



# Your Guide to Healthy Sleep

Despite the mounting support for the notion that adequate sleep, like adequate nutrition and physical activity, is vital to our wellbeing, people are sleeping less. Recent surveys show the average adult now sleeps less than seven hours a night, and more than one-third of adults report daytime sleepiness so severe that it interferes with work and social functioning at least a few days each month. As many as 70 million Americans may be affected by chronic sleep loss or sleep disorders.

This guide can help you better understand what sleep is, discover how to get adequate sleep and cope with sleep-related issues, and learn about sleep disorders.

## What Is Sleep?

Sleep has distinct stages that cycle throughout the night in predictable patterns. How well rested you are and how well you function depend not just on your total sleep time but on how much of the various stages of sleep you get each night.

Sleep is divided into two basic types: rapid eye movement (REM) sleep and non-REM sleep (with four different stages). Typically, sleep begins with non-REM sleep. In stage one non-REM sleep, you sleep lightly and can be awakened easily by noises or other disturbances. During this first stage of sleep, your eyes move slowly, and your muscle activity slows. You then enter stage two non-REM sleep, when your eye movements stop. Your brain shows a distinctive pattern of slower brain waves with occasional bursts of rapid waves.

When you progress into stage three non-REM sleep, your brain waves become even slower, although they are still punctuated by smaller, faster waves. By stage four non-REM sleep, the brain produces extremely slow waves almost exclusively. Stages three and

four are considered deep sleep, during which it is very difficult to be awakened. Children who wet the bed or sleep walk tend to do so during stages three or four of non-REM sleep. Deep sleep is considered the “restorative” part of sleep that is necessary for feeling well rested and energetic during the day.

During REM sleep, your eyes move rapidly in various directions, even though your eyelids remain closed. Your breathing also becomes more rapid, irregular, and shallow, and your heart rate and blood pressure increase. Dreaming typically occurs during REM sleep. During this type of sleep, your arm and leg muscles are temporarily paralyzed so that you cannot “act out” any dreams that you may be having.

The first period of REM sleep you experience usually occurs about an hour to an hour and a half after falling asleep. After that, the sleep stages repeat themselves continuously while you sleep. As the night progresses, REM sleep time becomes longer, while time spent in non-REM sleep stages three and four becomes shorter. By morning, nearly all your sleep time is spent in stages one and two of non-REM sleep and in REM sleep. If REM sleep is disrupted during one night, REM sleep time is typically longer than normal in subsequent nights until you catch up. Overall, almost one-half your total sleep time is spent in stages one and two non-REM sleep and about one-fifth each in deep sleep (stages three and four of non-REM sleep) and REM sleep. In contrast, infants spend half or more of their total sleep time in REM sleep. Gradually, as they mature, the percentage of total sleep time they spend in REM progressively decreases to reach the one-fifth level typical of later childhood and adulthood.

Why people dream and why REM sleep is so important are not well understood. It is known that REM sleep stimulates the brain regions used in learning and the laying down of memories. Animal studies suggest that



Types of Sleep	
Non REM Sleep	REM Sleep
<b>Stage 1:</b> Light sleep; easily awakened; muscle activity; eye movements slow down.	Usually first occurs about 90 minutes after you fall asleep; cycles along with the non-REM stages throughout the night.
<b>Stage 2:</b> Eye movements stop; slower brain waves, with occasional bursts of rapid brain waves.	Eyes move rapidly, with eyelids closed. Breathing is more rapid, irregular, and shallow. Heart rate and blood pressure increase. Dreaming occurs. Arm and leg muscles are temporarily paralyzed.
<b>Stage 3:</b> Considered deep sleep; difficult to awaken; brain waves slow down more, but still have occasional rapid waves.	
<b>Stage 4:</b> Considered deep sleep; difficult to awaken; extremely slow brain waves.	

dreams may reflect the brain's sorting and selectively storing important new information acquired during wake time. While this information is processed, the brain might revisit scenes from the day while pulling up older memories. This process may explain why childhood memories can be interspersed with more recent events during dreams. Studies show, however, that other stages of sleep besides REM are also needed to form the pathways in the brain that enable us to learn and remember.

### How Much Sleep Is Enough?

When healthy adults are given unlimited opportunity to sleep, they sleep on average between eight and 8.5 hours a night. But sleep needs vary from person to person. Some people appear to need only about seven hours to avoid problem sleepiness whereas others need nine or more hours of sleep. Sleep needs also change throughout the lifecycle. Newborns sleep between 16 and 18 hours a day, and children in preschool sleep between

10 and 12 hours a day. School aged children and adolescents need at least nine hours of sleep a night. The hormonal influences of puberty tend to shift adolescents' biological clocks. As a result, teenagers are more likely to go to bed later than younger children and adults, and they tend to want to sleep later in the morning. This sleep-wake rhythm is contrary to the early-morning start times of many high schools and helps explain why most teenagers get an average of only seven to 7.5 hours of sleep a night.

As people get older, the pattern of sleep also changes—especially the amount of time spent in the deep sleep stages. Children spend more time than adults in these sleep stages. This explains why children can sleep through loud noises and why they might not wake up when they are moved from the car to their beds. During adolescence, a big drop occurs in the amount of time spent in deep sleep, which is replaced by lighter, stage two sleep. Between young adulthood and midlife, the percentage of deep sleep falls again—from less than 20 percent to less than five percent, one study suggests—and is replaced with lighter sleep (stages one and two). From midlife through late life, people's sleep has more interruptions by wakefulness during the night. This disruption causes older persons to lose more and more of stages one and two non-REM sleep as well as REM sleep.

Many older people complain of difficulty falling asleep, early morning awakenings, frequent and long awakenings during the night, daytime sleepiness, and a lack of refreshing sleep. Many sleep problems, however, are not a natural aspect of sleep in the elderly. Because older people are more likely to have many illnesses that can disrupt sleep, their sleep complaints often may be due, in part, to illnesses or the medications used to treat them. In fact, one study found that the prevalence of sleep problems is very low in healthy older adults. Other causes of some of older adults' sleep complaints are sleep apnea, restless legs syndrome, and other sleep disorders that become more common with age. Also, older

people are more likely to have their sleep disrupted by the need to urinate during the night.

