep each night.
4. Determine what your bedtime should be. For example, if you normally rise at 6 AM and you sleep 5½ hours each night, your bedtime should be 12:30 AM.
5. Go to bed at your new "prescribed" time each night for 1 week.
6. If you do not fill your night with sleep, repeat steps 1-3 to identify a later bedtime.
7. Continue this plan until your time in bed is mostly filled with sleep or until you reduce your time in bed to 4 hours.
8. When your time in bed is mostly filled with sleep, hold that pattern for a few days and then begin increasing your time in bed each night by 15 minutes. Do this as long as you can continue to fill your time in bed with sleep.
9. Sleep restriction therapy can be modified in older adults by allowing an afternoon nap.

**Figure 3.** Example of a sleep restriction program. **Source:** Adapted from: Morin CM. *Insomnia: Psychological Assessment and Management.* New York, NY: Guilford Press; 1993.<sup>37</sup>

sleep medications provide. Chronic sleep disorders present a different challenge when concerns about long-term medication management arise. The research reported herein suggests that clinicians should consider nonpharmacologic strategies to manage long-term insomnia. In some cases, of course, the patient needs the sophisticated services of a specialist in sleep medicine. For many other patients, the physician's careful assessment and simple interventions may lead to a good night's sleep.

## References

1. Jindal RD, Buysse DJ, Thase ME. Maintenance treatment of insomnia: what can we learn from the depression literature? *Am J Psychiatry.* 2004;161(1):19-24.
2. Morin CM. Chronic insomnia: recent advances and innovations in treatment developments and dissemination. *Can Psychol.* 2010;51(1):31-39.
3. Bixler EO, Papanicolaou DA, Vgontzas AN, et al. Women sleep objectively better than men and the sleep of young women is more resilient to external stressors: effects of age and menopause. *J Sleep Res.* 2009;18(2):221-228.
4. Simon GE, VonKorff M. Prevalence, burden, and treatment of insomnia in primary care. *Am J Psychiatry.* 1997;154(10):1417-1423.
5. Stoller M. Economic effects of insomnia. *Clin Ther.* 1994;16(5):873-897.
6. Dodge R, Cline MG, Quan SF. The natural history of insomnia and its relationship to respiratory symptoms. *Arch Intern Med.* 1995;155(16):1797-1800.
7. Katz DA, McHorney CA. Clinical correlates of insomnia in patients with chronic illness. *Arch Intern Med.* 1998;158(10):1099-1107.
8. Buysse DJ. Chronic insomnia. *Am J Psychiatry.* 2008;165(6):678-686.
9. Perlis ML, Smith MT, Pigeon WR. Etiology and pathophysiology of insomnia. In: Kryger MH, Roth T, Dement WC, eds. *Principles and Practice of Sleep Medicine.* 4th ed. Philadelphia, PA: Elsevier Saunders; 2005:714-725.
10. Currie SR, Clark S, Rimal S, Malhotra S. Comprehensive assessment of insomnia in recovering alcoholics using daily sleep diaries and ambulatory monitoring. *Alcohol Clin Exp Res.* 2003;27(8):1262-1269.
11. Brower KJ, Aldrich MS, Robinson EA, Zucker RA, Greden JF. Insomnia, self-medication, and relapse to alcoholism. *Am J Psychiatry.* 2001;158(3):399-404.
12. Crum RM, Storr CL, Chan Y-F, Ford DE. Sleep disturbance and risk for alcohol-related problems. *Am J Psychiatry.* 2004;161(7):1197-1203.
13. Cho HJ, Lavretsky H, Olmstead R, Levin MJ, Oxman MN, Irwin MR. Sleep disturbance and depression recurrence in community-dwelling older adults: a prospective study. *Am J Psychiatry.* 2008;165(12):1543-1550.
14. Cukrowicz KC, Otamendi A, Pinto JV, Bernert RA, Krakow B, Joiner TE Jr. The impact of insomnia and sleep disturbances on depression and suicidality. *Dreaming.* 2006;16(1):1-10.
