Sleep Disorders Part 3: Elderly/Geriatrics

Introduction

The aging process leads to multiple changes in a number of body systems, and many aging adults require more medications, treatments, and modifications to maintain quality of life. Sleep habits can become disrupted with advancing age and sleep patterns change over time. According to Townsend-Roccichelli et al., adults an age of their late 70s need approximately 30 to 60 minutes of less sleep each night when compared to a young adult in their early 20s.[4] The sleeping habits that a middle-aged person adjusts to continue to change with advancing age and as a person enters older adulthood, he must adapt to change with it.

Normal Sleep Patterns

Most people experience a similar set of patterns during sleep that occur in cycles. Although some stages of sleep may be shorter or longer than others, all are important parts of the sleep cycle and all contribute to healthy sleep.

NREM

As a person falls asleep, he typically first enters a stage of non-rapid eye movement sleep, or NREM. This type of sleep is characterized by 4 substages, each of which has important functions. The first stage of NREM sleep is very light as the person is first falling asleep. At this early stage, the sleeping person may be awakened easily and the sleep itself is not restorative. In fact, if a person awakens during this time, he may feel as if he has not slept at all.
As a person moves through the stages of NREM sleep, he enters progressively deeper stages of sleep. The heart rate and respiratory rates slow down, blood pressure decreases, and body temperature drops.[4] During the later stages of NREM sleep, brain wave patterns change, as noted on an EEG during testing. During stages 3 and 4 of NREM sleep, the person enters a phase known as slow-wave sleep, which describes the characteristics of brain wave patterns during this time. Slow-wave sleep is essential for restoration, memory consolidation, and the release of important hormones, such as growth hormone. This stage is very important for repair of body tissues and restoration that normally comes from sleep.

Older adults may spend less time in the deep-sleep stages of NREM sleep, although they still have roughly the same periods of REM sleep as they did when they were younger. The decreased time spent in REM sleep leads to lighter sleep overall and older adults may awaken more frequently or not feel refreshed when waking up from a nap or sleep at night.[4]

**REM**

After going through a cycle of NREM sleep, the sleeping person enters rapid eye movement (REM) sleep, which typically occurs approximately 90 minutes after first falling asleep and then again multiple times during the sleep period. REM sleep is an essential part of the sleep cycle, particularly for older adults, as physiologic processes that occur during this stage are important for memory and cognition. It is during REM sleep that levels of neurotransmitters in the brain are restored; during this stage, the body also processes memories, taking short-term memories of events that occurred during the day and consolidating them so that they become long-term memories. REM sleep is also important for the secretion of growth hormone and for the body’s restoration.[4]
REM sleep is characterized and named because of the rapid eye movements that can be seen under the eyelids during this time. REM sleep is when most dreaming occurs, and the person who awakens during this time may be more likely to recall a dream that he was having. It is also during this stage that the heart rate, respiratory rate, and blood pressure increase after falling during NREM sleep. The muscles enter a state of atonia, in which they are unable to move while the person is dreaming. REM sleep completes the cycle of sleep on a normal sleep session. After completing REM sleep, the person may transition back to NREM and the cycle continues.

Common Sleep Disorders

Although normal sleep patterns have been identified through the various cycles of NREM and REM sleep, there are many types of sleep disorders that can disrupt these cycles and contribute to poor sleep and negative health outcomes. Older adults may be prone to developing some types of sleep disorders because of their aging bodies as well as social and environmental factors that can impact the ability to gain quality sleep.

Breathing Disorders

Approximately 25 percent of elders are affected by sleep-disordered breathing, which is a state in which a person does not breathe in a normal manner while asleep.[4] Sleep-disordered breathing leads to decreases in oxygen concentrations and elevations in carbon dioxide in the bloodstream because breathing is not regulated.

Sleep-disordered breathing is defined as the presence of more than five episodes of apnea and/or hypopnea per hour up until age 60. After age 60,
however, the definition changes to more than 10 episodes per hour of sleep.[4]

Obstructive sleep apnea (OSA) is one of the most common forms of sleep-disordered breathing; the majority of older adults who are diagnosed with a form of sleep-disordered breathing have OSA.[4] Obstructive sleep apnea occurs when the tissues at the back of the mouth and those in the throat collapse and block the airway during sleep. Under normal circumstances, a sleeping person breathes in through the mouth or nose and the air travels toward the throat on its way to the trachea and the lungs. As it reaches the back of the throat, dilator muscles keep the airway open so that air can pass through. The tissues at the back of the mouth are very soft and are prone to collapse, so the work of the dilator muscles is essential to keep the air passages open.[7] When a person has OSA, the tissues at the back of the throat collapse into themselves, which closes the airway and causes an obstruction and prevents air from passing through to the lungs. The person stops breathing because the air cannot get through, which causes apnea.

Apnea is defined as an absence of breathing for 10 seconds or more.[7] This period of apnea causes the oxygen levels in the blood to drop and the carbon dioxide levels to rise because gas exchange is not taking place in the lungs. Eventually, the sleeping person may wake up with a snort or a gasp as he or she tries to take in air and resolve the apnea. The person may or
may not remember waking up to breath and may not even know that he or she has sleep apnea at all.

At times, the airway may be only partially occluded, which does not cause complete apnea, but does lead to a reduction in airflow that is not enough to sustain the person’s oxygen needs. This is known as hypopnea. Instead of complete cessation of breathing, the person takes abnormally slow or shallow breaths. Just as what occurs with apnea, hypopnea causes oxygen desaturations in the bloodstream and increased amounts of carbon dioxide. Although it may appear that the person is still slightly breathing and is technically not in a state of apnea, hypopnea still leads to similar results, causing the patient to awaken suddenly and take in more air.

The persistent awakenings that occur during the night can lead to chronic sleep deprivation. The affected person may not be aware that there is a problem with sleep but may suffer from excessive daytime sleepiness. At other times, the patient’s bed partner may complain of hearing him or her awaken and gasp for breath, or may notice periods of apnea and become concerned. Often, OSA is associated with snoring, which can be disruptive to the sleep partner as well.

A diagnosis of OSA can be made if the patient complains of excessive daytime sleepiness and is noted to have five or more periods of apnea or hypopnea each hour. This is determined through a sleep study or other testing measures. Often, patients may awaken multiple times per hour every night, considerably disrupting their sleep habits. As a reference, a case of moderate OSA would be classified as a patient having 15 or more episodes of apnea or hypopnea each hour.[7]
There are some physical characteristics that are more commonly associated with obstructive sleep apnea and may contribute to the condition. People who have large necks may be more likely to have OSA; the extra tissue around the neck may place greater pressure on the person to breathe. A large neck would be classified as greater than 17 inches in a man and greater than 16 inches in a woman. Additionally, some people have facial characteristics that may make the incidence of OSA greater for them. A person who has either a receding or jutting jaw, someone with a large tongue, a person with a narrow upper jaw, or an individual who has enlarged tonsils or adenoids may be more likely to develop OSA.[7]

In addition to physical characteristics, there are some other risk factors that contribute to OSA development in certain people. OSA is more likely to develop in men as compared to women; however, the risk increases for women after menopause. Sleep apnea can be diagnosed at any age, but is most commonly seen in people ages 40 to 60 years. African Americans are more likely to develop OSA when compared to any other ethnic group, although the condition can and does develop among people of all ethnic backgrounds.[7]

Although age, gender, and race are unchangeable risk factors, there are also risk factors associated with sleep apnea that can be changed. Obesity is the most common risk factor, as increased weight contributes to greater amounts of pressure around the neck, leading to increased episodes of apnea and hypopnea. People who smoke greatly increase their risks of developing OSA, as do people who drink alcohol before going to bed. Obstructive sleep apnea may also be more likely to develop in people who have certain underlying medical conditions, including diabetes and
gastroesophageal reflux disease, which can be more prominent among older adults.[7]

Obstructive sleep apnea greatly impacts quality of life for the affected patient. The frequent awakenings each night contribute to excessive daytime sleepiness, which may cause a person to not only feel drowsy during the day but also to experience more frequent episodes of forgetfulness, difficulties with concentration, and lethargy. The affected person may be more likely to be irritable and could possibly fall asleep during routine events, which can make certain activities dangerous. The older adult with excessive daytime sleepiness is at higher risk for injuries and falls if he or she falls asleep while walking, driving, or even doing routine activities such as performing housework.

Additionally, obstructive sleep apnea can worsen some health problems that may already be present in the older adult or it can contribute to the development of other health problems that may further decrease quality of life for the affected patient, possibly requiring further treatment. Obstructive sleep apnea can increase the risk for or contribute to cardiovascular diseases, including hypertension, atrial fibrillation, coronary artery disease, and myocardial infarction. It also increases the risk of stroke among some patients. People with heart failure may have a cyclical relationship with OSA, as each condition seems to contribute to the other. Obstructive sleep apnea can cause damage to the heart that can worsen symptoms of heart failure in the diagnosed patient. Alternatively, symptoms of heart failure lead to breathing difficulties and increased fluid and edema. Approximately 30 percent of patients with heart failure have concurrent sleep apnea.[7]
Diagnosis of obstructive sleep apnea requires several steps that assess the patient’s health history, weight and body structure, and sleep habits. A health history is necessary to determine if there are factors that may be contributing to OSA, such as risk factors that may be present. The patient may give an account of his or her sleep habits and discuss symptoms they are having, including excessive drowsiness or fatigue. Additionally, if the patient’s partner is available, they may also give some insight into the patient’s sleep habits and any noticeable periods of apnea, snoring, or nighttime awakenings. The provider should also determine if there are other disorders present that are associated with OSA or that may be worsened because of OSA, such as cardiovascular disease, diabetes, or high blood pressure.

A physical exam is important to assess the client’s weight, which is an obvious contributor to sleep apnea. The physician may measure the size of the client’s neck if it appears that the patient may have a large neck; and, the physician may also check the inside of the patient’s mouth to assess the structures near the throat and to look for abnormalities, such as enlarged tonsils.

Reviewing the patient’s history and performing a polysomnogram, or sleep study, supports the diagnosis of obstructive sleep apnea. During a polysomnogram, the patient spends the night at a sleep lab and sleeps in a room where he or she is monitored for the night. Before going to sleep, the patient is connected to a number of sensors that monitor their breathing rate, oxygenation, and body movements. The patient will also be connected to cranial sensors that perform an EEG while they are asleep.
The sleep study is important for assessing the patient’s sleep habits and determining how many times he or she awakens during the night because of apneic episodes. The monitors can determine if the patient’s oxygen levels are dropping during sleep as well as the degree at which the patient awakens with each period of apnea or hypopnea. A sleep study is considered the “gold standard” for the diagnosis of obstructive sleep apnea and can point to problems that require treatment for the patient after he or she goes through the study. Once the sleep study is over, the sleep medicine specialist reviews the results and can make a diagnosis.

In some cases, the patient may be able to use a portable sleep monitor at home, which may also be used to diagnose OSA. The patient must first be educated about how to use the monitor and how it will read results. The patient then wears the monitor when he or she goes to bed and the monitor records breathing, oxygen saturations, airflow, and any interruptions in breathing that signify apnea and hypopnea. A portable sleep monitor may be a diagnostic option for a patient who most likely has obstructive sleep apnea based on the history and physical exam but does not have another underlying medical condition.[7]

The main form of treatment for OSA is continuous positive airway pressure (CPAP), which involves use of a machine that provides pressurized air at a continuous rate into the patient’s mouth and nose. This air pressure keeps the structures at the back of the throat open and prevents them from collapsing down and causing an obstruction that can block airflow. Often, the patient undergoes a sleep study in which he or she is diagnosed with obstructive sleep apnea and then must have a second sleep study in which a CPAP is worn while sleeping in order for the provider to determine whether the prescribed amount of pressure with use of the CPAP machine is effective
in reducing the patient’s apneic episodes. An exam called a split-night study may also be performed, in which the patient is assessed while asleep during the first half of the night without CPAP and then for the second half of the night wearing the CPAP, thereby reducing the number of times that he or she needs to return to the sleep lab.

There are other methods of managing sleep apnea that do not involve CPAP; for example, lifestyle changes and improving sleep hygiene can make a big difference for some people who have OSA. Positional therapy is one form of treatment that is non-invasive and that has been shown to be effective for some people. Positional therapy involves changing the position in which the patient sleeps if their normal position is contributing to airway obstruction. For many people, sleeping supine can contribute more to obstruction than sleeping in other positions. A patient who sleeps on their back may be more likely to have an airway obstruction if the tissues at the back of the mouth and the throat collapse due to gravity. By using positional therapy, the patient with OSA may sleep in a different position that can reduce these effects that contribute to an obstruction. The patient may breathe better by sleeping on his or her side, although this may be difficult to control while asleep. Using a pillow or a roll around the neck may help the person to remain on their side, even while asleep.