Some evidence shows that the biological clock shifts in older people, so they are more apt to go to sleep earlier at night and wake up earlier in the morning. No evidence indicates that older people can get by with less sleep than younger people. Poor sleep in older people is linked to excessive daytime sleepiness, attention and memory problems, depressed mood, and overuse of sleeping pills.

Despite variations in sleep quantity and quality, both related to age and between individuals, studies suggest that the optimal amount of sleep needed to perform adequately, avoid a sleep debt, and not have problem sleepiness during the day is about seven to eight hours for adults and nine or more hours for school-aged children and adolescents. Similar amounts seem to be necessary to avoid further increasing the risk of developing obesity, diabetes, or cardiovascular disorders.

Quality of sleep is as important as quantity. People whose sleep is frequently interrupted or cut short may not get enough of both non-REM sleep and REM sleep. Both types of sleep appear to be crucial for learning and memory—and perhaps for all the other restorative benefits of healthy sleep, including the growth and repair of cells.

Many people try to make up for lost sleep during the week by sleeping more on the weekends. But if you have lost too much sleep, sleeping in on the weekend does not completely erase your sleep debt. Certainly, sleeping more at the end of the week does not make up for the hampered performance you most likely had at the beginning of or during that week. Just one night of inadequate sleep can adversely affect your functioning and mood during at least the next day.

Daytime naps are another strategy some people use to make up for lost sleep during the night. Some evidence shows that short naps (up to an hour) can make up, at least partially, for the sleep missed on the previous night and improve alertness, mood, and work

performance. But naps don't substitute for a good night's sleep. One study found that a daytime nap after a lack of sleep at night did not fully restore levels of blood sugar to the pattern seen with adequate nighttime sleep. If a nap lasts longer than one hour, you may have a hard time waking up fully. In addition, late afternoon naps can make falling asleep at night more difficult.

### **What Disrupts Sleep?**

Many factors can prevent a good night's sleep. These factors range from well-known stimulants, such as coffee, to certain pain relievers, decongestants, and other culprits. Many people depend on the caffeine in coffee, soft drinks (for example, colas), or tea to wake them up in the morning or to keep them awake. Caffeine is thought to block the cell receptors that adenosine uses to trigger its sleep inducing signals. In this way, caffeine fools the body into thinking it isn't tired. It can take as long as six to eight hours for the effects of caffeine to wear off completely. Drinking a cup of coffee in the late afternoon consequently may prevent your falling asleep at night.

Nicotine is another stimulant that can keep you awake. Nicotine also leads to lighter than normal sleep. Heavy smokers also tend to wake up too early because of nicotine withdrawal. Although alcohol is a sedative that makes it easier to fall asleep, it prevents deep sleep and REM sleep, allowing only the lighter stages of sleep. People who drink alcohol also tend to wake up in the middle of the night when the effects of an alcoholic "night-cap" wear off.

Certain commonly used prescription and over-the-counter medicines contain ingredients that can keep you awake. These ingredients include decongestants and steroids. Many pain relievers taken by headache sufferers contain caffeine. Heart and blood pressure medications known as "beta blockers" can cause difficulty falling asleep and increase the number of awakenings during the night. People who have chronic asthma or bronchitis also have more problems falling asleep and staying

asleep than healthy people, either because of their breathing difficulties or because of the medicines they take. Other chronic painful or uncomfortable conditions—such as arthritis, congestive heart failure, and sickle cell anemia—can disrupt sleep, too.

A number of psychological disorders—including schizophrenia, bipolar disorder, and anxiety disorders—are well known for disrupting sleep. Depression often leads to insomnia, and insomnia can cause depression. Some of these psychological disorders are more likely to disrupt REM sleep. Psychological stress also takes its toll on sleep, making it more difficult to fall asleep or stay asleep. People who feel stressed also tend to spend less time in deep sleep and REM sleep. Many people report having difficulties sleeping if, for example, they have recently lost a loved one, are undergoing a divorce, or are under stress at work.

Menstrual cycle hormones can affect how well women sleep. Progesterone is known to induce sleep and circulates in greater concentrations in the second half of the menstrual cycle. For this reason, women may sleep better during this phase of their menstrual cycle, but many women report trouble sleeping the night before their menstrual bleeding starts. This sleep disruption is probably related to the abrupt drop in progesterone levels in their bodies just before they begin to bleed. Women in their late forties and early fifties, however, report more difficulties sleeping (insomnia) than younger women. These difficulties may be because, as they near or enter menopause, they have lower concentrations of progesterone. Hot flashes in women of this age also may cause sleep disruption and difficulties.

Certain lifestyle factors may also deprive a person of needed sleep. Large meals or exercise just before bedtime can make it harder to fall asleep. Studies show that exercise in the evening delays the extra release of melatonin at night that helps the body fall asleep. Exercise in the daytime, on the other hand, is linked to improved nighttime sleep.

If you aren't getting enough sleep or aren't falling asleep early enough, you may be overscheduling activities that can prevent you from getting the quiet relaxation time you need to prepare for sleep. Most people report that it's easier to fall asleep if they have time to wind down into a less active state before sleeping. Relaxing in a hot bath before bedtime may help. In addition, your body temperature drops after a hot bath in a way that mimics, in part, what happens as you fall asleep. Probably for both these reasons, many people report that they fall asleep more easily after a hot bath.

Sleeping environment also can affect your sleep. Clear your bedroom of any potential sleep distractions, such as noises, bright lights, a television, or computer. Having a comfortable mattress and pillow can help promote a good night's sleep. You also sleep better if the temperature in your bedroom is kept on the cool side.

