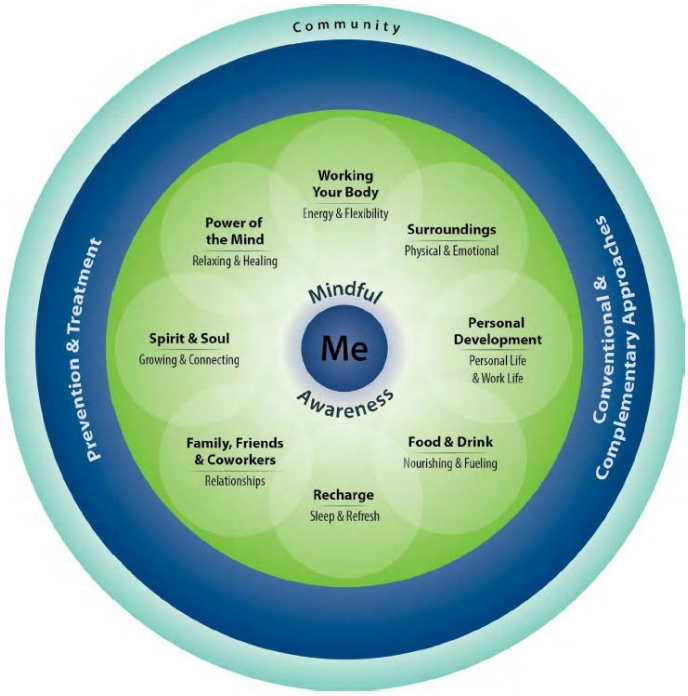
WHOLE HEALTH: CHANGE THE CONVERSATION

Advancing Skills in the Delivery of
Personalized, Proactive, Patient-Driven Care

Recharge
Educational Overview



This document has been written for clinicians. The content was developed by the Integrative Medicine Program, Department of Family Medicine, University of Wisconsin-Madison School of Medicine and Public Health in cooperation with Pacific Institute for Research and Evaluation, under contract to the Office of Patient Centered Care and Cultural Transformation, Veterans Health Administration.

Information is organized according to the diagram above, the *Components of Proactive Health and Well-Being*. While conventional treatments may be covered to some degree, the focus is on other areas of Whole Health that are less likely to be covered elsewhere and may be less familiar to most readers. There is no intention to dismiss what conventional care has to offer. Rather, you are encouraged to learn more about other approaches and how they may be used to complement conventional care. The ultimate decision to use a given approach should be based on many factors, including patient preferences, clinician comfort level, efficacy data, safety, and accessibility. No one approach is right for everyone; personalizing care is of fundamental importance.

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Vignette: Carl

Carl, a 62-year-old retired Air Force non-commissioned officer, presents with complaints of poor sleep. His symptoms began when he took a job that required him to work night shift after he retired from active duty. He describes difficulty falling asleep and staying asleep. He occasionally has disturbing dreams relating to his service in Operation Desert Storm. He has undergone polysomnography in the past, and it demonstrated mild obstructive sleep apnea, but he declined treatment with continuous positive airway pressure (CPAP).

He reports difficulty falling asleep unless he takes medication. He has tried multiple over-the-counter agents but feels groggy in the morning whenever he takes them. About three years ago, he was prescribed zolpidem 10 milligrams and initially found it to be effective. However, he has been using it essentially continuously for at least 18 months, and lately he has found it to be less effective. As a result, he has increased his dose to two tablets. His primary care physician has become concerned about the increased dose, and his pharmacy benefit plan is requiring prior authorization for continued usage. Carl recently experienced a fall during a sleep-walking incident in which he sustained minor injuries.

Carl lives with his wife in a small single-family home. He spends his time doing woodworking in his home shop. He consumes at least 12 cups of coffee daily, noting, “We always keep a pot on during the day.” He usually watches TV in the evening, when he may drink one to three beers. He typically falls asleep briefly in his recliner. He is very concerned about local politics and spends at least an hour each evening on the computer doing social-networking and related activities. He has a variable sleep schedule and watches TV in bed until he dozes off, but he is often awakened by the television between 3 and 4 a.m. He used to be an earlier riser, but now he sleeps until 8 or 9 a.m., especially if he had a bad night of sleep the night before. He does not exercise regularly and has gained 30 pounds in the past year. He is often tired and irritable during the day. He feels depressed and states, “I wonder how it could ever have gotten so bad.”

Recharge: *"Sleep and Refresh"* Getting enough rest, relaxation, and sleep.	
Where you are: Rate yourself on a scale of 1 (low) to 5 (high) 1 2 3 4 5	Where would you like to be? 1 2 3 4 5
What are the reasons you choose this number? *I can't sleep without medication and I'm scared because the meds aren't working like they used to. I am exhausted all the time but when I lay down to sleep, my mind starts racing and I just can't go to sleep unless I knock myself out. The harder I try, the worse it seems to get.*	What changes could you make to help you get there? *I'm not sure, that's why I came in to be seen.*

General Information and Introduction

If there's a secret to a good night's sleep, it's a good day's waking.1 —Rubin Naiman

The purpose of this review is to provide an evidence-informed examination of how primary insomnia might be treated by VA providers using a Whole Health approach. The incidence of insomnia in Veterans is higher than for the general population and is often associated with other comorbidities including depression, suicide and pain. A recent review showed that more than 40% of women Veterans have insomnia.2

What is insomnia?

Insomnia is defined as inadequate sleep duration or non-restorative sleep. In surveys, insomnia may be defined by questions such as, "Do you have difficulty falling asleep?" or "Do you have difficulty staying asleep?" In the sleep literature, insomnia is a term that is often used to describe long sleep latency; people with insomnia take longer to fall asleep, they have frequent awakenings, or both.3 The most essential element in the care of patients with sleep complaints is the subjective data they provide, and the most commonly used research scale for subjective evaluation of insomnia is the

Objectively, studies of people with insomnia show that they have modest increases in how long it takes them to fall asleep. They spend more time awake during the night, and they have slight decreases in total sleep time when compared to controls.5 In extreme cases, patients may complain of being awake when physiologically they are actually asleep. This is known as sleep state misperception.5

Types of insomnia

Insomnia can be grouped into three different types depending on the duration of the problem: transient, acute and chronic.