For the patient who is overweight or obese, sometimes, losing weight is the most effective method of managing sleep apnea and improving sleep. Many people with OSA who have lost weight have not needed further medication or therapy. Reduction in episodes of apnea and hypopnea that follows weight loss can significantly reduce the amount of excessive daytime sleepiness experienced by individuals with OSA.
Other measures are important as well. The patient should be encouraged to avoid alcohol in the evening, as alcohol can disrupt sleep patterns by causing the muscles at the back of the throat to relax too much, further contributing to periods of apnea. An individual who smokes should be encouraged to quit, with appropriate measures and help made available if necessary, since quitting can be extremely difficult for an older adult who may have smoked for many years.

Some medications may be helpful in reducing excessive daytime sleepiness. Medications are not typically used to treat the physical condition causing the airway obstruction, unless they are medications prescribed to treat an underlying medical condition that contributes to the sleep apnea. For example, some people with hypothyroidism may be more likely to have sleep apnea; in these cases, treatment with thyroid hormone may correct the condition and may reduce episodes of apnea.[7]

One of the most common medications used in people with OSA is modafinil, which is a type of stimulant that is often prescribed for people with excessive daytime sleepiness, including those with narcolepsy. Although it may seem helpful to take medications that induce sleep, such as certain sedatives, these drugs are actually contraindicated among people with sleep apnea. Some sedatives or narcotics have similar effects on the body as alcohol; the structures at the back of the throat can become too relaxed, leading to an increased risk of collapse and further obstruction.

**Insomnia**

The most commonly reported sleep disorder among older adults, insomnia
may be a primary sleep disorder or it may occur as a result of another condition or environmental occurrence. Because of many changes that occur as a result of aging as many as 30 percent of older adults experience chronic insomnia.[4]

Insomnia is defined as an inability to fall asleep, difficulties staying asleep, or experiencing sleep that is not refreshing and restorative.[4] It may occur as a symptom of another disorder, such as depression, or pain associated with some physical illnesses. Alternatively, insomnia may be more likely to develop among people who take medications and use alcohol. Depression is associated with insomnia, both as a causative factor and as a symptom of the condition. Older adults who are depressed may have sleep difficulties in which they try to go to sleep at night but find that they are unable to achieve adequate and restful sleep. Their sleep may be significantly disrupted due to physical conditions, such as nocturia, or through environmental stimuli that cause them to awaken from light sleep. When they get up in the morning, they may feel no more rested than when they went to bed the night before.

Chronic insomnia can also lead to feelings of depression in some older adults. The inability to maintain regular sleep and to gain adequate rest each night is frustrating and debilitating. The person with insomnia may feel misunderstood and socially isolated when others do not sympathize with their plight, instead referring to it as a normal change associated with aging. While aging does cause some sleep changes that can lead to insomnia, an adult with chronic insomnia should see a physician to rule out other conditions and to get help with sleeping, as well as depression if it has developed.
Patients who have insomnia as a result of underlying disease processes often benefit from treatment of the condition and the insomnia is resolved to some extent as well. For example, insomnia that develops as a result of major depressive disorder may successfully be managed if the patient starts taking medication to treat the depression. Patients who suffer from insomnia as a result of obstructive sleep apnea may see resolution of symptoms when they treat the sleep apnea with CPAP. At times, drugs or therapy specifically for insomnia are not necessary; treatments for concurrent disorders may resolve the insomnia instead.

Lifestyle changes may also be successful in eliminating some causes of insomnia. Maintaining a good bedtime routine and removing those substances or activities that can contribute to diminished sleep can go a long way toward improving symptoms of insomnia. Patients can be instructed to assess their own routines when preparing for bed to determine if there are
any areas that may contribute to sleeplessness, such as use of caffeine or alcohol in the evenings, or watching television before going to bed.

The sleep environment is another important component of achieving good sleep; often, people do not always consider their habits and activities and how they contribute to quality sleep. The patient should be instructed to keep the bedroom quiet and dark, using darkening shades if necessary, and to keep the temperature comfortable for sleeping. Additionally, the bed should only be used for sleeping or for sexual activity, and the patient should refrain from other activities that involve spending more time in bed, such as reading or watching television. When a person spends significant time reclining in bed doing other activities, it may be difficult to transition into sleeping while lying in the same position. It is better to perform activities such as reading in another room where the affected person is not later expected to sleep.

For some people, lifestyle changes and non-pharmacologic interventions are successful in minimizing insomnia; however, there are often enough other contributing factors such that insomnia is not so easily resolved. In many cases, further diagnostic measures, such as a sleep study or multiple sleep latency test, may be necessary to determine the amount and quality of sleep that a person is getting. Many people need pharmacologic intervention to manage insomnia as well.

Pharmacologic methods in the treatment of insomnia may include both prescription and over-the-counter preparations. Melatonin is one type of supplement that may be beneficial in treating insomnia. It is available without a prescription, it can successfully induce sleep when used appropriately, and it leaves few side effects, such as grogginess, that may
occur with other sleep aids. Alternatively, melatonin does not increase time spent in REM sleep and it is not well regulated when sold without a prescription. Doses of melatonin may vary between providers and the people who buy it over the counter to use as a supplement. Without a standard dose to take, consumers must rely on a method of trial and error to determine the appropriate amount needed to induce sleep.

Melatonin is a hormone that is normally produced by the body from the pineal gland. When the supra-chiasmatic nucleus recognizes the impending need for sleep from outside factors, the body increases its production of melatonin. The supplements that are available are synthetic forms of the hormone that can be used to induce its same effects. A medication called ramelteon (Rozerem®) works as a melatonin agonist and can make the work of melatonin more effective in the body. Ramelteon has been shown to induce sleep within 30 minutes for people who experience insomnia; however, it is not as effective at maintaining sleep, and affected people may still continue to awaken frequently despite taking this medication.[4]

Prescription drugs used in the treatment of insomnia must be given carefully, with proper education of the client about side effects and safety issues. Many prescription drugs given in the treatment of insomnia cause sedative effects, which can induce sleep but can also lead to grogginess and lethargy when awakening. Additionally, many drugs for insomnia have high levels of abuse within some populations and some people may develop dependence. These drugs can also be dangerous particularly within the elderly population as their sedative effects could increase the risk of injury. For example, a client who takes a prescription medication to treat insomnia may experience dizziness or somnolence if he or she awakens during the night to use the bathroom. The patient could be at increased risk of falling or
otherwise becoming injured if they are experiencing the side effects of these drugs.

Some examples of prescription medications that may be used to treat insomnia include benzodiazepines, such as triazolam (Halcion®) and flurazepam (Dalmane®). Additionally, some drugs that are known as benzodiazepine-like medications have fewer side effects and are less likely to lead to substance abuse and addiction. Examples of these drugs include eszopiclone (Lunesta®) and zolpidem (Ambien®).[4]

**Circadian Rhythm Disorders**

Sleep and wakefulness are regulated by the circadian rhythm: the body’s internal, 24-hour clock that determines when to be awake and when to go to sleep. The circadian rhythm, modified by an area in the brain called the suprachiasmatic nucleus (SCN), is located in the anterior hypothalamus. The SCN responds to changes in the environment that indicate time to go to sleep or wake up. These environmental factors are known as *zeitgebers* and they are cues from outside the body that clue a person to the appropriate time.[1]

As the external environment changes and the outside light turns dimmer, the SCN senses the change as the light impacts the retina of eye. As the body senses the change, it begins to prepare for sleep, such as by secreting hormones, including the hormone melatonin, which causes a person to feel sleepy. As a person ages, his or her circadian rhythm is not as well synchronized and the sleep/wake cycle can be altered. The body does not respond to external cues as it once did, so normal zeitgebers that would stimulate a move toward sleepiness are less likely to affect the older individual.[1] Consequently, circadian rhythm disorders may develop.
One of the most common circadian rhythm disorders that can develop among older adults is advanced sleep phase disorder (ASPD). This disorder occurs as a disruption in the sleep cycle, such that the affected person’s onset of sleep as well as awakening is advanced by several hours. The individual with ASPD feels sleepy at an earlier point in the evening and may fall asleep between 6 pm and 8 pm. Additionally, because of going to sleep so early, the person is more inclined to wake up early, and may awaken between 2 am and 5 am.

Advanced sleep phase disorder is not associated with aging; however, it is more common among older adults.[2] Because changes in sleep patterns can and do occur with aging, it may be necessary to distinguish ASPD from a change in sleep habits that cause an older adult to start going to bed earlier and getting up earlier. Some people naturally begin to feel sleepy earlier in the evening as they age, or they may have less energy and stamina compared with when they were younger. They then may go to sleep earlier and their bodies adjust to the time difference, causing them to awaken earlier.

This natural change in sleep habits that may occur with aging is not the same process as ASPD, which occurs because of a disruption in the homeostatic regulation of sleep.[2] Many people with ASPD do not enjoy going to bed at early hours and awakening during times when everyone else is still asleep. A person with ASPD may try to manage the situation and control his or her sleep habits, which could result in continuing to fall asleep early at inopportune times. For example, a person may be frustrated with feeling tired at 7 pm when it seems too early to go to bed, so he or she attempts to stay away from the bedroom by sitting up and watching...
television in the evening. The person may then fall asleep in front of the
television 30 minutes later. If the person wakes up later in the evening and
tries to go to bed, he or she may then have difficulty falling back asleep,
resulting in interrupted sleep patterns and insomnia.

Alternatively, the older adult may attempt to force themself to stay awake
and manage to fall asleep at a later time than their routine, but may still
wake up early at the time when their body’s clock has become accustomed
to waking. This ultimately results in decreased amounts of sleep; the
affected person may feel very tired but they may be unable to control their
internal clock that regulates when they wake up.

Advanced sleep phase disorder may be treated through several methods
that involve lifestyle changes and factors that can slowly alter the normal
times that the person falls asleep and wakes up. Chronotherapy is a
common form of treatment for ASPD that does not require the use of
medications or supplies. It involves slightly shifting the time that the person
goes to sleep and slowly setting back the normal sleep time until they have
reached a point where they are going to sleep and waking up at reasonable
times. For instance, a person with ASPD who normally becomes sleepy at 7
pm may use chronotherapy to make them stay up until 7:15 pm before
retiring. As a result the person may sleep 15 minutes or so later in the
morning as well. After several nights of successfully changing their sleeping
times, the affected person may then shift the time again and try to stay up
until 7:30 pm. This continued shift over weeks or months slowly changes the
sleep rhythm until the person is going to bed at a time that he or she feels is
comfortable.
The American Academy of Sleep Medicine recommends diagnosis of ASPD with a sleep diary and use of actigraphy for the affected patient. A sleep diary requires that the patient record their sleep habits every night, including the time of going to bed, the number of times awakening during the night, the time of waking up in the morning; and, any external environmental factors that may have affected sleep, such as room temperature, outside noise, or waking up from family members. The patient records his or her sleep habits in a journal for several weeks so that the diagnosing clinician can get a better idea of the patient’s sleep patterns over time.

Actigraphy involves wearing a sensor that is roughly the size of a wristwatch on the wrist for a period of approximately 2 weeks. The sensor determines the times that the patient is awake and when they are asleep based on levels of activity. The actigraph records the information and puts it into a graph so that the diagnosing clinician can read the results at a later time. When combined with a sleep journal, the clinician can compare the patient’s sleep descriptions with what occurred through the actigraphy results. Combining these two measures together can pinpoint a diagnosis of ASPD.

Another type of commonly used treatment for ASPD is bright light therapy. Exposure to bright light for a period of time every day may alter the circadian rhythm by changing how the body responds to the light as a zeitgeber. Many older adults have fewer periods of exposure to bright lights, which may play an additional factor in an older adult with ASPD. The bright light causes the body to recognize that it is not time to sleep yet and it responds by reducing the amount of sleep hormone it produces.
Bright light therapy is done by exposing the patient to a bright light for a period of time in the evening, around the time that the patient would normally go to sleep. For instance, if a patient is accustomed to falling asleep at 7:30 pm, they may use bright light therapy from 6:30 to 7 pm. Use of the bright light may help the patient to stay awake longer and fall asleep later than if he or she had not used the light.[2] As with chronotherapy, falling asleep later with bright light therapy may then cause the patient to correspondingly sleep later in the morning and not rise so early.