### Tips for Getting a Good Night's Sleep

- **Stick to a sleep schedule.** Go to bed and wake up the same time each day. As creatures of habit, people have a hard time adjusting to altered sleep patterns. Sleeping later on weekends won't fully make up for the lack of sleep during the week and will make it harder to wake up early on Monday morning.
- **Exercise is great but not too late in the day.** Try to exercise at least 30 minutes on most days but not later than five or six hours before your bedtime.
- **Avoid caffeine and nicotine.** Coffee, colas, certain teas, and chocolate contain the stimulant caffeine, and its effects can take as long as eight hours to wear off fully. Therefore, a cup of coffee in the late afternoon can make it hard for you to fall asleep at night. Nicotine is also a stimulant, often causing smokers to sleep only very lightly. In addition, smokers often wake up too early in the morning because of nicotine withdrawal.

- **Avoid alcoholic drinks before bed.** You may think having an alcoholic “nightcap” will help you sleep, but alcohol robs you of deep sleep and REM sleep, keeping you in the lighter stages of sleep. You also tend to wake up in the middle of the night when the effects of the alcohol have worn off.
- **Avoid large meals and beverages late at night.** A light snack is okay, but a large meal can cause indigestion that interferes with sleep. Drinking too many fluids at night can cause frequent awakenings to urinate.
- **If possible, avoid medicines that delay or disrupt your sleep.** Some commonly prescribed heart, blood pressure, or asthma medications, as well as some over-the-counter and herbal remedies for coughs, colds, or allergies, can disrupt sleep patterns. If you have trouble sleeping, talk to your doctor or pharmacist to see if any drugs you’re taking might be contributing to your insomnia.
- **Don’t take naps after three p.m.** Naps can help make up for lost sleep, but late afternoon naps can make it harder to fall asleep at night.
- **Relax before bed.** Don’t overschedule your day so that no time is left for unwinding. A relaxing activity, such as reading or listening to music, should be part of your bedtime ritual.
- **Take a hot bath before bed.** The drop in body temperature after getting out of the bath may help you feel sleepy, and the bath can help you relax and slow down so you’re more ready to sleep.
- **Have a good sleeping environment.** Get rid of anything that might distract you from sleep, such as noises, bright lights, an uncomfortable bed, or warm temperatures. You sleep better if the temperature in your bedroom is kept on the cool side. A TV or computer in the bedroom can be a distraction and

deprive you of needed sleep. Having a comfortable mattress and pillow can help promote a good night’s sleep.

- **Have the right sunlight exposure.** Daylight is key to regulating daily sleep patterns. Try to get outside in natural sunlight for at least 30 minutes each day. If possible, wake up with the sun or use very bright lights in the morning. Sleep experts recommend that, if you have problems falling asleep, you should get an hour of exposure to morning sunlight.
- **Don’t lie in bed awake.** If you find yourself still awake after staying in bed for more than 20 minutes, get up and do some relaxing activity until you feel sleepy. The anxiety of not being able to sleep can make it harder to fall asleep.
- **See a doctor if you continue to have trouble sleeping.** If you consistently find yourself feeling tired or not well rested during the day despite spending enough time in bed at night, you may have a sleep disorder. Your family doctor or a sleep specialist should be able to help you.

### Is Snoring a Problem?

Long the material for jokes, snoring is generally accepted as common and annoying in adults but as nothing to worry about. However, snoring is no laughing matter. Frequent, loud snoring is often a sign of sleep apnea and may increase your risk of developing cardiovascular disease and diabetes, as well as lead to daytime sleepiness and impaired performance.

Snoring is caused by a narrowing or partial blockage of your airways at the back of the mouth and upper throat. This obstruction results in increased air turbulence when breathing in, causing the soft tissues in your throat to vibrate. The end result is a noisy snore that can disrupt the sleep of your bed partner. This narrowing of the airways is typically caused by the soft palate, tongue, and throat relaxing while you sleep, but

allergies or sinus problems can also contribute to a narrowing of the airways, as can being overweight and having extra soft tissue around your upper airways.

The larger the tissues in your soft palate, the more likely you are to snore while sleeping. Alcohol or sedatives taken shortly before sleep also promote snoring. These drugs cause greater relaxation of the tissues in your throat and mouth. Surveys reveal that about one-half of all adults snore, and 50 percent of these adults do so loudly and frequently. African Americans, Asians, and Hispanics are more likely to snore loudly and frequently compared to Caucasians, and snoring problems increase with age.

Not everyone who snores has sleep apnea, but people who have sleep apnea typically do snore loudly and frequently. Sleep apnea is a serious sleep disorder, and its hallmark is loud, frequent snoring linked to intermittent brief pauses in breathing while sleeping. (See the section on “Sleep Apnea” later in this guide.) Even if you don’t experience these breathing pauses, snoring can still be a problem for you as well as for your bed partner. The increased breathing effort associated with snoring can impair your sleep quality and lead to many of the same health consequences as sleep apnea.

One study found that older adults who did not have sleep apnea, but who snored six to seven nights a week, were more than twice as likely to report being excessively sleepy during the day than those who never snored. The more people snored, the more daytime fatigue they reported. That sleepiness may help explain why snorers are more likely to be in car crashes than people who do not snore. Loud snoring can also disrupt the sleep of bed partners and strain marital relations, especially if snoring causes the spouses to sleep in separate bedrooms.

Snoring also increases the risk of developing diabetes and heart disease. One study found that women who snored regularly were twice as likely as those who did not snore to develop diabetes, even if they were not overweight—another risk factor for diabetes. Other studies

suggest persistent snoring may raise the lifetime risk of developing high blood pressure, heart failure, and stroke.

About one-third of all pregnant women begin snoring for the first time during their second trimester. If you are snoring while pregnant, let your doctor know. Snoring in pregnancy can be associated with high blood pressure and can have a negative effect on your baby’s growth and development. Your doctor will routinely keep a close eye on your blood pressure throughout your pregnancy and can let you know if any additional evaluations for the snoring might be useful. In most cases, the snoring and any related high blood pressure will subside shortly after delivery.