- **Transient insomnia**
  Transient periods of sleep disturbance associated with situational stress are a universal human experience. The annual incidence of transient situational insomnia is estimated to be as high as 85%.[3]

- **Acute insomnia**
  When insomnia persists more than a few nights, but less than a month, it is classified as acute insomnia. Severe acute insomnia is a significant risk factor for the development of chronic insomnia, but it is unclear if intervention in acute insomnia, including behavioral and pharmacological means, can reduce the risk of the development of chronic insomnia.[6]

- **Chronic insomnia**
  Chronic insomnia is defined as insomnia that persists for more than a month. Chronic insomnia affects an estimated 9% to 30% of the general population.[3]

Insomnia Complications

Mood and depression

While irritability is a common complication of acute or short-term insomnia, insomnia can be a marker for more serious psychiatric illnesses. A prodromal period of insomnia is a robust predictor of incipient depression.[7] In patients with depression, insomnia is associated with a greater risk of relapse and a decreased response to treatment.[8] Cognitive behavioral therapy for insomnia (CBTI) has been shown to significantly improve response rates to pharmacotherapy for depression and helps get at the root causes of it, as the patient and therapist work together to problem-solve around why sleep is poor and how it can be improved.[9] CBTI is discussed more below.

Accidents

Insomnia is associated with 7.2% of all workplace accidents and 23.7% of the costs of workplace accidents, resulting in a combined expense of $31.1 billion dollars.[10]

Suicide

In a study of sleep and suicide risk in Veterans, poor sleep quality was significantly associated with suicidal ideation.[11] It was reported in 39% of Veterans interviewed. "Short sleepers" were more likely to have attempted suicide in the preceding year. The combination of insomnia and alcohol use was particularly predictive of suicide risk.

Treatment for Insomnia

Pharmacotherapy

A randomized double blind, placebo controlled study examined the effectiveness of modified-release zolpidem (Ambien CR) on sleep in study participants with insomnia.[12] The researchers looked at sleep quality at the beginning (nights 1 and 2) and at the end (nights 15 and 16) of the study. Objective sleep parameters were improved at nights 1 and 2 as well as nights 15 and 16 *in both the placebo and treatment groups*.

The treatment was superior to placebo in terms of wakefulness after sleep onset, sleep efficiency, and latency to persistent sleep, but it must be asked whether or not the benefits were clinically significant. Taking modified-release zolpidem resulted in 10 minutes faster sleep onset than placebo at days 1 and 2. The difference in sleep onset decreased to 7 minutes by day 15 and 16. Wakefulness after sleep onset (WASO, which is how much time a person spends awake through the night after they first fall asleep) decreased by 23 minutes at day 1 and 2, compared to 16 minutes at day 15 and 16. Sleep efficiency, the time asleep divided by the time in bed, improved by 7% acutely. However, this measure also declined by day 15 and 16, to 3%. In addition to demonstrating a decreased therapeutic benefit over time, these data indicate that even the most "advanced" sleep medications have modest clinical effects.

It is clear that belief and intention have an important impact on sleep quality, so it is important for clinicians to keep an open mind regarding the nature of sleep problems and their many possible solutions, tailoring treatments to each individual. In truth, most treatments, including pharmaceuticals, dietary supplements, and mind-body techniques, show modest effect sizes. We often have significant expectations for "sleeping pills," when in actuality the effects are minimal.

- **Limitations of pharmacotherapy for insomnia**
  Sleep medications may be useful for transient and short-term insomnia and may be helpful in preventing them from progressing into chronic insomnia. However, sleep medications have only modest effects compared to placebo.[13] When conventional zolpidem (Ambien) 10 milligrams and 4 doses of eszopiclone (Lunesta) were compared to placebo, only higher doses of eszopiclone (2.5 and 3 milligrams) led to statistically significant improvements in sleep. The magnitude of the difference, while statistically significant, was small. For example, for eszopliclone at a 3 milligrams dose, the difference was only about 7 minutes, and this was the largest difference for all the sleep medications and doses tested. The primary outcome measure, latency (time) to persistent sleep (LPS) improved with both eszopiclone 3 milligrams and zolpidem compared to placebo. However, it only reduced LPS by 15.9 minutes. Side effects were more pronounced in the higher dose eszopiclone and zolpidem treatment compared to placebo.[13] In fact, over 50% of the benefit of sleep medications is likely to be attributable to the placebo effect.[14]

Furthermore, safety issues, such as increased risk of nighttime falls and motor vehicles accidents the morning after taking a sleep medication are significant. There is also increased risk associated with behavioral parasomnias (sleep walking, sleep-related eating, etc.), worsening of untreated sleep apnea, and interactions with alcohol. All of these side effects must be considered in the risk–benefit analysis. A meta-analysis of sedative-hypnotic use in older people found the number needed to treat was 13 while the number needed to harm was 6.[14]

Finally, costs of treatment should also be considered. Modified release zolpidem (Ambien CR) is listed as $275.99 for 30 capsules at retail prices, while eszoplicone is $286.99 for 30 of both the 1 and 2 milligram doses (eszoplicone is not marketed as a 3 milligram dose). Four percent of Americans aged 20 or over used prescription sleep aids in the past month, and this percentage has steadily increased. One in eight adults with sleep disturbances report using sleep aids.[15] United States expenditures on sleep medications was in the range of $4 billion dollars as of 2012.[16]

Cognitive behavioral therapy for insomnia (CBTI)

CBTI is regarded as the gold standard for the treatment of insomnia.[17] It is important to acknowledge that cognitive behavioral therapy was once considered a complementary and alternative treatment. As the research has shown it to have superior results, it has moved into the mainstream therapy. This is particularly true in the VA, where it is widely available. CBTI uses a combination approach to address behavioral and cognitive issues that interfere with sleep. From a behavioral perspective, interventions include sleep restriction, stimulus control, and relaxation.

- In sleep restriction, the goal is to temporarily limit the time a person sleeps (especially during the day) in order to increase the homeostatic sleep drive. This is something that anyone who has been chronically sleep-deprived (as in residency) is intuitively familiar with.
- Stimulus control seeks to minimize the impact of behavioral stimulation on arousal mechanisms. Examples include using the bed only for sleep, removing electronic devices like televisions, and hand-held devices from the bedroom, relaxation routines prior to bedtime, and removing the alarm clock from the bedside table to avoid clock watching. Sleep hygiene, discussed below, is linked closely with this.
- Relaxation involves using various mind-body tools to more successfully attain a relaxed state that is more conducive to sleep.