Another type of circadian rhythm disorder that may be less common in older adults is delayed sleep phase disorder (DSPD). This disorder more commonly is associated with adolescents but may occur in adults as well. In essence, DSPD occurs in the opposite manner as advanced sleep phase disorder in that the affected person is unable to go to sleep until very late and consequently rises at a much later time in the morning or early afternoon.

People with DSPD may have difficulties falling asleep before very late at night or sometimes early in the morning. They may eventually fall asleep between 1 and 4 am, despite going to bed at a normal hour. Alternatively, they may sleep late to compensate for their late sleep onset and not wake up until afternoon. Those affected by DSPD often have difficulty with maintaining a sleep schedule required for certain activities, such as employment and family functions, which typically require an earlier awakening time. If a person with DSPD consistently falls asleep after 2 am every morning but then must still get up to care for a spouse or attend an appointment, he or she may become exhausted and sleep deprived. Unless a person with DSPD is able to maintain a schedule of sleeping during hours
that are shifted from those of most of the rest of society, sleep deprivation often occurs.

Like those diagnosed with ASPD, people with DSPD may struggle with their schedules and be quite unhappy with their inability to sleep before late at night. They often sleep at times that differ from other people, including those with whom they live. While everyone in the house is still asleep, the person with DSPD may be awake and unhappy and not able to fall asleep until much later.

DSPD is not nearly as common in older adults as advanced sleep phase disorder, but it can develop in some. It is not the same as insomnia, as once a person is able to fall asleep, he or she often sleeps relatively well and does not awaken still feeling tired; unless, of course, there is a reason to get up early and miss out on several hours of sleep. Older adults with DSPD can take some of the same measures as those with ASPD to alter their sleep cycles and straighten out their circadian rhythms to adjust to an acceptable sleep schedule.

Avoiding the use of bright light in the evening, including that from the computer or television can help a person to become sleepy earlier. Alternatively, the use of bright light therapy in the morning after waking up has been shown to be helpful in supporting wakefulness when it is time to get up and may help the person to fall asleep earlier the next night.[2] Chronotherapy, like that used for ASPD, can be used in reverse for the patient with DSPD. Instead of trying to stay up later each night in short intervals to slowly shift the time it takes to go to sleep, the person with DSPD may try to fall asleep a few minutes earlier each night until he or she can successfully shift their sleeping time to a time that is more acceptable.
Despite the fact that DSPD is more rare in older adults, it does occur for some people, causing disruptions in regular sleep habits. Fortunately, for those who have circadian rhythm disorders, there are several options available for the management of these conditions that can change the times of going to bed at night and getting up in the morning, making sleep much more restful and refreshing.

**Limb Disorders**

For some, sleep may be elusive because of limb disorders; conditions in which the legs and arms either move involuntarily or the affected person must continuously move his or her limbs in order to maintain comfort. Limb disorders can significantly disrupt sleep habits and cause chronic sleep deprivation, as episodes may occur on a nightly basis or even multiple times every night for some.

*Periodic Limb Movement Disorder*

Periodic limb movement disorder (PLMD), formerly called nocturnal myoclonus, is a type of sleep disorder that can be disruptive to sleep because it causes frequent awakenings during the night. PLMD occurs when a sleeping person has occasional movements of the extremities; it most often occurs in the legs, but in some situations the arms are affected as well. The condition results in frequent movements of the legs and feet, which include extension of the great toe and flexion and extension of the foot, ankle, or hip.[24] Many times, the affected person awakens briefly from limb movements but he or she is not entirely aware. This results in frequent awakenings and fragmented sleep, leading to chronic sleep deprivation. Most cases of PLMD occur after the age of 40 years and may be much more common in older adults.[24] The condition affects approximately 30 percent
of people over age 65.[25] The affected person may suffer from many episodes of limb movements every night or periodic movements may occur once in a while. The movements tend to occur in clusters and are repeated every 20 to 40 seconds. They most frequently occur during NREM sleep.

The exact cause of PLMD is still unknown, although it is thought that the condition may occur as a result of low levels of the neurotransmitter dopamine in the brain. While many consider PLMD to be the same as restless legs syndrome and although the two conditions are related, they are not the same. Restless legs syndrome may cause different symptoms that can also occur during the daytime, while PLMD only occurs during sleep.[24]

Periodic limb movement disorder may be associated with other conditions, in which it would be considered a secondary form. For example, some people with diabetes may be more likely to develop PLMD as associated with diabetic neuropathy. Other conditions that may cause secondary PLMD include sleep apnea, narcolepsy, and anemia.[24]

Because PLMD can cause chronic sleep deprivation, the affected person may suffer from excessive daytime sleepiness, fatigue, and memory loss. The patient’s bed partner may also suffer from sleep disruption if he or she awakens frequently from the movements. When PLMD occurs as a result of another underlying disorder, other symptoms may develop in addition to chronic fatigue and exhaustion from sleep deprivation. For example, a person with uncontrolled diabetes mellitus who has PLMD will also suffer from other symptoms of diabetes related to uncontrolled blood sugar and may be more likely to have frequent episodes of nocturia, which could be another cause for awakening during the night. The coinciding disorders contribute toward each other and further cause sleep problems and distress.
Diagnosis of PLMD may come through taking the patient’s history, performing a physical exam, and determining disruptions in sleep patterns through testing such as polysomnography. The patient may complain of excessive drowsiness and may have lack of energy but be otherwise unable to pinpoint why he or she is so tired. A history and physical exam can rule out other causes of sleep disruption and some laboratory testing may be necessary. Some types of lab studies include thyroid function levels, iron, and magnesium, as alterations in these results could contribute to the involuntary movements. Ultimately, a polysomnogram is often necessary to determine whether other disorders are present, including obstructive sleep apnea; a polysomnogram is also necessary to monitor the amount of limb movements that occur during a period of sleep.[24]

Periodic leg movement disorder can be managed by treating associated diseases and sleep disorders when it is a secondary disorder. Alternatively, if PLMD is not associated with another medical condition, it may be managed through medications and lifestyle modifications. Medications may consist of anticonvulsants, dopaminergics, benzodiazepines, and skeletal muscle relaxants. Anticonvulsants may control some muscle spasms associated with PLMD and have been shown to successfully reduce symptoms. A type of anticonvulsant that might be prescribed is gabapentin (Neurontin®).[24] Dopaminergic agents are also useful in managing PLMD, although the exact mechanism of action is not clearly known. If the affected person is experiencing symptoms related to decreased levels of dopamine, then these drugs may be successful. There are a number of dopaminergic agents that may be used; some of the more common preparations include ropinirole (Requip®), carbidopa (Sinemet®), and pramipexole (Mirapex®).[24]
Because there is no cure for PLMD, management of the condition focuses on medications as needed to treat symptoms and making lifestyle changes that can inhibit worsening of symptoms. The patient should be instructed to avoid some types of food or drink in the evenings before going to bed, such as products containing caffeine. Because caffeine has been shown to worsen symptoms of PLMD, the patient should be counseled to avoid caffeine-containing products such as coffee, tea, or chocolate in the evening hours.[25]

Additionally, some types of medications may be more likely to lead to symptoms of PLMD and can actually worsen the condition. Medications such as some antidepressants, antihistamines, and antipsychotics have all been shown to impact PLMD symptoms to some extent.[25] For a patient with PLMD who uses these types of medications, further discussion with the prescribing provider is warranted to determine if alternatives exist or whether the medication could be discontinued.

Restless Legs Syndrome
Also referred to as Willis-Ekbom disease, restless legs syndrome (RLS) is a neurological condition that causes discomfort and sleep disruption for affected patients. RLS is more likely to develop with advancing age and the condition is thought to affect at least 10 percent of the population who are over 50 years.[26] RLS symptoms may cause minor discomfort or occasional sleep disruption; alternatively, the condition can lead to significant episodes that interrupt sleep and cause insomnia for the person who is unable to fall asleep because of symptoms.

Restless legs syndrome is classified as a type of hyperkinesia, which is a movement disorder that results in excessive movements; it is in the same
class of disorders as conditions such as tremors and myoclonus. RLS is characterized by sensations in the limbs—typically in the lower extremities—that feel similar to crawling, buzzing, crackling, or itching under the skin. There is an irresistible urge to move the legs in response, which results in relief of symptoms. Many patients find relief from RLS symptoms by getting up and walking or moving continuously, which leads to sleep deprivation. In contrast to PLMD, which occurs while the patient is asleep, RLS symptoms begin in the evening and extend into the night while the patient is still awake. It is only through walking and moving that relief of symptoms occurs; and, although the patient may desperately want to go to sleep, he or she usually needs to prevent the discomfort instead.

Diagnosis of RLS includes a patient history in which the person describes their symptoms and how long they have been occurring. Unlike PLMD, the patient is aware of the need to move the legs and should be able to give an explanation of how often the symptoms are occurring. The physician should check other factors that also contribute to RLS symptoms, including the patient’s intake of alcohol and products containing caffeine, as these items can make some symptoms worse. Low serum ferritin levels have been associated with RLS, even if the patient does not otherwise have low hemoglobin. Laboratory studies to check ferritin levels should be conducted and if the patient has RLS and has iron-deficiency anemia then iron replacement is necessary.

Like PLMD, symptoms of restless legs syndrome may be worsened with the use of certain types of antidepressants or antipsychotic medications. If the patient’s history clarifies the use of these drugs, a trial of a different type of medication may be necessary. The physician may also want to check
laboratory levels of serum folate, magnesium, glucose, and thyroid hormone, as alterations in these levels may increase symptoms of RLS.[27]

There are currently two kinds of medications that have been approved by the U.S. Food and Drug Administration specifically for the treatment of symptoms associated with RLS. Ropinirole (Requip®) was approved in 2005 and pramipexole (Mirapex®) was approved in 2006. Both drugs were originally developed for the treatment of Parkinson’s disease symptoms; however, researchers found benefits of using them for similar symptoms with RLS.[26]

Some non-pharmacologic interventions can be very helpful in many patients with RLS and when combined with medication, are very effective in managing symptoms. The client should be advised to avoid products that contain caffeine, alcohol, and vigorous exercise in the evening; symptoms may be worsened when these activities occur within 1 to 2 hours before bedtime. Sleep deprivation seems to worsen symptoms of RLS, which causes a cyclical relationship between the two conditions; the patient has RLS symptoms that are causing sleep deprivation and the drowsiness and fatigue that occurs from sleep deprivation worsens the symptoms of RLS.[27] When possible, the patient should take steps to get adequate sleep, including taking naps or allowing themself to sleep late when needed.

Some other non-pharmacologic therapies have been shown to be helpful in relieving symptoms of RLS, including regular massage, acupuncture, and biofeedback.[27] If the patient is willing to undergo a trial-and-error period of finding what therapy or treatment works, he or she can find a solution to the sleep disruption that occurs from this potentially debilitating condition.
Hypersomnias

Hypersomnia is a term used to describe a condition in which a person feels excessively sleepy. The person with hypersomnia may have increased daytime sleepiness, and consistent feelings of drowsiness at variable points throughout the day and evening that is not otherwise associated with insomnia, use of certain medications, or a psychiatric disorder.[3]

Hypersomnia conditions are typically classified as primary hypersomnia and narcolepsy.

Primary Hypersomnia

Most people think of narcolepsy as a state of increased sleepiness, which is partly correct. Although narcolepsy is classified as a type of hypersomnia, another condition, primary hypersomnia, also consists of the sleepiness that accompanies narcolepsy but without some of the other associated symptoms.

Clinically, primary hypersomnia is classified into three different subgroups:[3]

- Group 1, which involves symptoms of headaches, peripheral vasoconstriction, syncope, and orthostatic hypotension, and is most likely connected to a family history.
- Group 2 consists of people who develop hypersomnia after recovering from a viral infection that impacted neurological symptoms. Some examples of these diseases include infectious mononucleosis and Guillain-Barre syndrome. Although these patients are no longer suffering from the infection, they still manifest the fatigue and drowsiness that was part of the acute infection.
• Group 3, also known as idiopathic hypersomnia, is unrelated to a viral infection or family history. There is no known cause why people in group 3 develop primary hypersomnia.