Snoring can also be a problem in children. As many as 10 to 15 percent of young children, who typically have enlarged adenoids and tonsils, snore on a regular basis. Several studies show that children who snore (with or without sleep apnea) are more likely than those who do not snore to score lower on tests that measure intelligence, memory, and ability to maintain attention. These children also have more problematic behavior, including hyperactivity. The end result is that children who snore do not perform in school as well as those who do not snore. Strikingly, snoring was linked to a greater drop in IQ than that seen in children who had elevated levels of lead in their blood. Although the behavior of children improves after they stop snoring, studies suggest they may continue to get poorer grades in school, perhaps because of lasting effects on the brain linked to the snoring. You should have your child evaluated by your doctor if the child snores loudly and frequently—three to four times a week—especially if brief pauses in breathing while asleep are noted and if there are signs of hyperactivity or daytime sleepiness, inadequate school achievement, or slower than expected development.

Surgery to remove the adenoids and tonsils of children often can cure their snoring and any associated sleep apnea. Such surgery has been linked to a reduction in hyperactivity

and improved ability to pay attention, even in children who showed no signs of sleep apnea before surgery.

Snoring in older children and adults may be relieved by less invasive measures, however. These measures include losing weight, refraining from tobacco, sleeping on the side rather than on the back, or elevating the head while sleeping. Treating chronic congestion and refraining from alcohol or sedatives before sleeping can also stop snoring. In some adults, snoring can be relieved by dental appliances that reposition the soft tissues in the mouth. Although numerous over-the-counter nasal strips and sprays claim to relieve snoring, no scientific evidence supports those claims.

### Common Sleep Disorders

A number of sleep disorders can disrupt your sleep quality and leave you with excessive daytime sleepiness, even if enough time was spent in bed to be well rested. More than 70 sleep disorders affect at least 40 million Americans and account for an estimated \$16 billion in medical costs each year, not counting costs due to lost work time and other factors. The four most common sleep disorders are insomnia, obstructive sleep apnea (sleep-disordered breathing), restless legs syndrome (RLS), and narcolepsy. Additional sleep problems include sleep walking, sleep paralysis, night terrors, and other “parasomnias” that cause abnormal arousals.

### Common Signs of a Sleep Disorder

Look over this list of common signs of a sleep disorders, and talk to your doctor if you have any of them:

- It takes you more than 30 minutes to fall asleep at night.
- You awaken frequently in the night and have trouble falling back to sleep again.
- You awaken too early in the morning.
- You frequently don't feel well rested despite spending seven to eight hours or more asleep at night.

- You feel sleepy during the day and fall asleep within five minutes if you have an opportunity to nap, or you fall asleep at inappropriate times during the day.
- Your bed partner claims you snore loudly, snort, gasp, or make choking sounds while you sleep, or your partner notices your breathing stops for short periods.
- You have creeping, tingling, or crawling feelings in your legs, especially in the evening and when you try to fall asleep, that are relieved by moving or massaging them.
- You have vivid, dreamlike experiences while falling asleep or dozing.
- You have episodes of sudden muscle weakness when you are angry, fearful, or when you laugh.
- You feel as though you cannot move when you first wake up.
- Your bed partner notes that your legs or arms jerk often during sleep.
- You regularly need to use stimulants to stay awake during the day.

Also keep in mind that, although children can show some of these same signs of a sleep disorder, they often do not show signs of excessive daytime sleepiness. Instead, they may seem overactive and have difficulty focusing and concentrating. They also may not do their best in school.

### Insomnia

Insomnia is defined as having trouble falling asleep or staying asleep, or as having unrefreshing sleep despite having ample opportunity to sleep. Life is filled with events that occasionally cause insomnia for a short time. Such temporary insomnia is common and is often brought on by stressful situations such as work, family pressures, or a traumatic event. A National Sleep Foundation poll of adults in the United States found that close to half of the respondents reported temporary insomnia in the nights immediately after the terrorist attacks on September 11, 2001.

Chronic insomnia is defined as having symptoms at least three nights per week for more than one month. Most cases of chronic insomnia are secondary, which means they are due to another disorder or medications. Primary chronic insomnia is a distinct sleep disorder; its cause is not yet well understood. About 30 to 40 percent of adults say they have some symptoms of insomnia within any given year, and about 10 to 15 percent of adults say they have chronic insomnia. Chronic insomnia becomes more prevalent with age, and women are more likely than men to report having insomnia.

Insomnia often causes problems during the day, such as excessive sleepiness, fatigue, a lack of energy, difficulty concentrating, depressed mood, and irritability. Due to all of these potential consequences, untreated insomnia can impair quality of life as much as, or more than, other chronic medical problems.

**Chronic insomnia is often caused by one or more of the following:**

- Another disease or mood disorder. The most common causes of insomnia are depression and/or anxiety disorders. Neurological disorders such as Alzheimer's or Parkinson's disease can also have insomnia as a symptom. Chronic insomnia can result from arthritis, asthma, or other medical conditions in which symptoms become more troublesome at night, making it difficult to fall asleep or stay asleep.
- Various prescribed and over-the-counter medications that can disrupt sleep, such as decongestants, certain pain relievers, and steroids.
- Sleep-disrupting behavior such as drinking alcohol, exercising shortly before bedtime, ingesting caffeine late in the day, watching TV or reading while in bed, or irregular sleep schedules due to shift work or other causes.
- Another sleep disorder, such as sleep apnea or restless legs syndrome.

Some people, however, have primary chronic insomnia. This condition is linked to a tendency toward being more "revved up" than normal (hyperarousal). These people may have heightened secretion of certain hormones, higher body temperatures, faster heart rates, and a different pattern of brain waves while they sleep.

Doctors diagnose insomnia based mainly on sleep history, often by reviewing a sleep diary. An overnight sleep recording may be required if another sleep disorder is suspected. Doctors also will try to diagnose and treat any other underlying medical or psychological problems as well as identify behaviors that might be causing the insomnia.