The cognitive component of CBTI addresses beliefs or feelings about sleep that cause behavioral arousal and interfere with sleep. A good example is the tendency to exaggerate the effect of a bad night's sleep on the following day, "If I don't get to sleep, I'll never get through tomorrow." Another example is the emotional reaction that can occur with early morning awakening. Simply advising a patient that no one sleeps straight through the night and that awakenings are a natural part of sleep organization can help. Suggesting that they replace anger or frustration over their awakenings with gratitude for being able to spend the time in their sleeping area might also be of benefit. CBTI has been shown to be as good

as or better than medications in short term studies of insomnia; furthermore, patients treated with CBTI continue to maintain and, in many cases, improve even further after the treatment is completed. In a systematic review comparing the effectiveness of CBTI with standard sleep medications, CBTI was noted to have more durable long-term benefits.[18]

> Current data supports cognitive behavioral therapy for insomnia (CBTI) as one of the most effective non-pharmaceutical therapies available for promoting a healthier sleep-wake cycle.

One drawback of CBTI is that it is not always easily accessible, though it is offered much more commonly through the VA than through other care providers. For more information about this and a number of other mind-body options for improving sleep, see the clinical tool, Hints for Encouraging Healthy Sleep.

Proactive Self-Care and Insomnia

Working Your Body

Physical exercise is an important tool for addressing multiple sleep-related issues, including insomnia. It has been observed to have multiple beneficial effects on sleep including decreasing sleep latency, increasing slow wave sleep, and delaying onset of rapid eye movement (REM) sleep, possibly because it increases body temperature.[19] Since sleep quality as measured by the percentage of deep non-REM (slow wave) sleep declines with age, exercise may be a particularly excellent foundation for a self-care plan for insomnia that strikes older patients.[20]

> Physical activity during the day helps the body-mind transition into sleep at night.

A systematic review of the effect of exercise training in middle-aged and older adults with sleep problems reviewed six trials involving 305 study participants aged 40 or greater.[21] All studies used the self-reported Pittsburgh Sleep Quality Index (PSQI) to asses sleep quality. Study participants were assigned to either moderate-intensity aerobic exercise or high-intensity resistance training. Those assigned to the exercise groups had improved PSQI scores and reduced sleep latency, but they did not differ in reported sleep duration, sleep efficiency, sleep disturbances, or daytime functioning.

A Cochrane Review of physical exercise for sleeping problems in adults aged 60 or greater found only one study that met criteria for inclusion in the review.[22] In this research, study participants were randomized to either 16 weeks of moderate intensity endurance exercise (four 30-40 minute sessions per week of either brisk walking or low-impact aerobics) or a wait-listed control condition. Compared with people in the control group, those who randomized to exercise reported increased PSQI global sleep scores at 16 weeks ($p<.001$) as well as improved sleep quality and sleep onset latency.[23]

It has been argued that one should avoid intense exercise too close to bedtime, but this is not supported in the literature.[24] Gentle yoga or stretching before bed is relaxing and can be beneficial.

For most adults with sleep complaints, exercise is a useful element of a personal health plan (PHP). Given the low risk, low cost, and myriad of other health benefits of physical activity, it should be strongly recommended to all patients with sleep complaints as a part of a comprehensive approach.

Surroundings

The sleeping environment can have a major effect on sleep quality. It is important that the sleep environment be soothing and restful. When bedrooms are used for other purposes than sleep, such as the settings for home offices, web surfing and TV watching, a person can develop conditioned behavioral responses where the sleeping environment comes to be associated with behavioral arousal, rather than relaxation.

Over time these learned associations, when combined with frustration and anxiety over difficulty initiating and maintaining sleep can result in an increase in sleep latency and decrease in sleep continuity.

- **Allergens and sleep environment**
  Indoor air quality problems can result in respiratory allergies and exacerbation of sleep related breathing problems. For this reason maintaining a dust free and clean bedroom is important. The use of a high-efficiency particulate air (HEPA) filter in the bedroom can further ensure good indoor air quality. Ensuring fresh air in the bedroom by slightly opening a window can mitigate the effects of outgassing from furnishings and building materials, especially in new homes. Mold spores may contaminate the sleeping environment in older homes. Hidden sources of mold and other allergens, such as dust mites in carpets and old bedding, should be eliminated or thoroughly cleaned. Bedding should be organic, hypoallergenic, and able to be washed frequently in hot water.

- **Electromagnetic fields**
  Electromagnetic fields (EMFs) such as those generated by electrical appliances and home electronics can affect sleep in a dose-related fashion.[25] Animal studies have shown that EMFs in the 50 to 60 Hz range suppress melatonin secretion by the pineal gland.[26] For this reason, it is wise to minimize—and whenever possible, eliminate—electrical appliances and electronics in the bedroom. Electronic devices that connect to the alternating current electric supply of the home should be kept as far away from the head of the bed as possible. Instead of a plug-in clock radio on the bedside table, a small battery-powered electronic clock is preferable. In many cases, the clock can also result in behavioral activation due to clock-watching, so it is optimal for the clock to be moved across the room, as far away from the head of the bed as possible.

Appropriate timing of light exposure is essential for optimal sleep. The use of bright indoor lighting and electronic screens, televisions, computers, hand-held devices and smart phones during the evening can result in delayed sleep onset due to suppression of melatonin secretion.[27] Individuals with delayed sleep phase syndrome are particularly susceptible to this effect.[28] Melatonin suppression is most sensitive to blue spectrum light. This light is commonly produced by flatscreens.[29] Technology to block the blue light, such as blue-blocking glasses or screens, should be considered if exposure cannot be eliminated. Avoiding suppression of melatonin secretion in the evening by bright light is an important step in self-care of healthy sleep, insomnia prevention, and treatment.

Strategies to Increase Endogenous Melatonin to Improve Sleep

- Ensure a dark environment for sleep. Shift workers should use eye covers or extra curtains on windows to reduce light exposure.
- Avoid exposure to screens from computers, TVs, tablets, and cell phones before bed. The blue light they emit can inhibit melatonin.
- Keep all electrical devices (e.g., cell phones, clock radios, and computers) at least 3 feet from the head of the bed while sleeping. Avoid electric blankets.
- Eat vegetables and fruits. They contain the nutrient building blocks for melatonin production.
- Keep the sleeping environment cool.