Primary hypersomnia is characterized by excessive daytime sleepiness, extensive sleep at night, and the need for frequent naps during the day. At diagnosis, symptoms have been occurring for more than one month and typically have significantly impacted social, functional, and occupational areas of life. The person may take naps during the day but wake up without feeling refreshed or freed from symptoms of sleepiness; sleep at night is for prolonged periods and the person may sleep for 12 hours or more at a time. A patient may also have confusional arousals, in which he or she awakens but behaves in a confused, disoriented, or aggressive manner at times; the condition is also referred to as sleep drunkenness. People with primary hypersomnia may be difficult to awaken from sleep at night or from naps during the day.[3]

There are no physical features that appear on an exam of a patient who presents with symptoms of primary hypersomnia. The physician typically cannot order laboratory work or other testing that will show alterations in substances in the body that contribute to the sleepiness. If there is another underlying disorder, whether a sleep disorder or another medical condition, testing may rule it out as the cause of the hypersomnia. Some of the more common disorders that may be causing symptoms of hypersomnia include rheumatoid arthritis; degenerative neurological conditions, such as Parkinson’s disease; hypothyroidism, chronic obstructive pulmonary disease, and encephalitis.[3] Otherwise, hypersomnia without the presence of an underlying condition will typically not display alterations in blood chemistry or other lab work.
Most diagnostic processes of primary hypersomnia are related to the patient’s report of symptoms and sleep problems. After a history and physical exam, the physician may offer a data-collection scale that the patient completes that serves to identify problem areas of sleeping, such as the Epworth Sleepiness Scale. However, these types of rating scales remain subjective to the patient’s reporting of symptoms.\[3\]

If the patient is at risk of other sleep disorders that may be contributing to the excessive sleepiness, a polysomnogram may be warranted. This test could rule out the presence of obstructive sleep apnea, which is commonly associated with hypersomnia. Restless legs syndrome and narcolepsy have been implicated with the condition as well.

The multiple sleep latency test (MSLT) can be used to confirm hypersomnia; this test is often used in the diagnosis of narcolepsy but can be diagnostic in primary hypersomnia as well. The MSLT is performed the day after a patient has a polysomnogram during the night. With the MSLT, the patient is connected to various sensors that record chin and eye movements as well as brain waves while the patient is asleep. The patient is then placed in a darkened room where he or she is asked to take a nap; this process is repeated several times throughout the day.

When the patient goes to sleep for a nap, the MSLT records the stages of sleep that he or she goes through, including determining how quickly the patient enters the stage of REM sleep. This is important because it has been noted that people with narcolepsy enter a stage of REM sleep very quickly after falling asleep. For those with primary hypersomnia, entering into REM sleep does not occur any more quickly than average. Thus, the clinician can rule out narcolepsy for the person with excessive daytime sleepiness during
this test.[3] Additionally, the MSLT determines how long it takes a person to fall asleep, a process known as sleep latency. Someone with primary hypersomnia typically has short sleep latency and can fall asleep in less than 8 to 10 minutes, which is considered abnormal.

Treatment of primary hypersomnia is somewhat limited, although the patient may be helped with some types of medication and by making lifestyle changes. Unfortunately, most lifestyle changes, such as improving sleep hygiene, are ineffective for patients with primary hypersomnia who continue to remain tired throughout the day. Those who have severe daytime sleepiness should get regular naps throughout the day in addition to allowing time for adequate sleep at night. Additionally, the person who is very sleepy should refrain from certain activities that could result in injury or harm if he or she were to fall asleep; this may include limiting driving, cooking, or caring for others.

Medications used to manage hypersomnia typically include those with stimulant effects. Some of the most commonly prescribed are sodium oxybate, amphetamines, and methylphenidate. Modafinil (Provigil®) is a medication that is also used in the treatment of narcolepsy and has also been approved for the management of hypersomnia as well. Modafinil is classified as a psychostimulant that supports wakefulness and feelings of alertness in people who take it by impacting the hypothalamus of the brain. It may also work in the central nervous system to inhibit the reuptake of the neurotransmitter noradrenaline, which affects a person’s level of responsiveness.[3]

Unfortunately, there is no cure for primary hypersomnia, and people who are diagnosed typically are life-long sufferers. Patients who are diagnosed with
primary hypersomnia should have extensive education, both for themselves and involved family members, to better understand the effects of the disease and the toll it can take on daily functional activities and social relationships. People who develop primary hypersomnia are more likely to become depressed because of the effects of the disorder. Additionally, the hypersomnia can cause a strain on relationships, particularly within marriages, when misunderstandings arise related to excessive needs for sleep.

People diagnosed with primary hypersomnia should make their condition known to friends, family members, and others who would be affected by the person’s increased need for sleep and excessive sleepiness. Social functions, jobs, volunteer work, and other circumstances may need to be put on hold or at least temporarily shortened at times in order to catch up on sleep. Often, scheduling sleep at regular times helps the affected individual to return to their duties and complete tasks.

*Narcolepsy*

Although narcolepsy is most commonly diagnosed between the ages of 15 and 30 years, the condition may be diagnosed at any age and initial diagnosis of narcolepsy has occurred in some patients who have been more than 70 years old.[5] Narcolepsy is a disorder that causes hypersomnia and excessive daytime sleepiness in affected people. It may involve other symptoms that can lead to inappropriate amounts of sleepiness that can lead to decreased quality of life and even dangerous situations. While narcolepsy itself is not life threatening, it could lead to such levels of sleepiness that the affected person becomes injured or injures others. There is no cure for narcolepsy, only management of the condition.
Narcolepsy affects roughly one out of every 2,000 people.[6] The condition is characterized by a voracious need for sleep that leads to excessive daytime sleepiness and the need for frequent naps during the day. Most people awaken after daytime naps feeling refreshed, but they then feel the need to sleep again within 3 to 4 hours. The excessive sleepiness may lead to short bursts of sleep called microsleep, in which the affected patient falls asleep for very brief periods at inappropriate times. The microsleep may happen when the patient is performing other activities and they may or may not be aware that they have fallen asleep. The patient may continue to perform the activity automatically, even though he or she is in a light stage of sleep. If the patient has a period of microsleep during times that require attention, such as while driving, the situation could be dangerous or harmful.

People with narcolepsy also often experience periods of cataplexy, in which they exhibit muscle weakness that can be minor and only affect certain parts of the body; or major, in which the entire body is affected and they are unable to physically support themselves. Certain triggers, such as increased stress, medication use, or overeating, most commonly bring on cataplectic attacks. The most common cause of cataplexy is an increased emotional response to a situation, such as anger or laughter.[6]

Other symptoms of narcolepsy include episodes of sleep paralysis, in which the affected person experiences lack of muscle tone or a complete inability to move the muscles either just while falling asleep or during the time period of just waking up. The affected patient may also complain of hallucinations that occur just before falling asleep or just after awakening. The hallucinations are classified as hypnagogic hallucinations when they occur just as the patient transitions to sleep; if the patient has them upon awakening, they are called hypnopompic hallucinations. During either type
of hallucination, the patient may experience sensations, see visions, or hear sounds that are not really there.[6]

Narcolepsy has an inherited component and tends to run in families. A person with a close relative who has narcolepsy may be up to 40 times more likely to develop the condition himself. Narcolepsy that involves cataplexy is thought to be due to a deficiency in the neurotransmitter hypocretin, which is involved in regulating sleep and wakefulness.[6] The decreased levels of hypocretin may be caused by an autoimmune process. People with narcolepsy have been shown to have sleep patterns that are disrupted. Instead of progressing through the stages of NREM sleep, after initially falling asleep and then entering REM sleep almost 90 minutes later, a person with narcolepsy may be more likely to enter REM sleep at a much earlier time after going to sleep.

Diagnosing narcolepsy may take years for some patients who struggle with its symptoms, as it can be misunderstood or misdiagnosed for other conditions, including depression. A diagnosis of depression occurs more among patients who have narcolepsy, and some studies have shown that up to 57 percent of people with narcolepsy have concurrent depression.[6] Narcolepsy may be associated with other types of disorders, particularly those that affect older adults, such as Parkinson’s disease. In these cases, the condition is referred to as secondary narcolepsy.[5] People who suffer from narcolepsy may feel excessively sleepy, depressed, or physically weak, but they may not be able to attribute their symptoms to a specific cause or pinpoint the exact time that symptoms have developed. Further, narcolepsy is also associated with increased issues with memory and concentration, although these symptoms may be the result of chronic sleep deprivation.
The many facets of narcolepsy may make pinpointing a diagnosis difficult, and in some situations, people have waited over 10 years for a diagnosis.[6]

Diagnosis of narcolepsy is often based initially on patient reports of sleepiness. There are several questionnaires and scales that may be used for a patient to rate their levels of sleepiness, such as the Epworth Sleepiness Scale. The patient is given a list of situations in which they are asked to rate the probability of dozing off during certain activities.[6] The questionnaire is then scored by a physician or sleep medicine specialist who can determine if there appears to be sleep-related problems that need further testing.

Narcolepsy may be diagnosed through different types of sleep studies that monitor the patient while asleep and follow their sleep patterns and brain activity through an EEG. The patient undergoes an overnight polysomnogram, and may follow this test with a multiple sleep latency test, such as described with diagnosing idiopathic hypersomnia. A patient with an average sleep onset as found during the multiple sleep latency test can be diagnosed as having narcolepsy. However, as a client ages, he or she may have lengthening periods of sleep latency, in which it takes longer to fall asleep, regardless of the presence of narcolepsy. Therefore, the MSLT that measures sleep latency alone is not as effective in elderly clients.[5]

The MSLT may be beneficial for diagnosing narcolepsy among some clients, because the clinician can monitor how long it takes for the patient to enter the REM stage of sleep after falling asleep on multiple accounts throughout the day. If the patient repeatedly has episodes of quickly entering the REM stage of sleep after falling asleep, a narcolepsy diagnosis should be considered along with the patient’s reports of excessive sleepiness or periods of cataplexy. After a diagnosis of narcolepsy has been made, the patient can
make some lifestyle changes that can improve his or her quality of life; additionally, there are medications available that may help the affected patient to stay awake longer and have decreased amounts of excessive daytime sleepiness.

Lifestyle interventions are designed to minimize excessive sleepiness. Some changes that can be made include avoiding heavy meals, as eating large amounts of food at one time can make a person feel more sleepy and it may also contribute to episodes of cataplexy. The patient should also avoid alcohol, particularly before bedtime, as alcohol use may initially make a person feel sleepier from its depressant effects but may later have an opposite effect and can disrupt sleep. People who have a diagnosis of mild narcolepsy may benefit from scheduling naps and improving sleep hygiene, which involves going to bed and getting up at the same time every night and every morning; as well as performing activities in the evening that contribute to good sleep, such as quiet and relaxing hobbies and making the bedroom a comfortable and appropriate place to sleep.[6]

Medications used for narcolepsy are designed to reduce excessive daytime sleepiness and to help the client stay awake more often during the day. Most medications used for narcolepsy are stimulants; the most common types include modafinil (Provigil®) and armodafinil (Nuvigil®). Sodium oxybate (Xyrem®) is prescribed not only for excessive daytime sleepiness, but also to prevent some episodes of cataplexy.[6] Sodium oxybate, while commonly used as a prescription drug for treatment of narcolepsy, may cause unsafe side effects in older adults. Its use is more frequently associated with confusion in the elderly; sodium oxybate also may increase sodium levels in the body, which could be dangerous for the older adult who has heart disease, hypertension, or kidney disease.[5]
Other medications may also be helpful for treatment of narcolepsy and cataplexy, including antidepressants such as tricyclic antidepressants; selective serotonin reuptake inhibitors, such as fluoxetine (Prozac®) and paroxetine (Paxil®); selective serotonin norepinephrine reuptake inhibitors, such as venlafaxine (Effexor®); and monoamine oxidase inhibitors, including selegiline (Eldepryl®). These drugs are approved for the treatment of depression but their off-label use also helps excessive daytime sleepiness and can reduce the amount of cataplectic attacks in affected people. Antidepressants may also be helpful for people who suffer from narcolepsy and depression or who have sleep disorders associated with depression.[6]

**Nighttime Sleep Behaviors**

Nighttime sleep behaviors are types of sleep disorders that involve distinct behaviors while a person is asleep; they are often referred to as parasomnias. The movements and activities that a person performs during an episode of a parasomnia are unlike his or her normal behaviors and may appear different or even bizarre when compared to routine behavior. Parasomnias are commonly associated with childhood sleep disorders but they can occur among adults, including the older adult population over the age 65.