Often, people who have insomnia enter into a vicious cycle—because of having trouble sleeping in previous nights, they become anxious at the slightest sign that they may not be falling asleep right away. That anxiety can make it more difficult for them to fall asleep. The more time they spend in bed not sleeping, and watching the clock, the more their anxiety—and sleeplessness—increases.

To break that cycle of anxiety and negative conditioning, experts recommend going to bed only when you're sleepy. If you can't fall asleep (or fall back to sleep) within 20 minutes, get out of bed and go into another room where you can pursue a relaxing activity until you feel sleepy again. Then return to bed. This reconditioning therapy has been shown to be an effective way to treat insomnia.

Another effective behavioral strategy for some people is relaxation therapy. For example, progressively tense and then relax each of the muscle groups in your body before sleep. Another method is to focus on breathing deeply. Relaxation therapy can provide a needed slowing down period so that you are indeed sleepy when the desired bedtime arrives.



Sleep restriction therapy also works for some people who have insomnia. First, limit your night's sleep to four or five hours, then gradually add more sleep time each night until you achieve a more normal night's sleep. Daytime naps should be avoided during this sleep restriction therapy because napping may prolong insomnia by making it harder to fall asleep at night. In addition, during sleep restriction therapy, avoid driving a car or operating dangerous machinery until you have obtained adequate nighttime sleep.

All these changes in behavior are part of what is called "cognitive behavioral therapy." Cognitive behavioral therapy also can be used to replace negative thinking related to sleep, such as "I'll never fall asleep without sleeping pills," with more realistic positive thinking. Cognitive behavioral therapy is effective in most people who have chronic insomnia.

Some people who have chronic insomnia that is not corrected by behavioral therapy or treatment of an underlying condition may need a prescription medication. You should talk to a doctor before trying to treat insomnia with alcohol, over-the-counter or prescribed short-acting sedatives, or sedating antihistamines that induce drowsiness. The benefits of these treatments are limited, and they have risks. Some may help you fall asleep but leave you feeling unrefreshed in the morning. Others have longer-lasting effects and leave you feeling still tired and groggy in the morning. Some also may lose their effectiveness over time. Doctors may prescribe sedating antidepressants for insomnia, but the effectiveness of these medicines in people who do not have depression is not established, and there are significant side effects.

To treat their insomnia, some people pursue "natural" remedies, such as melatonin supplements or valerian teas or extracts. These remedies are available over the counter. There is little evidence that melatonin can help relieve insomnia. Studies with valerian have also been inconclusive, and the actual dose and purity of various supplements, extracts, or teas that contain valerian may vary from product to

product. In addition, because melatonin, valerian, and other natural remedies are not regulated by the Food and Drug Administration, their safety is not scrutinized.

### Sleep Apnea

In people who have sleep apnea (also referred to as sleep-disordered breathing), breathing briefly stops or becomes very shallow during sleep. This change is caused by intermittent blocking of the upper airway, usually when the soft tissue in the rear of the throat collapses and partially or completely closes the airway. Each breathing stop typically lasts 10 to 20 seconds or more and may occur 20 to 30 times or more each sleeping hour.

If you have sleep apnea, not enough air can flow into your lungs through the mouth and nose during sleep, even though breathing efforts continue. When this happens, the amount of oxygen in your blood decreases. Your brain responds by awakening you enough to tighten the upper airway muscles and open your windpipe. Normal breaths then start again, often with a loud snort or choking sound. Although people who have sleep apnea typically snore loudly and frequently, not everyone who snores has sleep apnea.

Because people who have sleep apnea frequently arouse from deeper sleep stages to lighter sleep during the night, they rarely spend enough time in deep, restorative stages of sleep. They are therefore often excessively sleepy during the day. Such sleepiness is thought to lead to mood and behavior problems, including depression, and such sleepiness more than triples the risk of being in a traffic or work related accident.

The many brief drops in blood-oxygen levels can be associated with morning headaches and decreased ability to concentrate, think properly, learn, and remember. In sleep apnea, the combination of the intermittent oxygen drops and reduced sleep quality triggers the release of stress hormones. These hormones in turn raise your blood pressure and heart rate and boost the risk of heart

attack, stroke, irregular heart beats, and congestive heart failure. In addition, untreated sleep apnea can lead to altered energy metabolism that increases the risk for developing obesity and diabetes.

Anyone can have sleep apnea. It is estimated that at least 12 to 18 million American adults have sleep apnea, making it as common as asthma. More than one-half of the people who have sleep apnea are overweight. Sleep apnea is more common in men. More than one in 25 middle-aged men and one in 50 middle-aged women have sleep apnea along with excessive daytime sleepiness. About three percent of children and 10 percent or more of people over age 65 have sleep apnea. This condition occurs more frequently in African Americans, Asians, Native Americans, and Hispanics than in Caucasians.

More than one-half of all people who have sleep apnea are not diagnosed. People who have sleep apnea generally are not aware that their breathing stops in the night. They just notice that they don't feel well rested when they wake up and are sleepy throughout the day. Their bed partners are likely to notice, however, that they snore loudly and frequently and that they often stop breathing briefly while sleeping. Doctors suspect sleep apnea if these symptoms are present, but the diagnosis must be confirmed with overnight sleep monitoring. (See the section "How Are Sleep Disorders Diagnosed?" later in this guide.) This monitoring will reveal pauses in breathing, frequent sleep arousals, and intermittent drops in levels of oxygen in the blood.

Like adults who have sleep apnea, children who have this disorder usually snore loudly, snort or gasp, and have brief stops in breathing while sleeping. Small children often have enlarged tonsils and adenoids that increase their risk for sleep apnea. But doctors may not suspect sleep apnea in children because, instead of showing the typical signs of sleepiness during the day, these children often become agitated and may be considered hyperactive. The effects of sleep apnea in

children may include diminished school performance and difficult, aggressive behavior.