- **Aromatherapy**
  Aromatherapy has been studied as an intervention in insomnia. It is low-risk and may improve sleep quality. In a single blinded, randomized crossover pilot study of 10 study participants with insomnia defined by a PSQI score of five or greater, either lavender oil or sweet almond oil was administered by a vaporizer during sleep. The results were confounded by some of the study participants turning off the vaporizer upon going to bed, but nonetheless, significant improvement in the primary outcome measure (PSQI) was seen in those who inhaled lavender oil.[30] In another study of patients hospitalized with ischemic heart disease, lavender oil aromatherapy was associated with statistically significant ($p<.001$) improvements in self-rated sleep quality, as measured by a self-rating scale. In this study, a few drops of lavender oil were placed on a cotton ball on a bedside table about 20 centimeters from the sleeping study participant's head.[31]

Power of the Mind

Each of us literally chooses, by way of attending to things, what sort of universe he shall appear to himself to inhabit. —William James, 1842-1910

Mind-body approaches can be extremely helpful in addressing insomnia and can be foundational in developing a PHP that addresses insomnia and related conditions.

- **Neuroplasticity**
  The brain is dramatically more malleable and responsive to experience than previously recognized. Hebbs' Law, formulated by psychologist Donald Hebbs in 1949, is popularly stated as "neurons that fire together, wire together." This important physiological postulate bridges the gulf between behaviorist views and those that take a cognitively focused approach. Modern techniques for imaging brain function, ranging from the recording of high frequency gamma oscillations in EEG[32] to positron emission tomography (PET),[33] functional MRI[34,35] and diffusion tensor imaging, [35] paint an increasingly detailed picture of the adaptation of the human brain to use and experience.

Studies of neuroplasticity indicate that there is potential for mind to be "re-wired" to bypass conditioned habits of interrupted sleep patterns. Changing how one thinks and acts can change the brain's function, allowing for a healthier circadian rhythm.

UCLA research psychiatrist Jeffrey Schwartz made key pioneering observations regarding the impact of mental activity on the function of the brain when he treated a group of patients with severe obsessive-compulsive disorder (OCD) with a metacognitive approach (thinking about one thing). This resulted in decreased activity in a hypermetabolic zone seen on PET scanning, located in the right frontal lobe and corresponding to the "worry circuit" between the orbitofrontal cortex and the head of the caudate.[36]

The practices that have become known as mind-body practices are ancient; they come from many different cultures and traditions. All share the use of mental exercises or activities to effect functional reorganization and structural change within the brain.[37] Amazingly, these practices can result in change in genetic expression.[38]

As the mind becomes clearer, it becomes more empty and calm, and as it becomes more empty and calm, it grows clearer. —Master Sheng-yen 1930-2009

- **Meditation**
  Meditation can take many forms and can be useful in improving outcomes in multiple medical conditions.[39] In meditation, participants sit quietly and focus their attention, usually on the breath or on a repeated word or phrase. With application and practice, controlled attention can alter brain function (through neuroplasticity), resulting in long-term effects, including improved sleep. Mindfulness meditation has been popularized in the West through the efforts of Jon Kabat-Zinn, who developed a technique termed mindfulness-based stress reduction (MBSR). In MBSR, participants sit and observe their thoughts and breath without judgment. The goal is the development of mindfulness, voluntary nonjudgmental awareness in the moment. This does not mean that unpleasant thoughts and experiences are avoided, for indeed, pain is seen as unavoidable in human life. What is addressed is noticing

how one reacts to pain and other difficult experiences. This allows one to better-understand how pain—a signal—become suffering, the response to that signal.[40] In the setting of insomnia, being able to be with one's thoughts and feelings about sleep difficulty without making the situation worse by reacting to them, is a key step in deactivating the patterns of thought that feed forward into limbic stimulation and can contribute to chronic insomnia.[41] Mindfulness has revolutionized psychotherapy and has even been termed "the third wave of psychotherapy" (behavioral and cognitive approaches being the first and second waves, respectively).[42] Mindfulness based cognitive behavioral therapy for insomnia (MBCTI) is a leading-edge approach for treatment of difficult or refractory insomnia that utilizes a metacognitive approach (thinking about thinking) to address the problem of chronic insomnia.[42]

Meditation involves focusing one's awareness in a non-judgmental, non-striving way, on the present moment. This may supported by the use of a mantra, the breath, or something else that brings the mind repeatedly back to the present moment. This focused attention reduces activation of multiple neural pathways in the brain, allowing for more efficient transition into sleep.

Meditation and cultivation of mindful awareness can serve as excellent self-help practices for individuals to follow to improve their sleep. MBSR group classes are a cost-effective way to gain a solid foundation in mindfulness and meditation. These are typically organized around eight weekly group sessions and daily individual practice. Teachers are certified to teach MBSR through the Oasis Institute for Mindfulness-Based Professional Education and Training at the University of Massachusetts Medical School and other programs. In addition to in-person MBSR, eight-week online courses are available. MBSR teacher training requires a graduate level degree or equivalent work experience and involves multiple steps. It usually takes several years to complete.

A systematic review of the efficacy of meditation techniques identified 82 studies with 20 randomized clinical trials involving 958 subjects. No serious adverse events were described in any of the studies. Only one of the 20 studies specifically looked at sleep disturbance.[39]

The study that specifically evaluated effects on sleep utilized a Tibetan yoga intervention in patients with lymphoma. The intervention consisted of seven weekly exercise classes with a four-part program consisting of controlled breathing, mindfulness, and various body postures. The exercises were simple motions that were done with specific breathing patterns. In addition, participants were given handout materials and encouraged to practice the exercises at home at least once a day. Results were assessed with a variety of psychological measures, as well as the PSQI. Total PSQI scores improved ($p<.0.004$), as did self-rated sleep quality ($p<0.02$), sleep latency ($p<0.01$, and sleep duration ($p<0.03$). In addition, multiple other psychological variables improved.[43]

A pilot study of a brief mind-body intervention in Veterans with posttraumatic stress disorder (PTSD) and sleep disturbance evaluated 63 Veterans with self-reported sleep disturbance. Study participants received Mind-Body Bridging (MBB) or an active sleep education (sleep hygiene) control. MBB is a novel and emerging form of awareness training that teaches various awareness skills to help the individual calm the mind and relax the body. In addition, MBB teaches a person to become aware of mind-body states that are characterized by a heightened state of self-centeredness, including rumination, contraction of awareness, and body tension. Interventions were conducted in two sessions, once per week. Multiple patient-reported outcomes were used. Sleep disturbance decreased in both groups. MBB performed significantly better not only in terms of sleep, but in terms of PTSD symptoms, which remained unchanged in the sleep hygiene group. Overall mindfulness increased in MBB, while it remained unchanged in the control.[44]