**Sleepwalking**

Sonambulism is the technical term used to describe sleepwalking, the condition in which a person gets up from bed and walks or performs other activities while still asleep. Sleepwalking may not involve walking at all; in some situations, a person may sit up in bed, talk, or move around. Alternatively, some people who sleepwalk do get up out of bed and may walk around the room or the house. Typically, most people who sleepwalk do
not perform extraordinary activities, such as driving or cooking; although these events do happen on occasion. Sleepwalking is more common in children but it also occurs in up to 4 percent of adults.[28]

One uncommon form of sleepwalking that may be seen in some adults is sleep-related eating disorder. This occurs when a person is still asleep but he or she gets up out of bed and eats or drinks. The person may eat large amounts of food and the practice is associated with binge eating. At times, the person may eat foods that he or she would not normally eat and may eat items that are not normally edible. Sleep-related eating disorder may lead to weight gain and obesity, as it typically occurs frequently in affected people and episodes may occur more than once a night. The practice is more common among people who have a history of eating disorders, and it occurs more frequently in women than in men.[28, 29]

Most instances of sleepwalking are harmless and may cause more concern for a bedroom partner or caregiver of the affected person. It may be disturbing to see a person arise from bed and walk around the room while still asleep. Contrary to popular belief, people who sleepwalk do not walk with their arms extended in front of them, although they may stumble or have coordination problems. The individual is often difficult to arouse, as sleepwalking typically occurs during the deepest stage of sleep: slow-wave sleep.[29] Getting up in the night while asleep places sleepwalkers at increased risk of injuries if they walk into furniture or otherwise are harmed by objects in the room. Sleepwalking may occur very sporadically and may cause almost no sleep disruption at all; alternatively, some people sleepwalk more frequently, which may or may not affect their sleep habits. The person who sleepwalks typically has no memory of the event.
There is little treatment for sleepwalking, as the condition is generally benign. If an affected patient is a regular sleepwalker, it is helpful to clear the room of clutter and avoid leaving items on the stairs that could contribute to falls or injuries. It may also be helpful to lock outside doors and windows in order to avoid going outside while asleep. Some caregivers may feel added protection by placing an alarm on the patient’s bed or door to notify them if the person is sleepwalking. In general, it is not necessary to awaken a sleepwalker, although doing so is usually harmless. In some cases, it may cause agitation or aggression in the sleeping person and so should be avoided. Instead, the caregiver should gently try to redirect the sleepwalking person back to his or her bed.

Sleepwalking is most commonly associated with illness among adults. In cases where fever is present or a person is extremely tired, he or she may be more likely to have a sleepwalking episode. Among adults, it is important to rule out underlying conditions that may be contributing to the sleepwalking episodes, or to consider if there are medications that are causing the parasomnia. A thorough exam and patient history is necessary to determine if there are factors present that point to increased parasomnia activity.

**Bruxism**

Bruxism is a type of parasomnia in which a person grinds or clenches their teeth while asleep. It occurs in approximately 20 percent of adults. People with chronic bruxism may have abnormal wear on their teeth or damage to the periodontal tissues. Some people wake up with pain in the mouth or jaw but do not understand why if they are unaware of their activity in their sleep. Often, bed partners are more aware of bruxism within patients than the patients themselves.
Bruxism is more likely to occur with increased stress. It may be an abnormal response to elevated stress levels in a person’s life. It may also be associated with other factors, such as increased fatigue, snoring, obstructive sleep apnea, smoking, alcohol consumption, and anxiety. Overall, people who experience bruxism do not typically have underlying medical or psychological disorders.[31] If the patient with bruxism is developing tooth or jaw damage because of the activity, it may be beneficial to refer him or her to a dentist.

Bruxism is typically not treated with medications, and while there are therapies such as mouth guards and dental appliances that a patient can wear to prevent them from grinding their teeth during sleep, it is important to determine the underlying cause and manage it to avoid the activity from continuing. Studies have shown that although bruxism can be temporarily stopped with the use of mouth guards, it often resumes when the appliance is removed. If the cause of the bruxism is not addressed, such as by managing elevated stress levels, the patient will most likely continue to practice it.[28]

**REM Behavior Disorder**

A type of parasomnia that occurs during the REM stage of sleep, REM behavior disorder involves increased levels of activity during the REM sleep stage. Under normal circumstances, a person experiences muscle atonia during the REM stage; because this is the stage of sleep during which most dreams occur, muscle atonia “freezes” the person to avoid the potential for acting out dreams. A person with REM behavior disorder may have less muscle atonia and may be able to physically act out while dreaming. The condition is characterized by increased activity while the patient is asleep.
The patient may get up out of bed, yell, scream, cry, punch the air, or run around the room.[28]

Prevalence of REM behavior disorder increases with age. The condition is seen in approximately 2 percent of adults but is most common in older males. REM behavior disorder is also associated with some other conditions that can impact older adults, including Parkinson’s disease and dementia.[28] Most episodes of REM behavior disorder occur either early in the night or in the late morning, closer to the time that the person will get up for the day. The first episode of the night may occur after approximately 90 minutes of sleep, or just about the time that the person is entering the REM stage. Some people have episodes of the disorder once in a while, but in other cases, there may be more than one episode per night.[28] Unlike sleepwalking or some other types of parasomnias, the person with REM behavior disorder typically stops the activity when he or she wakes up. Because the person has been in the REM stage of sleep, they are more likely to remember what they were dreaming about.

REM behavior disorder is often diagnosed after a sleep study, which can manifest the magnitude of the behaviors. A patient history and physical exam is important to rule out other conditions as well. This is particularly important in situations in which an older adult with no prior history of sleep disorders suddenly starts exhibiting parasomnias and odd behaviors while asleep. It is important to determine if other changes are developing, such as dementia, which may contribute to the behaviors seen with this condition.

REM behavior disorder may also more likely occur after withdrawal from use of certain medications, such as benzodiazepines and some types of antidepressants. The most common medications that result in symptoms
associated with REM behavior disorder are monoamine oxidase inhibitors (MAOIs), anticholinergic agents, selective serotonin reuptake inhibitors, and tricyclic antidepressants.[29]

It is also important to maintain a safe sleep environment for the person with REM behavior disorder. Removing items that can cause harm or that could lead to injury for the patient is necessary. If the patient is aggressive or violent toward others during the episodes, medication is often necessary to prevent the episodes from occurring. The most common medication used in the treatment of REM behavior disorder is clonazepam (Klonopin®), a benzodiazepine used to treat seizures and anxiety. When taken in the evening or at bedtime, clonazepam is effective in reducing activities of REM behavior disorder in up to 90 percent of patients.[29] This treatment is typically chosen when behaviors associated with REM behavior disorder are out of control, violent, or significantly contribute to sleep deprivation. Melatonin, a supplement of the hormone produced in the brain, may also be used to induce sleep and reduce REM sleep behaviors. Melatonin is often more successful when used in combination with clonazepam for treating this condition.

**Sleep Disorders Secondary To Illness/Injury**

Illnesses and injuries can have significant impacts on some patients’ abilities to sleep. Whether the illness is somewhat minor or the patient is experiencing a significant injury or suffering from a complex disease, sleep disorders and sleep deprivation are prone to develop.

Minor illnesses, such as a viral cold or fever, may not be debilitating for some older adults; however, they often must move more slowly with even minor illnesses and take time recovering. Minor illnesses also impact sleep
and can cause difficulties with falling asleep as well as frequent awakenings. Fever, congestion, headache, or body aches associated with minor illnesses can be disruptive to sleep and can cause breathing difficulties while asleep. For example, nasal congestion associated with an upper respiratory infection in an older adult may require mouth breathing when nasal passages are blocked. The person may be more likely to snore and suffer from dry mouth, which may cause more frequent awakening during the night.

Injuries also cause sleep disruption among adults, whether they are minor injuries or have caused considerable harm and require hospitalization. Older adults are at increased risk of injuries because of changes in sensory functions, including hearing, vision, and sense of smell; additionally, older adults may become injured when they experience balance issues or increased difficulties with walking and gait.

An injury can lead to pain when the person has bruises, lacerations, broken bones, or other effects. Pain, whether acute or chronic, can lead to sleep difficulties, both in getting to sleep and staying asleep all night. The older adult may feel pain while lying in bed and trying to get to sleep; the pain may be enough that it is difficult to fall asleep. Alternatively, repositioning during sleep or turning from side to side can be painful and can cause the injured person to awaken more.

People who are ill or injured seriously enough to require hospitalization may be more likely to experience sleep deprivation, which may occur while in the hospital as well as during recovery. This may be due to interrupted sleep patterns from environmental factors or the symptoms associated with pain and illness that contribute to poor sleep quality. The patient may be more likely to suffer fragmented sleep, in which he or she sleeps for short periods of time more often, rather than for several hours at once. While this may
result in the same amount of total sleep in 24 hours, fragmented sleep decreases the amount of slow-wave sleep achieved by the patient.\[32\]

Depending on the level of injury or illness present, the elderly patient and/or their caregivers need to take measures to maintain sleep habits during the recovery period. It may be difficult to achieve, but sleep deprivation will only perpetuate problems and may lead to exacerbations of illness or increased pain associated with injuries. Controlling sleep habits may involve consulting a healthcare provider for medication that can be used temporarily to help achieve sleep. Adequate and quality sleep is imperative for adults who are recovering from illness or injury and must be maintained in order to proceed through the healing process.

**Age-Specific Contributors**

There are certain factors associated with aging that impact the sleep of older adults. Whether people like it or not, in many cases aging is often associated with a decline in physical ability as well as changes in physical or mental health. Although each person is individual and may be impacted by sleep disorders in different ways, there are some conditions common to aging that specifically contribute to sleep problems and chronic sleep deprivation.

**Cognitive Disorders**

Dementia is a general term used to describe cognitive decline; it can affect various abilities, including memory, thought, language, and judgment. Because of its effects on cognitive processes, dementia also leads to behavior changes. Dementia occurs as a result of medical disorders or conditions, including Alzheimer’s disease, Parkinson’s disease, and stroke. Unfortunately, older adults are more likely to develop dementia as a result of
diseases, which can impact their abilities to function. They may have difficulties with walking or getting around, performing activities of daily living, recognizing familiar people, or even coming up with the right words to say that are appropriate.

Dementia can cause significant difficulties with sleep. At least 50 percent of people who have dementia also suffer from sleep problems. Sleep difficulties may occur because of changes in the brain that disrupt normal sleeping patterns, in which an affected person may spend abnormal amounts of time in the different stages of sleep and not gain adequate sleep at night. Some people with dementia are sleepy during the day and then take frequent naps; this can lead to difficulties falling asleep or staying asleep at night as well.

Dementia may also be associated with some types of sleep disorders that further contribute to sleep deprivation in affected people. The most common sleep disorders affiliated with dementia include sleep apnea and periodic limb movements.[21] Unfortunately, a person with dementia already has enough difficulties with daily activities that sleep deprivation only further contributes to problems with memory and behavior. For people who care for those with dementia, it may be difficult to maintain a safe environment and help the affected person to get enough rest.

One situation that may occur among individuals with dementia is sundown syndrome, in which affected patients exhibit increasingly confused, aggressive, and anxious behaviors in the late afternoon, evening, and at night. Sundown syndrome is thought to have a correlation to degeneration of the suprachiasmatic nucleus, which is responsible for recognizing environmental factors that signal the brain to release melatonin to induce
sleep. Because of this degeneration, the person with dementia may secrete less melatonin and may suffer from a circadian rhythm sleep disorder.[30]

Sundown syndrome is a challenging phenomenon and many caregivers of patients with dementia struggle with providing care for their affected patients. People who are “sundowning” are more likely to be agitated, angry, and disruptive; they may pace or wander frequently, and they may scream or yell in response to directions. The symptoms develop and are prominent in the evening and at night; alternatively, the person may have a completely different personality during the day and may not exhibit any of these behaviors.[30]

Sundowning is common among most people who experience dementia and it is the second most common behavior manifestation associated with dementia, second only to wandering. According to a literature review published in *Psychiatry Investigation*, up to 66 percent of institutionalized elderly patients experience sundown syndrome.[30] Beyond the theory that sundowning is caused by circadian rhythm disruption, some patients with dementia may be more likely to demonstrate sundown syndrome when other factors are present that are causing discomfort or anxiety. The condition may develop secondary to other situations, such as chronic pain, incontinence, or gastroesophageal reflux. Patients with dementia may be unable to explain their discomfort and instead act out through behaviors associated with sundown syndrome.

People with dementia who remain active during the day may be more likely to sleep better at night, so it is important to support regular activity and exercise. It can also help to maintain light levels at the appropriate times; for example, bright light in the morning and during the day tells the body
that it is time to wake up and remain awake. Bright light therapy has also been used successfully in helping some patients experiencing sundown syndrome.\[30\] Alternatively, dim light in the evening helps the transition with going to sleep; maintaining dim lighting or preventing a person with dementia from exposure to natural light during a time when he or she should be awake may only reinforce sleepiness and can alter normal sleep routines.