15. Vorona RD, Winn MP, Babineau TW, Eng BP, Feldman HR, Ware JC. Overweight and obese patients in a primary care population report less sleep than patients with a normal body mass index. *Arch Intern Med.* 2005;165(1):25-30.
16. Phillips BA, Danner FJ. Cigarette smoking and sleep disturbance. *Arch Intern Med.* 1995;155(7):734-737.
17. Cohen S, Doyle WJ, Alper CM, Janicki-Deverts D, Turner RB. Sleep habits and susceptibility to the common cold. *Arch Intern Med.* 2009;169(1):62-67.
18. Knutson KL, Van Cauter E, Rathouz PJ, et al. Association between sleep and blood pressure in midlife: the CARDIA sleep study. *Arch Intern Med.* 2009;169(11):1055-1061.
19. Steptoe A, Peacey V, Wardle J. Sleep duration and health in young adults. *Arch Intern Med.* 2006;166(16):1689-1692.
20. American Academy of Sleep Medicine. *International Classification of Sleep Disorders: Diagnostic and Coding Manual.* 2nd ed. Westchester, IL: American Academy of Sleep Medicine; 2005.
21. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders.* 4th ed, text rev. Washington, DC: American Psychiatric Association; 2000.
22. Schenck CH, Mahowald MW, Sack RL. Assessment and management of insomnia. *JAMA.* 2003;289(19):2475-2479.
23. Conroy DA, Arnedt JT, Brower KJ, Strobbe S, Hoffman R, Armitage R. Perception of sleep in recovering alcohol-dependent patients with insomnia: relationship with future drinking. *Alcohol Clin Exp Res.* 2006;30(12):1992-1999.
24. Buysse DJ. Diagnosis and assessment of sleep and circadian rhythm disorders. *J Psychiatr Practice.* 2005;11(2):102-115.
25. Nicassio PM, Mendlowitz DR, Fussell JJ, Petras L. The phenomenology of the pre-sleep state: the development of the pre-sleep arousal scale. *Behav Res Ther.* 1985;23(3):263-271.
26. Johns MW. Reliability and factor analysis of the Epworth Sleepiness Scale. *Sleep.* 1992;15(4):376-381.
27. Moul DE, Pilkonis PA, Miewald JM, Carey TJ, Buysse DJ. Preliminary study of the test-retest reliability and concurrent validities of the Pittsburg Insomnia Rating Scale (PIRS). *Sleep.* 2002;25(suppl):A246-A247.
28. Silber MH. Chronic insomnia. *N Engl J Med.* 2005;353(8):803-810.
29. Miyamoto M. Pharmacology of ramelteon, a selective MT<sub>1</sub>/MT<sub>2</sub> receptor agonist: a novel therapeutic drug for sleep disorders. *CNS Neurosci Ther.* 2009;15(1):32-51.
30. Ebben MR, Spielman AJ. Non-pharmacological treatments for insomnia. *J Behav Med.* 2009;32(3):244-254.
31. National Heart, Lung, and Blood Institute Working Group on Insomnia.

*Insomnia: Assessment and Management in Primary Care*. Bethesda, MD: National Heart, Lung, and Blood Institute. NIH publication 98-4088. [http://www.nhlbi.nih.gov/guidelines/archives/insom\\_pc/insom\\_pc\\_archive.pdf](http://www.nhlbi.nih.gov/guidelines/archives/insom_pc/insom_pc_archive.pdf). Published September 1998. Accessed May 31, 2010.

32. Adachi Y, Sato C, Kunitsuka K, Jayama J, Doi Y. A brief behavior therapy administered by correspondence improves sleep and sleep-related behavior in poor sleepers. *Sleep Biol Rhythms*. 2008;6(1):16-21.

33. Hauri P. The influence of evening activity on the onset of sleep. *Psychophysiology*. 1969;5(4):426-430.

34. Morin CM, Culbert JP, Schwartz SM. Non-pharmacologic interventions for insomnia: a meta-analysis of treatment efficacy. *Am J Psychiatry*. 1994;151(8):1172-1180.

35. Bootzin RR, Epstein D, Wood JM. Stimulus control instructions. In: Hauri PJ, ed. *Case Studies in Insomnia*. New York, NY: Plenum Press; 1991:19-28.