MBSR was compared to pharmacotherapy in the treatment of chronic primary insomnia in a randomized controlled trial (RCT) involving 30 study participants who were stratified by gender and the randomized in a ratio of 2:1 to either an eight-week MBSR intervention or pharmacotherapy (eszopiclone 3 milligrams nightly for eight weeks). Validated self-report measures such as the PSQI sleep diaries and the Insomnia Severity Scale (ISI) as well as objective validated surrogates for sleep (wrist actigraphy) were used. A follow up subjective assessment was performed at five months. All study participants met criteria for diagnosis of insomnia. All sleep measures improved significantly ($p<0.05$) in both groups when baseline measures were compared to those taken at eight weeks post-intervention. However, the MBSR group was more likely to no longer have insomnia at the conclusion of the eight weeks and at five months than the pharmacotherapy group. Participants assigned to the MBSR group were much more satisfied with their treatment at five months as well.[45]

Finally, MBSR has been compared to CBTI in a group of cancer patients with insomnia. The study was a randomized, partially-blinded trial involving 111 study participants. Sleep diaries and actigraphy were used to measure the primary outcome measures, which included sleep onset latency, time awake after sleep onset, total sleep time, and sleep efficiency. Secondary outcomes included self-rated sleep quality, sleep beliefs, mood, and stress. CBTI was better than MBSR in the primary outcome measures, both immediately at the conclusion of the eight-week programs, but the differences were not statistically significant ($p<0.35$). At three-month follow-up, MBSR was equivalent to CBTI. Both groups experienced reduced stress and mood disturbance ($p<0.001$). Although the authors conclude that CBTI is superior to MBSR in the treatment of insomnia, another interpretation of the data would suggest that the interventions are roughly equal.[46] This is important, because MBSR may be more available than CBTI.

In summary, it would appear that multiple mindfulness-based interventions are valuable in the treatment of insomnia and that mindfulness can be an important part of a PHP. For more information, as well as tools that can be used in practice, see the Mindful Awareness and Power of the Mind modules.

Mindful Awareness Moment
Mindfulness Sleep Induction Technique

The majority of sleep onset insomnia is due to the intrusive thoughts of a racing mind. The next time you have trouble initiating sleep, give this a try:

Begin with abdominal breathing.

- Place one hand on your chest and the other on your abdomen. When you take a deep breath, the hand on the abdomen should rise higher than the one on the chest. This insures that the diaphragm is expanding, pulling air into the bases of the lungs. (Once you have this mastered, you do not have to use your hands).
- Take a slow deep breath in through your nose for a count of 3-4, and exhale slowly through your mouth for a count of 6-7. (Your exhalation should be twice as long as your inhalation).
- This diaphragmatic breathing stimulates the vagus nerve, which enhances the "relaxation response."
- Allow your thoughts to focus on your counting or the breath as the air gently enters and leaves your nose and mouth.
- If your mind wanders, gently bring your attention back to your breath.
- Repeat the cycle for a total of 8 breaths.
- After each 8-breath cycle, change your body position in bed and repeat for another 8 breaths.

It is rare that a person will complete 4 cycles of breathing and body position changes before falling asleep.

- **Guided imagery**
  Guided imagery involves the use of visualization to evoke specific emotional states. For insomnia, it is often used to help a person relax more deeply. Since behavioral hyperarousal is a key contributor to the development and perpetuation of chronic insomnia, developing a greater capacity for relaxation can be helpful in improving sleep.

Guided imagery has proven useful as a self-care modality for improving sleep. In a study of 41 people with insomnia, subjects were randomized to one of three conditions: 1) no instructions, 2) general distraction, and 3) specific imagery distraction. The imagery distraction group rated their sleep onset latency as significantly shorter than the general distraction ($p<0.05$) or no instruction group $p<0.01$).[47] Guided imagery audio programs are commercially available on CD and in MP3 form and can be utilized in a wide variety of settings to good effect. Guided imagery has been widely utilized within DOD and VHA to address posttraumatic stress in troops returning from deployment. It has been shown to be effective and widely accepted. For instance, image rehearsal therapy is widely used as treatment for disabling nightmares in the setting of PTSD.[48] Under the direction of a trained therapist, the emotional impact of disturbing dream content can be dissipated.[49] Guided imagery for sleep and posttraumatic stress can be an effective therapeutic approach to include in a PHP.

- **Breathwork**
  Conscious manipulation of breathing is a powerful psychophysiological intervention. It improves the balance between the sympathetic and parasympathetic nervous systems, and it reduces behavioral hyperarousal.[50] Breathwork is a key component of yoga (pranayama) and MBSR, but it can be used as a standalone intervention as well.[50]

  One example of breath work is 4-7-8 breathing, popularized by Andrew Weil, M.D. In this practice, the people monitor their breathing, inhaling for a count of 4, holding the breath for the count of 7, and then exhaling for 8.[51] This has an almost immediate calming effect, and when practiced as a part of an evening ritual, it may result in enough calming to allow sleep to occur naturally.

  Ujjayi breath, or Ujjayi pranayama, is a key component of hatha yoga. In this type of breathwork, attention is directed to the breath, and the airway is slightly constricted in the larynx in the same manner as when one whispers or fogs a mirror.[50] The increased airway resistance is thought to result in vagal stimulation and enhance vagal tone that, in turn, promotes relaxation. These and many other breathwork techniques should be considered as a component of a PCP in dealing with insomnia. See the clinical tool, Breathing for more information.

- **Yoga Nidra**
  iRest® Yoga Nidra (Integrative Restoration Institute www.iRest.us) is a secularized practice of yogic meditation. The practice involves the invocation of deep relaxation, attention training, the development of self-management tools, and learning to proactively engage emotions, thoughts, joy, and awareness.

  iRest was initially piloted at Walter Reed Army Medical Center and is now available at over 30 military and VHA facilities. iRest has applications as a complementary approach in the treatment of PTSD, traumatic brain injury (TBI), chronic pain,

chemical dependency , depression, anxiety, and sleep-related issues including insomnia, as well as for enhancing well-being and resiliency. Large-scale trials of iRest are not yet available, but small case series have been presented. iRest has been embraced by the Veteran and military community.[52] The U.S. Army Surgeon General and the Defense Centers of Excellence (DCoE) recommend iRest for the management of chronic pain and PTSD in military and Veteran settings. Research and anecdotal evidence suggests that iRest releases negative rumination, calms the nervous system, and improves emotional resilience.