A Multiple Sleep Latency Test (MSLT), usually done in a sleep center, is used to see how quickly you fall asleep at times when you would normally be awake. Falling asleep in only a few minutes usually means that you are very sleepy during the day. Being very sleepy during the day can be a sign of sleep apnea. Once all the tests are completed, the sleep medicine specialist will review the results and work with you and your family to develop a treatment plan. Changes in daily activities or habits may help reduce your symptoms:

- **Sleep on your side instead of on your back.** Sleeping on your side will help reduce the amount of upper airway collapse during sleep.
- **Avoid alcohol, smoking, sleeping pills, herbal supplements, and any other medications that make you sleepy.** They make it harder for your airway to stay open while you sleep, and sedatives can make the breathing pauses longer and more severe. Tobacco smoke irritates the airways and can help trigger the intermittent collapse of the upper airway.
- **Lose weight if you are overweight.** Even a little weight loss can sometimes improve symptoms. These changes may be all that are needed to treat mild sleep apnea. However, if you have moderate or severe sleep apnea, you will need additional, more direct treatment approaches.

Continuous Positive Airway Pressure (CPAP) is the most effective treatment for sleep apnea in adults. CPAP delivers air into your airway through a specially designed nasal mask attached to a machine that acts as a pump. The mask does not breathe for you; the flow of air creates enough increased pressure to keep the airways in your nose and mouth more open while you sleep. The air pressure is adjusted so that it is just enough to stop

your airways from briefly becoming too small during sleep. The pressure is constant and continuous. Sleep apnea will return if CPAP is stopped or if it is used incorrectly.

People who have severe sleep apnea symptoms generally feel much better once they begin treatment with CPAP. CPAP treatment can cause side effects in some people. Possible side effects include dry or stuffy nose, irritation of the skin on the face, bloating of the stomach, sore eyes, or headaches. If you have trouble with CPAP side effects, work with your sleep medicine specialist and support staff. Together, you can do things to reduce or eliminate these problems.

Currently, no medications cure sleep apnea. However, the prescription drug modafinil may help relieve the excessive sleepiness that sometimes persists even with CPAP treatment of sleep apnea.

Another treatment approach that may help some people is the use of a mouthpiece (oral or dental appliance). If you have mild sleep apnea or do not have sleep apnea but snore very loudly, your doctor or dentist may also recommend this. A custom-fitted plastic mouthpiece will be made by a dentist or an orthodontist—a specialist in correcting teeth or jaw problems. The mouthpiece will adjust your lower jaw and tongue to help keep the airway in your throat more open while you are sleeping. Air can then flow more easily into your lungs because there is less resistance to breathing. Following up with the dentist or orthodontist is important to correct any side effects and to be sure that your mouthpiece continues to fit properly.

Some people who have sleep apnea, depending on the findings of the evaluation by the sleep medicine specialist, may benefit from surgery. Removing tonsils and adenoids that are blocking the airway is done frequently, especially in children. Uvulopalatopharyngoplasty (UPPP) is a surgery for adults that removes the tonsils, uvula (the tissue that hangs from the middle of the back of the roof of the mouth), and part of the soft palate (roof of the mouth

in the back of the throat). Tracheostomy is a surgery used rarely and only in severe sleep apnea when no other treatments have been successful. A small hole is made in the windpipe, and a tube is inserted. Air will flow through the tube and into the lungs, bypassing the obstruction in the upper airway.

A number of factors can make a person susceptible to sleep apnea. These factors include:

- Throat muscles and tongue that relax more than normal while asleep
- Enlarged tonsils and adenoids
- Being overweight—the excess fat tissue around your neck makes it harder to keep the throat area open
- Head and neck shape that creates a somewhat smaller airway size in the mouth and throat area
- Congestion, due to allergies, that can also narrow the airway
- Family history of sleep apnea

If your doctor suspects that you have sleep apnea, you may be referred to a sleep specialist. Some of the ways to help diagnose sleep apnea include:

- A medical history that includes asking you and your family questions about how you sleep and how you function during the day.
- An overnight recording of what happens with your breathing during sleep (polysomnogram, or PSG).
- Checking your mouth, nose, and throat for extra or large tissues—for example tonsils, uvula (the tissue that hangs from the middle of the back of the mouth), and soft palate (roof of your mouth in the back of your throat).

## Restless Legs Syndrome (RLS)

Restless legs syndrome (RLS) causes an unpleasant prickling or tingling in the legs, especially in the calves, that is relieved by moving or massaging them. This sensation creates a need to stretch or move the legs to get rid of these uncomfortable or painful feelings. As a result, a person may have difficulty falling asleep and staying asleep. One or both legs may be affected. In some people, the sensations are also felt in the arms. These sensations can also occur with lying down or sitting for prolonged periods of time, such as while at a desk, riding in a car, or watching a movie.

Many people who have RLS also have brief limb movements during sleep, often with abrupt onset, occurring every five to 90 seconds. This condition, known as periodic limb movements in sleep (PLMS), can repeatedly awaken people who have RLS and reduce their total sleep time. Some people have PLMS but have no abnormal sensations in their legs while awake.

RLS affects five to 15 percent of Americans, and its prevalence increases with age. RLS occurs more often in women than men. One study found that RLS accounted for one-third of the insomnia seen in patients older than age 60. Children also can have RLS. This condition can be difficult to diagnose in children, and it often is confused with hyperactivity or “growing pains.”

RLS is often inherited. Pregnancy, kidney failure, and anemia related to iron or vitamin deficiency can trigger or worsen RLS symptoms. Researchers suspect that these conditions cause insufficient iron that results in a lack of dopamine. The brain uses dopamine to control limb movements. Doctors usually can diagnose RLS by patients’ symptoms and a telltale worsening of symptoms at night or while at rest. Some doctors may order a blood test for iron, although many people who have RLS have normal levels of iron in their blood but abnormal levels in the fluid that bathes their brain. Doctors may also ask people who have RLS to spend a night in a

sleep lab where they are monitored to rule out other sleep disorders and to document the excessive limb movements.