36. Harris J, Lack L, Wright H, Gradisar M, Brooks A. Intensive sleep retraining treatment for chronic primary insomnia: a preliminary investigation. *J Sleep Res*. 2007;16(3):276-284.

37. Morin CM. *Insomnia: Psychological Assessment and Management*. New York, NY: Guilford Press; 1993.

38. Tan G, Alvarez JA, Jensen MP. Complementary and alternative medicine approaches to pain management. *J Clin Psychol*. 2006;62(11):1419-1431.

39. Kirsch DL, Gilula MF. CES in the treatment of insomnia: a review and meta-analysis. *Pract Pain Manage*. 2007;October:28-39.

40. Lichtbroun AS, Raicer MC, Smith RB. The treatment of fibromyalgia with cranial electrotherapy stimulation. *J Clin Rheumatol*. 2001;7(2):72-78.

41. Bystritsky A, Kerwin L, Feusner JD. A pilot study of cranial electrotherapy stimulation for generalized anxiety disorder. *J Clin Psychiatry*. 2008;69(3):412-417.

42. King AC, Oman RF, Brassington GS, Bliwise DL, Haskell WL. Moderate-intensity exercise and self-rated quality of sleep in older adults: a randomized controlled trial. *JAMA*. 1997;277(1):32-37.

43. Passos GS, Poyares D, Santana MG, Garbuio SA, Tufik S, Mello MT. Effect of acute physical exercise on patients with chronic primary insomnia. *J Clin Sleep Med*. 2010;6(3):270-275.

44. Belanger L, Savard J, Morin CM. Clinical management of insomnia using cognitive therapy. *Behav Sleep Med*. 2006;4(3):179-202.

45. Cervena K, Dauvilliers Y, Espa F, et al. Effect of cognitive behavioural therapy for insomnia on sleep architecture and sleep EEG power spectra in psychophysiological insomnia. *J Sleep Res*. 2004;13(4):385-393.

46. Davis JL, Wright DC. Randomized clinical trial for treatment of chronic nightmares in trauma-exposed adults. *J Trauma Stress*. 2007;20(2):123-133.

47. Vincent N, Walker J. Anxiety sensitivity: predictor of sleep-related impairment and medication use in chronic insomnia. *Depress Anxiety*. 2001;14(4):238-243.

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Comorbid insomnia implies that insomnia in subjects with other health conditions is as significant as the underlying disorder and hence requires independent assessment and treatment [13]. Distressed emotion, lack of energy and profound fatigue, sleepiness and impaired functioning during the daytime, are shown to be some cardinal consequences of insomnia. Furthermore, impairment in social and occupational performance adversely affects the quality of life. Lande RG, Gragnani C (2010) Nonpharmacologic approaches to the management of insomnia. *J Am Osteopath Assoc* 110: 695-701. Morin CM, Vallières A, Guay B, Ivers H, Savard J, et al. Management of labor pain is a major goal of intrapartum care. There are two general approaches: pharmacologic and nonpharmacologic. Pharmacologic approaches are. In contrast, nonpharmacologic approaches are largely directed at increasing comfort, enabling the laboring woman to cope with the pain, and preventing suffering. This topic will explore a variety of nonpharmacologic methods of pain management during labor and the evidence of their efficacy. Related topics on the pharmacologic management of labor pain and labor are presented separately. (See "Pharmacologic management of pain during labor and delivery".) (See "Neuraxial analgesia for labor and delivery (including instrumented delivery)".) (See "Management of normal labor") Nonpharmacologic interventions have been studied and shown to produce reliable and sustained improvements in sleep patterns of patients with insomnia. Cognitive behavior therapy for insomnia has multiple components, including cognitive psychotherapy, sleep hygiene, stimulus control, sleep restriction, paradoxical intention, and relaxation therapy. 27 Regardless of the cause, most patients with insomnia benefit from approaches that focus on good sleep habits, 11,12 especially when combined with other CBT approaches. 5 STIMULUS CONTROL One of the most effective therapies for insomnia is stimulus control, even when used alone. ABC of sleep disorders. Practical management of insomnia: behavioural and cognitive techniques. *BMJ*.