Some people with dementia have had success with using melatonin, a hormone that is available by supplement without a prescription. Melatonin stimulates the body to go to sleep and can be a helpful supplement for someone who is having difficulties with falling asleep. At night, the sleeping area should be quiet and dark, but comfortable for the sleeping person.

It is important to maintain some of the same bedtime routines that the affected patient is accustomed to; for instance, someone who has slept with a fan near the bed would still benefit from using this same method of white noise to help him sleep. The area surrounding the bedroom and the bathroom should be free of clutter and items that could potentially be harmful to the person with dementia. If the person gets up during the night to use the bathroom or if he or she awakens and is prone to wander, then a safe environment is necessary to prevent injury and falls. In some cases, a bed or room alarm may be necessary to alert caregivers that the person with dementia has gotten up out of bed, which helps to keep the person safe.

Finally, reducing overstimulation may be helpful in controlling behaviors associated with dementia and improving sleep among people who are experiencing sundown syndrome. This may include keeping the environment quiet and reducing distractions and outside noise, such as turning down the
television and keeping conversations quiet with low talking. Reducing overstimulation in the environment may prevent a person with dementia from becoming agitated and anxious, which may further help caregivers to navigate the person’s symptoms, manage their care and promote sleep.

Chronic Disease And Sleep Disorders

Although poor health and chronic disease do not have to be associated with aging, for many people, this is reality. Chronic disease can develop because of poor lifestyle habits or in many cases, because of aspects that are unchangeable. Simply growing older places some people at higher risk of some diseases, whether they practice healthy living or not. Some chronic diseases can significantly affect sleep habits and may lead to insomnia, sleep-disordered breathing, or excessive daytime drowsiness. For many, diagnosis with a chronic disease requires time and management strategies to maintain quality of life.

Chronic Obstructive Pulmonary Disease

Chronic obstructive pulmonary disease (COPD) results in considerable sleep difficulties as a result of breathing problems associated with the chronic nature of the disease. People with COPD may be more likely to suffer from sleep disorders such as insomnia, nightmares, and excessive daytime sleepiness.[33]

Chronic obstructive pulmonary disease is a form of progressive lung disease that results in difficulties breathing, increased amounts of retained carbon dioxide in the body, and often, the need for supplemental oxygen. Smoking most often causes COPD, but it may also develop after chronic exposure to lung irritants, such as among some groups of workers who have been exposed to environmental irritants and carcinogens because of their jobs.
COPD consists of two main types: chronic bronchitis and emphysema. Each has different disease processes but both conditions lead to breathing difficulties and reduced activity tolerance. Chronic bronchitis results from chronic irritation of the airways; when this occurs, increased inflammation leads to increased mucous production, making it more difficult to breathe. The person with chronic bronchitis may have a regular, productive cough, and shortness of breath with physical activity. Emphysema occurs when the alveoli in the lungs become stretched out of shape, impeding their ability to control gas exchange. People with emphysema may also suffer from a chronic cough, wheezing while breathing, decreased activity tolerance, and feelings of tightness in the chest.

Most people who have COPD are at least 40 years old. The risk of developing COPD increases with age, as the older a person becomes the longer the periods of exposure to irritants that can cause damage of lung disease. Many people with COPD are older adults who struggle with activity tolerance to even perform activities of daily living. Sleep deprivation is associated with
COPD because breathing difficulties can make falling asleep and staying asleep very challenging for affected patients.

According to the American Thoracic Society, people with COPD are more likely to experience sleep fragmentation, in which they sleep for shorter periods off and on but are less likely to achieve hours of sleep in a row. Sleep fragmentation can diminish a person’s ability to achieve slow-wave sleep and the restoration it provides.[33]

The most common causes of sleep deprivation associated with COPD are due to breathing difficulties, particularly when lying down. However, some medications taken by patients with COPD may also contribute to sleep disruption. Patients with COPD may have more periods of hypoventilation during sleep that cause a reduction in the intake of oxygen as well as increased levels of carbon dioxide building up in the bloodstream. The prevalence of obstructive sleep apnea among patients with COPD is about the same as the general population, but for those who have concurrent OSA and COPD, oxygen desaturations that occur during sleep may be much more significant when compared to someone with OSA who does not have COPD.[33]

Management of sleep problems related to COPD involves improving breathing efforts, improving oxygenation, and decreasing coughing, which can be disruptive to sleep patterns. Some patients may need positional therapy to improve airflow and better keep the airways open. Raising the head of the bed at least 30 degrees may facilitate this. Supplemental oxygen is not usually warranted at night for sleep disorders, unless the patient already uses oxygen during the day.[33]
Medications may be necessary for some patients; the kinds of medications most often used are those that are bronchodilators, such as theophylline; or anticholinergic medications that can reduce wheezing, chest tightness, or bronchospasm, such as ipratropium bromide. If a patient has been diagnosed with obstructive sleep apnea, CPAP or BiPAP is beneficial to maintain an open airway during sleep. Because COPD typically causes hypoventilation during sleep, many patients benefit from BiPAP instead of CPAP because they do not have to breathe as hard against the continuous pressure of CPAP.[33]

**Heart Failure**

Heart failure is another chronic illness that is more common in older adults and that may contribute to sleep difficulties. Heart failure is sometimes called congestive heart failure, which refers to the excess fluid that builds up in circulation and causes congestion around the lungs. Heart failure occurs when the heart is unable to keep up with providing oxygenated blood to the demands of the body. The heart initially tries to compensate but eventually becomes damaged and is even more ineffective.

Because of the damage to the heart, blood does not course through the chambers of the heart at a normal pace and may back up into circulation. The patient with heart failure typically experiences difficulties with breathing and low tolerance for activity, becoming short of breath while performing routine activities. The chronic symptoms of heart failure lead to higher levels of morbidity and mortality among affected patients. According to research published in the *Medical Clinics of North America*, more than 5 million Americans have heart failure, and it is the second leading cause of hospitalization in people over the age of 65.[34]
Heart failure is commonly associated with sleep-disordered breathing, including central sleep apnea and obstructive sleep apnea. Heart failure may contribute to sleep apnea through cyclical patterns. Obstructions in the airway can result from increased edema in the pharyngeal tissues from heart failure, and increased ventricular pressure from attempting to breathe after a period of apnea may ultimately cause heart damage, which then further contributes to obstruction in sleep apnea.[34]

As previously stated, sleep apnea can cause excessive daytime drowsiness and fatigue related to increased periods of awakening during the night after apneic episodes. Sleep deprivation associated with sleep apnea leads to further problems with memory, concentration, mood changes, and depression. Additionally, the breathing difficulties associated with heart failure can also make sleeping at night a challenge. The patient with heart failure may have great difficulties going to sleep or staying asleep when breathing is disordered and the heart cannot keep up with the body’s demands. The person with heart failure who is short of breath may need supplemental oxygen with sleep or may need to sleep with the head of the bed elevated in order to facilitate better airway expansion and promote easier breathing.

The combination of sleep difficulties caused by heart failure and sleep apnea can be exhausting for the patient and puts the older adult at risk of injuries or even death due to falls or other environmental hazards because of being chronically tired. Treatment is aimed at improving oxygenation and reducing apneic episodes. Treatment of sleep apnea for the patient with heart failure utilizes CPAP in the same method as treatment of OSA for the patient without heart failure. People with heart failure who use CPAP may respond well to increased air pressure and have a reduction in apneic episodes. The
use of CPAP also reduces intraventricular pressure associated with gasping or choking for air and trying to breathe following apnea. This further reduces the progression of damage to the heart and stops the cycle between heart failure and OSA.[34]

Although sleep apnea and heart failure often occur together, management of one condition may lead to improvement in symptoms of the other. For patients with heart failure who have OSA, use of CPAP is a valid form of therapy that can reduce nighttime awakenings and improve sleep habits. More rest from better sleep at night helps the patient with heart failure to better face the day and manage the other aspects of his or her disease.

**Depression**

Depression is common among older adults, although unfortunately, it often goes unrecognized. Many older adults endure significant changes as they age, which can lead to feelings of sadness or hopelessness that do not go away. Major depression is typically diagnosed when a person experiences a persistent feeling of sadness, fatigue, weight changes, loss of pleasure in normal activities, sleep disturbances, and feelings of low self-worth.[8] For some older adults, these symptoms may have gone on for so long that they do not know the difference or cannot remember when they started. Some people experience many losses, including death of a spouse or loved one; loss of friendships and changes in income or work structure, such as through retirement; family or friends moving away, which increases feelings of isolation; or body changes that result in more aches and pains or even diagnoses of medical conditions. Depression may exist in some older adults but they may not necessarily feel sad, isolated, or withdrawn. The older adult who is depressed may not have the classic symptoms of depression seen among younger and middle-aged
adults. Therefore, skilled providers should know to look for the subtle signs of depression and how it manifests in the elderly population, because it can be a painful experience to suffer through without treatment.

Instead of the classic symptoms that characterize depression in some younger people, older adults may instead experience an increase in body aches and pains, difficulties concentrating, poor memory, loss of interest in routine activities that once provided enjoyment, decreased energy, lack of motivation, slowed speech, increased anxiety, and poor personal hygiene.[8] Many older adults do not recognize the symptoms of depression or they may have a stigma associated with being depressed. They may believe that they are simply getting older and that slowing down is part of the aging process. Additionally, they may believe that being depressed is a sign of weakness and they do not want to ask for help.

It is important to educate seniors that part of taking care of the body is to also take care of the mind, and that emotional health is just as important as physical health. Many older adults willingly take medications for health conditions, such as to control their high cholesterol or blood pressure, but they do not believe that taking medications to help with depression is worthwhile. Depression seems to have a cyclical relationship with sleep problems. People who are depressed are more likely to have sleep difficulties, whether it is sleeping too much or sleeping too little, while people with sleep disorders may have such difficulties with sleeping that it leads to depression. It can be tough to determine which condition occurred first.

One of the most common sleep disorders related to depression is insomnia. Insomnia is already a common condition among older adults; the numbers
then further increase when insomnia is combined with depression in this same population. A person who is depressed may have difficulties falling asleep or staying asleep; additionally, he or she may also wake up without feeling refreshed after sleeping all night. Excessive daytime sleepiness is also associated with insomnia and depression, as the person who struggles to sleep at night because of depression is then drowsier during the day. Although depression can be a cause of sleep problems; alternatively, insomnia is a cause of depression, particularly the types of insomnia that result in difficulties in falling asleep or staying asleep. According to the National Sleep Foundation, the greatest amount of depression develops among people who have both sleep-onset insomnia and sleep maintenance insomnia.[9]

Obstructive sleep apnea is also associated with depression. People who have difficulties sleeping because of OSA may become depressed when they consistently struggle with excessive daytime sleepiness, lack of energy, and lack of motivation due to sleep deprivation. Unfortunately, some people with OSA are unaware that they even have the disorder and do not know how many times they wake up every night to breathe. Instead, they feel chronically exhausted and are unsure of the cause, which could further contribute to depression and feelings of hopelessness about their overall health.

Studies have shown that treatment of OSA may relieve symptoms of depression as well. In another study reported by the National Sleep Foundation, people with depression are five times more likely to suffer from sleep-disordered breathing, including OSA. However, treatment with CPAP to resolve obstructive sleep apnea symptoms improves depression symptoms as well, and improvements may last for over one year.[9]
Depression is most often treated through therapy and medication. Certain prescriptions for antidepressants should be considered carefully among older adults because they often are already taking more than one type of medication to manage physical illnesses, and some antidepressants can have a sedating effect, which can make sleep difficulties even worse. Patients who experience insomnia and depression may be able to successfully take antidepressants, which can help to improve sleep. Alternatively, if a medication has a sedating effect, it may cause the structures in the mouth to relax too much, which could further contribute to obstruction in a patient with OSA. This is further discussed in the section on medications.

The physician should carefully discuss the client’s medication regimen and sleep problems before writing a prescription for medication for depression. If the sleep disorder can be treated through another method, the depression may be somewhat relieved by managing the underlying sleep disorder instead.

**Neurological Conditions**

Changes in neurological function may develop with aging, leading to increases in symptoms that affect neuromuscular and cognitive functions. People who develop neurological conditions as they age may have more difficulties with sleeping, including disrupted sleep patterns and the development of specific sleep disorders as a result of certain neurological conditions.
**Stroke**

A neurological event that can impact thought, language, and physical ability, a stroke occurs when decreased perfusion to the brain causes ischemia of brain tissue. The diminished perfusion may occur as a result of rupture of a small blood vessel in the brain (hemorrhagic stroke) or from a blood clot that blocks appropriate blood flow to certain parts of the brain, causing the ischemia (ischemic stroke). Depending on the area affected, a stroke can cause problems with balance, difficulties with talking or understanding language, swallowing difficulties, and paralysis.[23]

Stroke is the cause of 9 percent of deaths and is the second most common cause of mortality worldwide.[23] Stroke is not a condition that occurs by accident; instead, it has many risk factors that can significantly increase the chance of it occurring within certain people. Some risk factors include hypertension, tobacco use, overweight and obesity, high cholesterol, and decreased physical activity.