A pilot study of the effect of iRest® Yoga Nidra on sleep complaints and daytime sleepiness in clinicians in a military medical center demonstrated a trend toward improvements in waking somnolence, as measured by the Epworth Scale. It was also well-accepted.[53] Additional studies, utilizing wrist actigraphy to measure sleep parameters, are underway.[53]

iRest teacher training is open to individuals with a variety of backgrounds, including yoga teachers, physical therapists, nurses, physicians, social workers, psychologists and laypersons. There are three levels of iRest training. Level I training is completed as an intensive 32-hour workshop. After attending Level I training, iRest Teachers-in-Training are able to work with patients. Level II is comprised of a second 32-hour intensive. Certification entails completing two additional retreats, finishing teaching assignments, and meeting with a supervisor to assure competency in delivering the iRest protocol to various populations and settings. Completion of certification qualifies an individual as a certified iRest Teacher®.

iRest includes many aspects of rational-emotive and cognitive behavioral therapy, which are helpful for those experiencing sleep disorders and insomnia, including deep relaxation, stimulus control and paradoxical intention. iRest can form a foundation for self-care management for a variety of stress-related problems including insomnia and chronic pain. iRest is highly suitable for delivery in a group setting. See the www.irest.us website for more information.

Food and Drink

Foods can have significant impact on sleep and insomnia. Many foods, such as chocolate, tomatoes, onions, fats, and alcohol, can reduce lower esophageal sphincter pressure and contribute to nocturnal gastroesophageal reflux, delaying sleep onset, and triggering awakenings.[51,54]

Melatonin increases the tone of the lower esophageal sphincter. It makes intuitive sense that a hormone that leads to better sleep would also reduce reflux when the body becomes supine for sleeping.[55,56]

Caffeine has objective effects on sleep onset and sleep quality even in individuals without sleep complaints.[57] Caffeine half-life usually increases with age,[58] so amounts that may have been tolerated early in life may result in insomnia later.

Alcohol is often consumed in the evening in an attempt to self-medicate for insomnia. Although alcohol may result in a more rapid sleep onset, this comes at a cost of increased sleep disruption in the second half of the night. With repeated exposure to alcohol at bedtime, the sleep-promoting effect may wane while the sleep disruption in the second half of the night worsens.[59] This gradually results in hypersomnolence during waking hours. It also leads to impaired driving performance the next morning, even if there is no alcohol in the system, which increases the risk of accidents. Alcohol can dramatically worsen airway control, worsening obstructive sleep apnea. It may also exacerbate restless legs syndrome/periodic limb movement disorder. In the elderly, poor-quality sleep may lead to self-medication with alcohol, which in turn leads to even poorer sleep and increases the risk of sleep-related injury from falls.

Drawing attention to the impact of foods, caffeine, and alcohol is an important component of building a PHP that promotes healthy sleep.

Spirit and Soul

Honoring one's self by reflective writing can have meaningful benefits and can be helpful in developing a personal health plan. Setting aside a few minutes each evening to record personal observations, worries, joys, and pleasures can ease the burden of "racing thoughts" that interfere with sleep onset. See the Therapeutic Journaling clinical tool for more information.

Recharge

Although recharging requires a healthy sleep-wake cycle, it does not stop there. It also requires that we take breaks from our work routine. For more ideas on how to incorporate short and long breaks see the clinical tool, Give Me a Break: How Taking Breaks from Work Leads to Whole Health.

With a good night's sleep and appropriate use of breaks, we will explore our personal work-life balance that requires continued fine-tuning. For more information see the clinical tool, Work-Life Balance (WLB): Tips and Resources.

Complementary Approaches

According to a 2002 national health survey regarding insomnia, complementary and alternative medicine (CAM), patients may turn to CAM for treating these complaints. In this sample, 17% reported insomnia or trouble sleeping in the preceding year. Over a quarter (4.5%) utilized some form of CAM for their sleep problems, with nearly 65% choosing an herbal remedy.[60] Providers need to ask their patients about the use of these treatments and have some basic knowledge to help guide them.

Dietary supplements

Supplements that may be beneficial for sleep include minerals, vitamins, botanicals, and precursors of neurotransmitters thought to be involved in the regulation of sleep onset.

Note: *Please see the module on Dietary Supplements for more information about how to determine whether or not a specific supplement is appropriate for a given individual. Supplements are not regulated with the same degree of oversight as medications, and it is important that clinicians keep this in mind. Products vary greatly in terms of accuracy of labeling, presence of adulterants, and the legitimacy of claims made by the manufacturer.*

- **Magnesium**
  Magnesium is an essential element that is often deficient in the standard American diet. Serum magnesium levels are unreliable, and red cell magnesium levels are more relevant. However, magnesium supplementation is well tolerated as long as renal function is normal and excessive accumulation does not occur. Magnesium has multiple physiological effects including sedative, anticonvulsant, antihypertensive and muscle-relaxant properties. Magnesium also may enhance the production of melatonin by the pineal gland.[61] Magnesium supplements are available in multiple formulations that differ mainly in terms of their likelihood of causing loose stools. Amino acid chelates of magnesium (chelated magnesium) are less likely to cause diarrhea. A typical dose is 300 milligrams two times daily.

  Precautions: The first toxic side effect of magnesium is diarrhea. If this occurs, reduce the dose.

- **Vitamin B12**
  Vitamin B12 is a cofactor in synthesis of multiple neurotransmitters, including dopamine, serotonin and melatonin. B12 deficiency can result in depression and other neuropsychiatric disturbances. B12 supplementation has been reported to improve insomnia in a variety of settings.[61] B12 deficiency can be diagnosed through direct measurement of serum levels. In the face of low normal serum levels, an elevated methylmalonic acid (MMA) level suggests biochemical insufficiency and can be used as a more sensitive test. Supplementation can be accomplished through oral or sublingual methylcobalamin tablets dosed at 1 milligram daily, although in severe deficiency a period of parenteral therapy with cyanocobalamin may be appropriate.

  Precautions: B12 is adequately excreted in the urine and rarely causes side effects except in renal failure.

- **5-Hydroxytryptophan (5-HTP)**
  5-HTP is derived from the amino acid, tryptophan. It is a precursor of serotonin and may be useful for improving sleep.[61] In the 1990s, there were reports of eosinophilia-myalgia syndrome arising in people taking this supplement, but this appears to have been due to contamination of a product manufactured in Japan.[62]

  Precautions: 5-HTP has been associated with eosinophilia-myalgia syndrome which was traced to a contaminant in a product. The most common side effects are

gastrointestinal. They include diarrhea, stomach upset and nausea. Combining 5-HTP with anti-depressants may increase the risk of serotonin syndrome.