RLS is a treatable but not curable condition. Dramatic improvements are seen quickly when patients are given dopamine-like drugs. Alternatively, people who have milder cases may be treated successfully with sedatives or by behavioral strategies. These strategies include stretching, taking a hot bath, or massaging the legs before bedtime. Avoiding caffeinated beverages can also help reduce symptoms. If iron or vitamin deficiency underlies RLS, symptoms may improve with prescribed iron, vitamin B12, or folate supplements. Some people may require anticonvulsant medications to stem the creeping and crawling sensations in their limbs. Others who have severe symptoms may need to be treated with pain relievers, such as codeine or morphine, or a combination of drug treatments.

## Narcolepsy

Narcolepsy’s main symptom is excessive and overwhelming daytime sleepiness, even after adequate nighttime sleep. In addition, nighttime sleep may be fragmented by frequent awakenings. People who have narcolepsy often fall asleep at inappropriate times and places. Although television sitcoms occasionally feature these individuals to generate a few laughs, narcolepsy is no laughing matter. People who have narcolepsy experience daytime “sleep attacks” that last from seconds to more than one-half hour, can occur without warning, and may cause injury. These embarrassing sleep spells can also make it difficult to work and to maintain normal personal or social relationships.

With narcolepsy, the usually sharp distinctions between being asleep and awake are blurred. Also, people who have narcolepsy tend to fall directly into dream-filled REM sleep, rather than enter REM sleep gradually after passing through the non-REM sleep stages first.

In addition to overwhelming daytime sleepiness, narcolepsy has three other commonly associated symptoms, but these may not occur in all people:

- **Sudden muscle weakness (cataplexy).** This weakness is similar to the paralysis that normally occurs during REM sleep, but it lasts a few seconds to minutes while an individual is awake. Cataplexy tends to be triggered by sudden emotional reactions, such as anger, surprise, fear, or laughter. The weakness may show up as limpness at the neck, buckling of the knees, or sagging facial muscles affecting speech, or it may cause a complete body collapse.
- **Sleep paralysis.** People who have narcolepsy may experience a temporary inability to talk or move when falling asleep or waking up, as if they were glued to their beds.
- **Vivid (hypnagogic) dreams.** These dreams tend to surface when people who have narcolepsy first fall asleep. The dreams are so lifelike that they can be confused with reality.

Experts estimate that as many as 350,000 Americans have narcolepsy, but fewer than 50,000 are diagnosed. The disorder is as widespread as Parkinson's disease or multiple sclerosis, and more prevalent than cystic fibrosis, but it is less well known. Narcolepsy is often mistaken for depression, epilepsy, or the side effects of medicines.

Narcolepsy can be difficult to diagnose in people who have only the symptom of excessive daytime sleepiness. It is usually diagnosed with the aid of an overnight sleep recording (PSG) and the MSLT. (See the section "How Are Sleep Disorders Diagnosed?" later in this guide.) Both tests reveal signs of narcolepsy—the tendency to fall asleep rapidly and enter REM sleep early, even during brief naps.

Narcolepsy can develop at any age, but the symptoms tend to appear first during adolescence or early adulthood. About one of

every 10 people who have narcolepsy has a close family member who has the disorder, suggesting that one can inherit a tendency to develop narcolepsy. Studies suggest that a neurotransmitter called hypocretin plays a key role in narcolepsy. Most people who have narcolepsy lack hypocretin, which promotes wakefulness. Scientists believe that an autoimmune reaction, perhaps triggered by disease or brain injury, specifically destroys the hypocretin-generating cells in the brains of people who have narcolepsy.

Eventually, researchers may develop a treatment for narcolepsy that restores hypocretin to normal levels. In the meantime, most people who have narcolepsy find some to all of their symptoms relieved by various drug treatments. For example, central nervous system stimulants can reduce daytime sleepiness. Antidepressants and other drugs that suppress REM sleep can prevent muscle weakness, sleep paralysis, and vivid dreaming. Doctors also usually recommend that people who have narcolepsy take short naps (10 to 15 minutes) two or three times a day, if possible, to help control excessive daytime sleepiness.

### Parasomnias (Abnormal Arousals)

In some people, the walking, talking, and other body functions normally suppressed during sleep emerge during certain sleep stages. Alternatively, the paralysis or vivid images usually experienced during dreaming may persist after awakening. These arousal malfunctions are collectively known as parasomnias and include confusional arousals, sleep talking, sleep walking, night terrors, sleep paralysis, and REM sleep behavior disorder (acting out dreams). Most of these disorders—such as confusional arousals, sleep walking, and night terrors—are more common in children, who tend to outgrow them once they become adults. People who are sleep-deprived also may experience some of these disorders, including sleep walking and sleep paralysis. Sleep paralysis also commonly occurs in people who have narcolepsy.

Certain medications or neurological disorders appear to lead to other parasomnias, such as REM sleep behavior disorder, and these parasomnias tend to occur more in elderly people. If you or a family member has persistent episodes of sleep paralysis, sleep walking, or acting out of dreams, talk with your doctor.

### How Are Sleep Disorders Diagnosed?

Depending on what your symptoms are, your doctor will gather various kinds of information and consider several possible tests when trying to decide if you have a sleep disorder:

- **Sleep history and sleep log.** Your doctor will ask you how many hours you sleep each night, how often you awaken during the night and for how long, how long it takes you to fall asleep, how well rested you feel upon awakening, and how sleepy you feel during the day. Your doctor may ask you to keep a sleep diary for a few weeks. (See the “Sample Sleep Diary” at the end of this guide.) Your doctor may also ask you if you have any symptoms of sleep apnea or restless legs syndrome, such as loud snoring, snorting or gasping, morning headaches, tingling or unpleasant sensations in the limbs that are relieved by moving them, and jerking of the limbs during sleep. Your sleeping partner may be asked if you have some of these symptoms, as you may not be aware of them yourself.
- **Sleep recording in a sleep lab (polysomnogram).** A sleep recording refers to a polysomnogram (poly-SOM-no-gram) or PSG test that is usually done in a sleep center or sleep laboratory. You will likely stay overnight in the sleep center with electrodes and other monitors placed on your scalp, face, chest, limbs, and finger. While you sleep, these devices measure your brain activity, eye movements, muscle activity, heart rate and rhythm, blood pressure, and how much air moves in and out of your lungs. This test also checks the amount of oxygen

in your blood. A PSG test is painless. In certain circumstances, the PSG can be done at home. A home monitor can be used to record heart rate, how air moves in and out of your lungs, the amount of oxygen in your blood, and your breathing effort.