A patient who has suffered a stroke may be more likely to have sleep difficulties, particularly sleep disorders such as sleep-disordered breathing, insomnia, and periodic limb movement disorder. Up to 50 percent of patients who have had an acute stroke or who are undergoing rehabilitation after a stroke have experienced obstructive sleep apnea or periodic oxygen desaturations while sleeping. Further, OSA is a risk factor for stroke and people who have had a stroke and who have developed OSA are at higher risk of another stroke.[22] The correlation between stroke symptoms and sleep problems is widespread enough that part of rehabilitation provided after a stroke should be focused on managing sleep in order to prevent further disabilities from chronic sleep loss.
Parkinson’s Disease

Parkinson’s disease is a type of motor system disorder that develops after loss of brain cells that produce the neurotransmitter dopamine. The condition most commonly develops after 50 years of age. Parkinson’s is a progressive disease, and its symptoms worsen over time. People who have Parkinson’s may develop a variety of symptoms related to neuromuscular impairment, including tremor, rigidity of the extremities, and impaired gait and balance. As the disease progresses, tremor becomes more pronounced and the affected person may develop difficulties with eating, sleeping, and speaking.

Sleep problems are very common among people who have Parkinson’s disease. In fact, some sleep difficulties point to early signs of Parkinson’s, which could eventually be discovered during testing for sleep disorders. People with Parkinson’s most often suffer from insomnia, nightmares, limb movement disorders, sleep apnea, and nocturia.[58] There is a strong correlation between REM behavior disorder and the development of Parkinson’s disease. Studies have shown that some people with REM behavior disorder eventually develop Parkinson’s disease within 10 years.[29]

There is no cure for Parkinson’s disease, although it may be managed with medication and in some cases, surgical intervention. One of the most common medications is levodopa, which is converted to dopamine in the
brain to help regulate levels of the neurotransmitter. Levodopa is often combined with carbidopa, which allows the levodopa to reach the brain before being converted into dopamine. Surgical intervention, including deep brain therapy, may be necessary in severe forms of the condition. Deep brain therapy involves placement of electrodes into the brain that are stimulated by an outside transmitter. The transmitter is programmed to provide electrical stimulation to certain parts of the brain, which can reduce many of the symptoms of Parkinson’s and may reduce the need for much of the medication that is often required.[57]

Part of maintaining quality of life after a diagnosis of Parkinson’s is to manage sleep difficulties and make the sleep environment as comfortable and safe as possible. The patient with Parkinson’s may have excessive daytime drowsiness and may be more likely to fall asleep at inappropriate times.[58] It is important to keep the surrounding environment safe so that if this occurs, the affected patient will not be harmed. It is also important to maintain a regular schedule of activities and sleep, and to get regular exercise during the day to promote sleep at night. Although Parkinson’s is progressive and permanent, through several coping measures and interventions it is possible to maintain and support quality of life for affected individuals.

**Reduced Activity**

Levels of physical activity may be reduced among older adults because of physical changes that may make daily activities more difficult to perform. As a person ages, their body changes and they may be more prone to weight gain, reduced muscle mass, and slower metabolism. Many older adults have less stamina for activities when compared to middle-aged or young adults; further, older adults often have accompanying illnesses or medical conditions
that may make performing routine activities difficult. This may include increased pain with regular activity; cardiovascular disease, which can impact stamina levels; and the presence of other chronic conditions that can make the elderly person feel fatigued or exhausted.

Despite the potential for decline among older adults, exercise and regular physical activity are still important and are recommended to improve overall health and to reduce mortality. Regular physical activity supports healthy sleep; it also improves circulation, promotes flexibility, strengthens heart function, promotes weight loss, and improves outlook.

A sedentary lifestyle may contribute to unhealthy sleep habits and decreased levels of exercise can impact various stages of the sleep cycle, ultimately leading to the changes in the amount of time a person spends in REM sleep and slow wave sleep. Alternatively, the National Sleep Foundation reports that regular exercise improves total sleep time, increases time spent in slow-wave sleep, and prolonged latency to REM-stage sleep.[19] Therefore, regular exercise is important to maintain good sleep habits and reduce instances of sleep deprivation among not only young and middle-aged adults, but older adults as well.

Older adults who are not active may be at risk of some types of sleep disorders, which further contribute to impaired sleep. Weight gain, which may occur as a person ages, increases the risk of developing sleep-disordered breathing and obstructive sleep apnea. Additionally, exercise often combats feelings of stress and is a useful technique for controlling daily strains and pressures. A person who lives a very inactive lifestyle is then less able to control stress levels through exercise. Increased amounts
of stress and anxiety contribute to other sleep disorders, including limb movement disorders and nighttime behaviors.

The Centers for Disease Control and Prevention recommend that adults older than 65 years continue to exercise on a regular basis. The current recommendations for people who can tolerate physical activity and who have no health conditions that would limit the ability to exercise are 150 minutes of moderate-intensity exercise per week plus muscle-strengthening activities on 2 or more days per week. Alternatively, a person could also perform 75 minutes of vigorous-intensity exercise per week with 2 or more days of strength training. The type and amount of exercise depends on the person’s abilities, exercise history, and overall health condition.[20]

Moderate exercise includes aerobic activities that cause the heart to beat faster but not so fast that the person is unable to carry a conversation. Some of these activities include brisk walking, jogging, bicycling, gardening, or yoga. Alternatively, vigorous activities may cause the person to breathe hard enough that he or she cannot say more than a few words at a time.[20] Vigorous activities could include running, heavy gardening or shoveling, speed walking, or fast swimming. Strength training includes lifting weights and performing resistance exercises to strengthen muscles and improve their flexibility.

Older adults should be cautioned to start an exercise program under the care of a healthcare professional, particularly if they normally live a sedentary lifestyle or if they have a medical condition that may prevent them from achieving regular exercise. However, people who are normally sedentary can slowly increase their amounts of exercise until they achieve the recommended results; they may need to exercise in shorter intervals.
until they eventually work up to the recommended levels. And, those who have medical conditions may still find ways to exercise, even if it is in shorter intervals. The client can work with their healthcare provider to determine which exercises are feasible and what can be incorporated into their lifestyle to derive the greatest benefits.

**Pain**

Pain, unfortunately, is seen as a common part of the aging process for many older adults. Many people believe that increased aches and pains, as well as symptoms of other painful disorders, such as arthritis, are normal parts of getting older and they tolerate their conditions without seeking outside help. Pain can be debilitating during the daytime when it affects everyday activities and slows motor skills; at night, pain can be disruptive enough for sleep that it causes chronic sleep deprivation.

Chronic pain leads to feelings of depression, social isolation, and poor functioning, in addition to sleep difficulties. Reduced overall sleep at night because of pain then further perpetuates these symptoms during the day as the affected patient experiences daytime drowsiness, lethargy, decreased energy, and difficulties with concentration. Chronic pain may be caused by a number of physical conditions that impact older adults, including rheumatoid arthritis, osteoarthritis, shingles, diabetic neuropathy, and peripheral vascular disease.[16]

Pain alters a person’s ability to sleep in several ways. It may cause difficulties with falling asleep, or the person may awaken frequently because of discomfort. Enduring pain throughout the day and limiting activities due to pain can be exhausting and stressful, which can further impact the ability to sleep at night. The affected person may feel frustrated, sad, or worried
about the impact of the pain, which can make getting to sleep difficult. Additionally, experiencing pain while lying in bed can make it difficult to get to sleep; pain that occurs while sleeping, such as while changing positions, can cause the person to wake up frequently during the night, further disrupting sleep patterns.[16]

Chronic pain is also associated with depression, which impacts daily functioning and quality of life but also has an impact on sleep habits. Further, sleep loss seems to exaggerate symptoms of pain and depression and may cause a cyclical effect. A study in the journal *SLEEP* found that participants with rheumatoid arthritis reported increased severity of pain and depression after experiencing sleep loss when compared to those with arthritis who were not sleep deprived.[17] Clearly, pain and sleep deprivation collaborate in reducing quality of life for affected individuals.

Diagnosing chronic pain in the older adult can be challenging. Some elderly clients are stoic about pain or if they attribute it to aging, may choose to downplay the effects the pain is having on their lives. Additionally, assessment of pain on site, such as during an office visit with the healthcare provider, may or may not provide an example of the typical amount of pain the patient is experiencing. For example, during a routine office visit, the practitioner may ask about the patient’s level of pain, but the result could be lower or higher than normal, depending on a number of factors. The patient may have just taken a pain reliever and is experiencing less pain at the moment; alternatively, the patient may have had difficulties getting to the appointment and is experiencing more pain during the visit. A routine assessment of pain through brief questioning provides only a snapshot of the amount of pain the person experiences on a daily basis.
It may help for the client to keep a pain journal, in which he or she records the type and amount of pain experienced throughout the day and night. The journal would also record how pain affected certain areas of life, such as activities of daily living, sleep, and the ability to maintain social relationships. The patient could also record what therapeutic methods he or she tried to control or limit the pain. After reviewing the client’s pain diary, the physician may have a better idea of how the pain is truly affecting the patient and can further explore methods of pain management.

Non-pharmacologic methods of pain management can be extremely helpful in controlling pain levels so that they are less likely to interfere with sleep and activities. Many older adults are comfortable with making lifestyle changes and with including interventions that do not involve taking medications. Some non-pharmacologic measures that could be implemented include meditation, relaxation therapy, guided imagery, prayer, or distraction. Some patients have success with using biofeedback, in which they mindfully recognize those physiological factors that are associated with pain and learn how to minimize them, thereby contributing less to the pain. Patients with health conditions that contribute to pain, such as musculoskeletal disorders, often benefit greatly from regular and gentle exercise on a daily basis. Low-impact, aerobic exercise such as walking or swimming, improves cardiovascular function and circulation, supports weight loss, and improves quality of life, among many other benefits. Many healthcare providers recommend a regular exercise routine for older adults who experience pain, and who can tolerate exercise, as a method of pain management.

Pharmacologic pain management is possible but must be considered carefully in the elderly population. Medication use can impact older adults
who may metabolize drugs differently when compared to younger patients; the distribution of fat and muscle may affect drug absorption and distribution.[18] Further, many older adults take more than one medication on a daily basis and adding pain medication increases their regular drug regimen, which can be difficult to maintain. Side effects of drugs, especially those used for pain control, may also negatively impact many seniors when they cause increased drowsiness, lethargy, and poor focus. These side effects, when combined with sleep deficits caused by pain, can exponentially exacerbate negative symptoms in the elderly population and lead to an increased risk of injury.

The American Geriatric Society has provided a summary of appropriate medications to use among older adults when treating pain. The first and foremost drug recommended for pain control in patients who are able to tolerate it is acetaminophen (Tylenol®). It is not habit forming and is a non-opioid analgesic that has a good safety profile and has been shown to be effective in treating pain, particularly that associated with musculoskeletal disorders.[18] Non-steroidal anti-inflammatory drugs (NSAIDs) and COX-2 inhibitors are non-opioid analgesics that also protect against pain associated with inflammation. Because many of these drugs can cause gastrointestinal irritation, they should be used with caution in some elderly patients. They are recommended as a second source of non-opioid analgesic when intolerance to acetaminophen is present. Patients who take NSAIDs should simultaneously take a proton pump inhibitor to avoid stomach upset and gastrointestinal tract damage.[18]

Opioid pain relievers are typically used to treat moderate to severe pain. They may be used to effectively treat pain among people who otherwise
have diminished quality of life as a result of chronic pain and they may be effectively combined with some non-opioid analgesics. Alternatively, opioid analgesics have more side effects, some of which can exacerbate symptoms of sleep deprivation. These drugs are also more likely to be habit forming and have higher incidences of abuse when compared to non-opioid drugs.[18] Patients who take these drugs should be counseled to take a dose of medication before the pain is severe and out of control, which prevents debilitating effects of pain and better manages it by allowing the medication time to take effect.