- **Melatonin**
  Melatonin is secreted by the pineal gland in response to declining light levels. Its release is suppressed by light. It acts as the principal circadian signal transducer. Exogenous melatonin has been used for insomnia with varying results. A systematic review and meta-analysis of melatonin looked at 17 studies involving 284 study participants.[62] Melatonin treatment significantly reduced sleep onset latency by 4.0 minutes (95% CI 2.5-5.4), increased sleep efficiency by 2.2% (95% CI 0.2-4.2), and increased total sleep duration by 12.8 minutes (95% CI 2.9-22.8) Melatonin is especially effective in the setting of delayed sleep phase syndrome.[63] A review and meta-analysis of five trials including 91 adults and four trials including 226 children found that melatonin treatment advanced mean endogenous melatonin onset by 1.18 hours (95% CI 0.89-1.48) and clock hour of sleep onset by 0.67 hours (95% CI 0.45-0.89). Melatonin decreased sleep-onset latency by 23.3 minutes (95% CI: 4.8-41.7). Wake-up time and total sleep time did not change significantly. Melatonin is well tolerated; complaints of headache, nausea and drowsiness have been noted by small numbers of study participants.

  Melatonin should be taken about two hours before bedtime. The typical dose is 1-3 milligram(s), taken orally. Lower doses, such as 0.3 milligrams, may be more effective than higher doses. Sublingual tablets avoid first-pass metabolism and may be more effective than oral dosing.

  Precautions: Melatonin can cause sedation and dreaming in high doses. At doses recommended above, the side effects are not significantly different from placebo.

  In summary, exogenous melatonin may be helpful in insomnia, especially if there is difficulty falling asleep due to a blunted endogenous melatonin rise caused by either delayed sleep phase syndrome or suppression of melatonin secretion due to artificial light.

- **Herbal remedies**
  Herbs can be of benefit in addressing sleep complaints and insomnia. They can be administered in the form of teas (tisanes) made from raw herb or extracts of raw herbs. In contrast to pharmaceutical hypnotics, herbal remedies are generally free of significant respiratory depressant effects and generally have favorable toxicological profiles. Herbs have a widespread tradition of use, but rigorous well-controlled studies are generally not available for most herbs used for insomnia and sleep disturbances.[61]

- **Kava kava**
  Kava is derived from the dried rhizomes of the shrub *Piper methysticum,* which is native to the South Pacific, where the endogenous population has used the herb

medicinally for centuries. Clinically, it was initially described as having a calming and relaxant effect with no impairment of consciousness. In contrast to many herbs, the psychotropic effects of kava are well understood and are related to substances called kavapyrones or kavalactones.[64] Kavapyrones act centrally as skeletal muscle relaxants and anticonvulsants. Pharmacologically relevant actions include gamma-aminobutyric acid (GABA) channel modulation and weak direct GABA agonist activity. Although primarily used for anxiety, kava may be useful in treating anxiety-related insomnia.[65] Potential benefits of kava in treating anxiety and depression must be evaluated in light of the risk of hepatic and neurological toxicity when used long term and in high doses. Because of reports of hepatic toxicity, kava has been withdrawn from the market in much of the world, although it continues to be available in the United States. Individuals who use kava should be monitored appropriately for hepatic toxicity via liver function testing.[64]

Precautions: High doses for prolonged periods of time have been associated with hepatotoxicity and liver failure. For this reason, this supplement has been taken off the market in Switzerland, Germany and Canada. More common side effects are gastrointestinal-related. Extrapyramidal side effects are also possible.

- **Valerian**
  Valerian is derived from the dried roots of *Valeriana officinalis,* a small flowering shrub native to northern Europe. It has long been used for insomnia. Valerian is the herbal sleep remedy for which the greatest evidence base exists.[65] Valerian is recognized as being indicated for the treatment of insomnia and restlessness by the German Commission E. Pharmacologically, it appears to increase the availability of GABA in the synaptic cleft. Clinically, it seems to work best after 2-4 weeks of nightly administration two hours before bed. Dosage can be in the form of a tea made from 2-3 grams of dried herb or as an ethanolic extract at doses of 600 milligrams. Safety appears to be good with only mild adverse effects such as headache or morning grogginess reported in small numbers. A systematic review and meta-analysis of valerian for sleep analyzed the results of 16 placebo-controlled clinical trials involving 1,093 patients.[66] While methodological problems and variability among the studies made comparison difficult, the available evidence suggests that valerian may improve sleep quality without producing side effects. Moreover, it may be uniquely suited for longer-term treatment of chronic insomnia. It may need to be taken for a few weeks before it takes effect.

  Precautions: Prolonged use of valerian can result in a benzodiazepine-like tolerance, which requires a slow taper when discontinuing. It is best not to use valerian and benzodiazepines in combination. Common side effects include headache and gastrointestinal intolerance.

- **Chamomile**
  Chamomile is derived from a member of the Aster family, *Matricaria recutita*, and it is one of the most commonly utilized herbal remedies in the United States. It is

usually taken as a tea and is thought to be beneficial for indigestion and nervousness. It may be helpful with insomnia. A randomized controlled trial of chamomile in generalized anxiety disorder (GAD) suggested that it might be effective in treatment of mild to moderate GAD.[67] Chamomile occupies a place in English and United States herbal practice similar to that occupied by valerian in German practice. It is quite safe but can cause allergic reactions in people with allergies to other members of the Aster family, such as ragweed.

Precautions: The main side effect of chamomile is that it can trigger allergic reactions in some individuals.

- **Herbal Teas**
  Herbal teas are traditionally taken in the evening one to three hours prior to sleep. Widely available examples include "Sleepy Time," a mixture of chamomile, spearmint and lemongrass and "Organic Bedtime Tea," a combination of valerian, chamomile and passionflower, with licorice, cardamom and cinnamon added as flavorings. As with all teas, a single bag is usually steeped in a cup of hot water until the tea is brewed to taste.

Movement-based therapies

- **Yoga**
  The high variability of yoga practices makes the study of yoga for clinical applications difficult, but this also means that yoga is adaptable to a variety of clinical populations.[68] Yoga involves a combination of movements/postures, breathing, direction of gaze, and sensory withdrawal. Trauma-informed yoga has been used extensively in the treatment of PTSD and developmental trauma disorder. PTSD is associated with a variety of sleep complaints, including insomnia and nightmares.