- **Multiple Sleep Latency Test (MSLT).** Particularly useful for diagnosing narcolepsy, this test measures how sleepy you are during the day. In this test, typically done after an overnight sleep recording (PSG), monitoring devices for sleep stage are placed on your scalp and face. You are asked to nap four or five times for 20 minutes every two hours during times in which you would normally be awake. Technicians note how quickly you fall asleep and how long it takes you to reach various stages of sleep, especially REM sleep, during your naps. Normal individuals either do not fall asleep during these short designated nap times or take a long time to fall asleep. People who fall asleep in less than five minutes are likely to require treatment for a sleep disorder, as are those who quickly develop REM sleep during their naps.

It is important to have a sleep medicine specialist interpret the results of your sleep monitoring test (PSG) or MSLT.

### Do You Think You Have a Sleep Disorder?

At various points in our lives, all of us suffer from a lack of sleep that can be remedied by making sure we have the opportunity to get enough sleep. But, if you are spending enough time in bed and still wake up tired or feel very sleepy during the day, you may have a sleep disorder.

One of the best ways you can tell if you are getting enough good quality sleep, and whether you have signs of a sleep disorder, is by keeping a sleep diary. Use the “Sample Sleep Diary” at the end of this guide to record the quality and quantity of your sleep;

your use of medications, alcohol, and caffeinated beverages; your exercise patterns; and how sleepy you feel during the day. After a week or so, look over this information to see how many hours of sleep or nighttime awakenings the night before are linked to your being tired the next day. This information will give you a sense of how much uninterrupted sleep you need to avoid daytime sleepiness. You can also use the diary to see some of the patterns or practices that may keep you from getting a good night's sleep.

You may have a sleep disorder and should see your doctor if your sleep diary reveals any of the following:

- You consistently take more than 30 minutes each night to fall asleep.
- You consistently awaken more than a few times or for long periods of time each night.
- You take frequent naps.
- You often feel sleepy during the day—especially if you fall asleep at inappropriate times during the day.

### **How To Find a Sleep Center and Sleep Medicine Specialist**

If your doctor refers you to a sleep center or sleep specialist, make sure that center or specialist is qualified to diagnose and treat your sleep problem. To find sleep centers accredited by the American Academy of Sleep Medicine and sleep specialists certified by the American Board of Sleep Medicine, go to [www.sleepcenters.org](http://www.sleepcenters.org) or call 708-492-0930.

### **Helpful Resources**

#### **National Center on Sleep Disorders Research**

National Heart, Lung, and Blood Institute  
National Institutes of Health  
6705 Rockledge Drive Suite 6022  
Bethesda, MD 20892  
301-435-0199  
[www.nhlbi.nih.gov/sleep](http://www.nhlbi.nih.gov/sleep)

#### **NHLBI Health Information Center**

P.O. Box 30105  
Bethesda, MD 20824  
301-592-8573  
[www.nhlbi.nih.gov/health/infoctr](http://www.nhlbi.nih.gov/health/infoctr)

#### **American Academy of Sleep Medicine (AASM)**

One Westbrook Corporate Center, Suite 920  
Westchester, IL 60154  
708-492-0930  
[www.aasmnet.org](http://www.aasmnet.org)  
[www.sleepcenters.org](http://www.sleepcenters.org) (Find a Sleep Center or Sleep Specialist)

#### **American Insomnia Association**

One Westbrook Corporate Center, Suite 920  
Westchester, IL 60154  
708-492-0930  
[www.americaninsomniaassociation.org](http://www.americaninsomniaassociation.org)

#### **American Sleep Apnea Association**

1424 K Street, NW Suite 302  
Washington, DC 20005  
202-293-3650  
[www.sleepapnea.org](http://www.sleepapnea.org)

#### **Narcolepsy Network, Inc.**

P.O. Box 294  
Pleasantville, NY 10570  
401-667-2523  
[www.narcolepsynetwork.org](http://www.narcolepsynetwork.org)

#### **National Sleep Foundation**

1522 K Street, NW Suite 500  
Washington, DC 20005  
202-347-3471  
[www.sleepfoundation.org](http://www.sleepfoundation.org)

#### **Restless Legs Syndrome Foundation**

819 Second Street, SW  
Rochester, MN 55902-2985  
507-287-6465  
[www.rls.org](http://www.rls.org)

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
<b>Name:</b>							
<b>Date:</b>	04/10/09						
<b>Bedtime last night</b>	11 p.m.						
<b>Wake time this morning</b>	7 a.m.						
<b>Number of hours slept last night</b>	8						
<b>Number of awakenings</b>	5						
<b>Total time awake last night</b>	2 hrs.						
<b>How long I took to fall asleep last night</b>	30 mins.						
<b>Medications taken last night</b>	None						
<b>How awake did I feel when I got up this morning:</b> 1—Wide awake 2—Awake but a bit tired 3—Sleepy	2						
<b>Number and time of caffeinated drinks</b>	1 drink @ 8 p.m.						
<b>Number and time of alcoholic drinks</b>	2 drinks @ 9 p.m.						
<b>Nap times and lengths</b>	3:30 p.m. 45 mins.						
<b>Exercise time and lengths</b>	None						
<b>How sleepy did I feel during the day today:</b> 1—I had to struggle to stay awake during the day 2—Somewhat tired 3—Fairly alert 4—Wide awake	1						

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