  Yoga has been found to decrease salivary cortisol and increase heart rate variability.[69] In a pilot study of 20 individuals with chronic primary insomnia, an eight week intervention of daily yoga was associated with improvements in self-rated sleep efficiency and total sleep time, and decreases in sleep latency and wakefulness after sleep onset.[70] A randomized trial of yoga in 139 adults over age 60 who lived in the community evaluated several mental health indicators, including sleep. Yoga led to statistically significant improvements in all parameters, including global PSQI scores, rating of sleep latency, sleep efficiency and daytime function.[71] A systematic review and meta-analysis of 18 studies of yoga interventions involving 649 study participants found that while the studies were generally small and hampered by mixed methodological quality, yoga appeared superior to other more conventional physical activity interventions in improving general self-rated health status, aerobic fitness and strength. In addition, a significant improvement in multiple self-reported sleep measures, including improved PSQI scores, decreased sleep latency and increased sleep duration were reported.[72]

See the Yoga: Looking Beyond "The Mat" clinical tool for additional information.

Whole medical systems

- **Traditional Chinese medicine (TCM)**
  Acupuncture is the most familiar component of TCM in the West. However, it is important to recognize that as a whole medical system, acupuncture is but one component in an approach that is inherently focused on lifestyle-based wellness and prevention practices. The theoretical basis for acupuncture is based on the concept of qi, a life force that is conceptualized to flow in channels or meridians in the body. The flow of qi in these meridians can be affected by insertion of fine needles, thus correcting imbalances that are postulated to result in physical or psychological symptoms. However, this conceptualization does not exclude neurohumoral mechanisms more consistent with current Western physiological models.

  Acupuncture is widely utilized for treatment of insomnia in China and has been extensively studied. In a systematic review of 46 randomized trials involving 3,811 study participants, acupuncture was shown to be safe and effective in the treatment of insomnia.[72] A Cochrane review of acupuncture for insomnia analyzed 33 trials with 2,293 participants[73]. Although acupuncture was associated with improvement in sleep measures, effect sizes were small, and the studies had methodological problems that limited their ability to draw reliable conclusions.

  For more information see the Acupuncture and Traditional Chinese Medicine clinical tool.

- **Homeopathy**
  Homeopathy is often used to treat insomnia. Homeopathic preparations are widely available over the counter, and homeopathic physicians often treat insomnia. According to a systematic review of homeopathy for insomnia published in 2010,[74] four RCTs comparing homeopathic medications to placebo have been published. All involved small numbers of patients, had high withdrawal rates, and were statistically underpowered. Nonetheless, a trend toward benefit was demonstrated. No RCTs of treatment by a homeopathic physician have been reported, but observational studies suggest a benefit.

Back to Carl

After meeting with his VHA health care clinician, Carl came up with several specific changes that have had significant benefits regarding his sleep and overall well-being. First, he has reduced his caffeine intake by gradually switching to decaffeinated coffee. Second, he and his wife agreed to redo their bedroom. They gave the TV in the bedroom to a local homeless shelter and bought a new mattress and organic cotton linens. They ripped up the old wall-to-wall carpet and discovered beautiful oak floors beneath, which Carl was able to restore

easily. They try to leave the bedroom window open a little for fresh air. Carl decreased his television watching in the evening and has been able to avoid napping after dinner. Instead of spending time on the computer doing social media, he does his community activism in person. He used his woodworking skills to build raised beds for a community garden. For a time he had trouble doing without his sleeping medication, but then he found that an herbal combination containing valerian and hops extracts was a good substitute. He has cut out beer except when he bowls with his new friends in the bowling league he and his wife just joined. He limits himself to just one or two drinks. Even if he has an occasional bad night, he gets up at 6:30 a.m. each morning and goes for a walk-jog. He has lost 15 pounds and feels "10 years younger." His wife wants to take some yoga classes at the local YMCA, and he thinks he may tag along. He is planning to run in a charity fun run in the spring. He adds, "Although I am sleeping a lot better, it is about so much more than sleep. With these changes I feel like I am more in control of my health. In a real way, I feel like I have my life back."

Recharge Clinical Tools
• Hints for Encouraging Healthy Sleep • Neuroplasticity and Sleep • A Natural Approach to Sleep, Stress, and Insomnia

Additional Resources	
Resource	**Website**
The Society of Behavioral Sleep Medicine website	
The National Sleep Foundation website	http://www.sleepfoundation.org/
Information about iRest® Yoga Nidra	http://www.irest.us/
University of Maryland Medical Center Complementary and Alternative Medicine Guide. This is a great and easily accessible database that covers extensive areas of complementary, alternative and integrative medicine. It is easy to search and to look up potential drug herb interactions.	http://umm.edu/health/medical/altmed
The Natural Medicines Comprehensive Database. A tremendous resource for information on herbs and supplements. Mobile apps are also available. A subscription fee may be required.	http://naturaldatabase.therapeuticresearch.com

Online MBSR courses through the Oasis Institute at the University of Massachusetts School of Medicine	https://www.soundstrue.com/shop/The-MBSR-Online-Course/4556.pd
Live online MBSR instruction	www.emindful.com
Guided imagery programing for purchase and download	http://www.healthjourneys.com/default.asp
Guided imagery programing, which can be streamed for free!	https://healthy.kaiserpermanente.org/health/care/!ut/p/a0/FchBDoMgEADAt_iAzYZEYfFmhH6hhdsGiZIIGELt99seZ9DjC33hO-3cUy18_uxCLD22md9bqnCnLVZ8okd_Nd4zoysVAocj_o9bT-GM6IzVap2MBamlBCGsgEWPBohoUkKp8UErXjnTZxmGL2IKPpI!/

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- **Insomnia** by Rubin Naiman, PhD. In: Rakel D, ed. ***Integrative Medicine, 3rd ed.*** Philadelphia, PA: Elsevier Saunders; 2012:65-76. Excellent review of an integrative approach to insomnia.
- ***Healthy at Home: Get Well and Stay Well Without Prescriptions*** by Tieraona Low Dog, M.D. Washington D.C.: National Geographic Society, 2014. Chapter 4 "Calming the Nerves, Strengthening the Nervous System" offers the perspective of a master herbalist on insomnia and related topics.
- ***Rational Phytotherapy: A Reference Guide for Physicians and Pharmacists 5th ed.*** by Volker Schulz, Rudolf Hänsel, Mark Blumenthal, V. E. Tyler. Berlin, Heidelberg: Springer-Verlag, 2014. The standard reference for herbal medicine.

Whole Health: Change the Conversation Website

Interested in learning more about Whole Health?
Browse our website for information on personal and professional care.

http://projects.hsl.wisc.edu/SERVICE/index.php

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