Adjuvant drugs are those medications that are not indicated for the treatment of pain, but their off-label use may be helpful in pain control or they may be effectively combined with pain medications to better manage pain.[17] Examples of adjuvant medications may include antidepressants, hormone supplements, anticonvulsants, and corticosteroids. Other types of drugs and supplements may be helpful in controlling some types of pain and sometimes a trial-and-error method is necessary to determine the best type of pain control with the least amount of side effects. Examples of other drugs or supplements that may be used include topical capsaicin or menthol.

Some older adults experience pain relief when using adjuvant therapies, including acupuncture, massage, or chiropractic treatments. In addition to being physically debilitating, pain can also be emotionally draining for the affected person. Proper pain management involves not only pharmacological treatments and lifestyle interventions, but assessing and treating the emotional aspects associated with increased pain as well. Patients who are sleep deprived because of chronic pain need support as part of interventions to help them control this aspect of their lives.
Nighttime Urination

Nocturia, or nighttime urination, is a common problem among older adults that can significantly interrupt regular sleep. Nocturia involves repeated episodes of getting up at night from sleep to use the bathroom. Many people are able to sleep for a full night without getting up at all, however, there are also some who need to use the bathroom once during the night and who do so on a routine basis. This is still considered normal. However, people with nocturia may need to get up to use the bathroom five times or more during the night, which has a significant impact on sleep. Research indicates that getting up two times at night to urinate is associated with sleep deprivation.[14]

Older adults may be especially prone to nighttime urination because of physical changes that occur with aging. For some people, the amount of fluid that the bladder is able to hold changes and diminishes with age, requiring more frequent emptying. As people age, they may produce less anti-diuretic hormone, which is responsible for controlling urine production while a person is asleep. Decreased amounts of anti-diuretic hormone may lead to continued or increased urine production during the night, requiring more frequent awakenings from sleep to urinate. Nighttime urination is also associated with some medical conditions that may be more common in older adults, including heart failure, Parkinson’s disease, and uncontrolled diabetes, as well as urinary tract infections, diabetes insipidus, and tumors affecting the prostate.[14, 15]

Although nocturia may be viewed as a common part of aging, it is not considered normal and its effects can be profound on affected people. Nevertheless, nocturia has been shown to affect 68 to 93 percent of men older than 70 years, and 74 to 77 percent of older women, according to a literature review in the Cleveland Clinic Journal of Medicine.[15] Some people
have repeated episodes of nighttime urination every night, while others may have regular awakenings once or twice per week. The number of times of getting up during the night varies between people and is dependent on patient condition and medical background. In addition to the frequent need to urinate, nocturia may also cause urgency or a reduction in total urine, resulting in the feeling of incomplete bladder emptying.[14] The person may feel the need to urinate but then produce little urine as a result when this occurs.

Obviously, awakening multiple times each night to use the bathroom is disruptive to sleep patterns. The affected person may be able to fall asleep, but a need to urinate may not only awaken them to use the bathroom, but they may then have difficulties falling back to sleep, particularly if other disorders or underlying health problems are present. When the person does finally return to sleep, it may be interrupted again with another episode of awakening to return to the bathroom.

Although nocturia may be related to increased urine production due to altered levels of anti-diuretic hormone or even too much fluid intake before bed, it may also be related to other sleep disorders, including sleep apnea. While the exact reason is still unknown, it has been postulated that while in a REM sleep cycle (caused by sleep apnea), some people are more likely to wake up and use the rest room. For these people, sleep apnea is linked to frequent nighttime urination and treating the sleep apnea, such as through CPAP, also reduces the frequency of nocturia.[14]

Nocturia can significantly impact quality of life for the affected patient. It not only is disruptive to sleep patterns, which can lead to excessive daytime sleepiness, lethargy, decreased motivation, and low energy, but it can leave
the affected person feeling frustrated and depressed. People with frequent nocturia may feel embarrassed to talk with their healthcare providers about the problem, believing that they can handle it themselves by making lifestyle changes. They may suffer from feelings of isolation if they believe that others do not understand their difficulties or if they must retreat from social events because they are too tired.

Frequent nighttime urination also places many older adults at risk of injury or even death due to injuries and falls that occur when they get up during the night. By getting up to use the bathroom at night, older adults may be more likely to fall and suffer from bruises or broken bones on their way between the bedroom and the bathroom. Additionally, sleep deprivation that causes excessive daytime sleepiness places older adults at risk of injuries during the day due to lack of concentration or drowsiness while performing certain daytime activities.[15]

Diagnosis of nocturia may involve asking the affected patient to maintain a sleep and voiding diary for several nights. In this diary, the patient records such information as:

- the number of times that they awakened to use the bathroom
- how much they voided when using the bathroom
- whether they experienced urgency or incomplete bladder emptying
- the times that they went to bed and when they woke up
- their overall quality of sleep
- whether they experienced bedwetting or other complications
- any other environmental factors that may have affected the situation, such as consuming caffeine or alcohol before bed
Other tests may also be necessary for some patients, including laboratory testing of urine that may include checking urine glucose and protein levels, or a urine culture to look for infection. The healthcare provider can usually provide a diagnosis based on the client’s sleep journal, by taking a client history, and performing a physical exam. The history and physical are important components that look for the presence of other underlying diseases that may increase nocturia.

Treatment of nocturia involves treating the cause of the condition. If it appears to be related to another underlying medical condition, treatment of that primary situation would occur first. For example, if after testing the client and reviewing the sleep diary, the physician determines that he or she has a bladder infection then treatment of the infection with antibiotics is warranted, and treatment may resolve the nocturia episodes.

Non-pharmacologic measures are an important component of managing frequent nocturia, although they may not entirely resolve the condition. Still, it is important for the older adult to implement some lifestyle changes that may have a positive result on the number of times he or she needs to get up during the night. The patient should be instructed to avoid or limit fluid intake in the evening and restrict alcohol and caffeine, which may have a diuretic effect. Some studies have also shown that elevating the legs in the evening may promote venous return and decrease the amount of fluid retention in the lower legs, which could contribute to an increased need to void later in the night.[15]

Other measures include improving the sleep environment, such as by making the bedroom a quiet and calm place to sleep and reducing outside noise that would otherwise contribute to further awakenings during the
night. Safety measures are important as well, and the patient should ensure that the area between the bedroom and the bathroom is clear of clutter or objects that could cause injury. Other fall-prevention measures may be warranted as well, including use of grab bars, avoiding throw rugs or carpet that may be a trip hazard, and using adequate lighting in the area.

While lifestyle changes and non-pharmacologic measures can and do help with some episodes of nocturia, many people still require medical treatments to resolve the condition. For primary nocturia that is not related to another underlying medical condition, medication is the most common form of treatment. If the patient suffers from low levels of anti-diuretic hormone that cause an increase in urine production during the night, treatment with desmopressin may be the drug of choice. Desmopressin (DDAVP) is a synthetic form of vasopressin, another term for anti-diuretic hormone.\[15\] By replacing some of this important hormone through a synthetic form, the patient may produce less urine at night and may experience less frequent episodes of nighttime urination.

Patients that suffer from overactive bladder, such as by increased amounts of bladder contractions and the inability to store larger amounts of urine, may benefit from antimuscarinic medications. These drugs work by relaxing the detrusor muscle of the bladder that controls bladder contractions and creates the urge to urinate. The patient who takes this type of medication may then have less of an urge to urinate during the night and may be able to store more urine in the bladder. Examples of these types of medications include tolterodine (Detrol®) and oxybutynin (Ditropan®).\[15\]

Other medications may also be prescribed, depending on the patient’s underlying symptoms and whether he or she can tolerate the medications
prescribed. For example, some people have difficulties using desmopressin and may better tolerate diuretics to release extra urine during the day. A diuretic medication such as hydrochlorothiazide may be taken during the day, well before the patient goes to bed at night, and it releases excess fluid through urine production before it accumulates to the point that it would impact nighttime voiding. Furosemide (Lasix®) is another type of diuretic that may be useful in these situations.[15]

Finally, some men experience increased nocturia because of benign prostatic hyperplasia. Taking anti-inflammatory medications, such as COX-2 inhibitors, may help in these situations if there is prostate inflammation present. These drugs have also been shown to improve detrusor muscle tone and to decrease overall urine production, thereby improving symptoms of nocturia.[15]

Although nocturia is common in older adults, it does not have to be a condition that people live with as part of aging. Because of the potential for sleep disruption as well as injury, a patient with nocturia should not try to manage the condition on his or her own or assume that it is another aspect of getting older. Instead, careful management of the situation with the help of a healthcare provider can improve sleep habits and restore rest and normal function.

**Menopause**

Menopause is a permanent change that occurs among older adults. Menopause involves the permanent cessation of menstrual periods among women, thereby eliminating the ability to become pregnant. All women go through menopause, which typically occurs between the ages of 45 and 55, but it may also develop later. Menopause occurs because the body produces
less estrogen and progesterone; it also stops releasing eggs through ovulation. Menopause occurs naturally for many women who become old enough; however, there are some women who go through surgical menopause, in which their bodies produce less estrogen because of surgical removal of the ovaries.[11]

Many older women who experience menopause talk about its symptoms and changes associated with the process. Menopause does not usually happen all at once; instead, a woman goes through changes over a period of time — typically about a year — in which her menstrual periods become more sporadic until they stop entirely. Menopause symptoms may continue even after menstruation has ceased, and some women may suffer from symptoms for up to 5 years. Ultimately, the body adjusts to the difference and symptoms abate; at this point, the woman is said to be postmenopausal.[11]

Some women suffer from many symptoms of menopause, while others have very few. The symptoms vary between women and while some might be severe, others may be quite mild to non-existent. Symptoms of menopause include rapid or pounding heartbeat, hot flashes, night sweats, skin flushing, and insomnia. Other symptoms may also include headaches, irritability, mood swings, a decreased interest in sex, vaginal dryness, urine leakage, and forgetfulness.[11]

Menopause is associated with several different sleep disorders; it may cause insomnia and it is related to obstructive sleep apnea and sleep-disordered breathing as well as limb movement disorders of sleep.[12] Insomnia may be related to a number of factors associated with menopause. Many women who are going through menopause may also have symptoms of depression,
which can impact sleep habits and cause difficulties with falling asleep or staying asleep.

Insomnia may also be more likely in perimenopausal women who are experiencing many negative symptoms of menopause. For example, a woman who has night sweats several nights each week may have difficulties going back to sleep after waking up drenched in sweat. Hot flashes and skin flushing may make it difficult or uncomfortable to try and go to sleep. Hot flashes occur in up to 80 percent of perimenopausal women and may persist on and off for up to 5 years after onset. Women who have hot flashes during the day are more likely to have them at night. Those who have hot flashes at night may most likely suffer insomnia from being awakened from the effects of hot flashes and then having difficulties falling back asleep, compared to difficulties with initially falling asleep. Approximately 43 percent of women who have regular and/or severe hot flashes are classified as having chronic insomnia.[13]

Additionally, anxiety and mood swings can lead to sleep problems when the affected woman is unable to stop thinking or ruminating about certain thoughts or ideas that are prominent in her mind.[12] Hot flashes are associated with depressive symptoms in menopausal women; those who experience more hot flashes as menopause symptoms are also more likely to develop symptoms of depression, which can cause further sleep difficulties. Similar to depression, anxiety is also associated with an increased number of hot flashes during menopause, leading researchers to believe that insomnia caused by menopause symptoms can be attributed to a combination of hot flashes, anxiety, and depression in certain women.[13]
Menopause is also associated with obstructive sleep apnea and sleep-disordered breathing. The drop in progesterone levels that occur during menopause may lead to changes in airway clearance, as progesterone works as a respiratory stimulant and may dilate the airways. This can lead to breathing changes and possible obstructions while the woman is asleep.[12] Additionally, some women gain weight due to hormone changes associated with menopause; added weight can impact breathing while sleeping and is a risk factor for the development of OSA.

Perimenopausal women are also more likely to suffer from limb movement disorders while sleeping, such as restless legs syndrome.[12] The increase in limb movements during sleep may result from increased levels of stress that occur with menopause or may be a side effect of sleep deprivation that results from insomnia or other types of sleep disorders during the perimenopausal period.

Cognitive-behavioral therapy (CBT) is one method of treating sleep disorders that occur during menopause. CBT may be used in the management of insomnia, but it may also help a woman to better manage her symptoms of menopause as well. CBT involves working with a therapist to adjust thinking patterns when it leads to negative symptoms associated with illness or disorders. CBT also helps the client to consider her behaviors that are contributing to negative symptoms and alter those behaviors to have better outcomes.

CBT may be useful in managing menopause symptoms, particularly if they are causing such sleep problems as insomnia. If thoughts, worries, or anxiety are keeping a woman up at night, CBT may be able to help with managing those sleep disruptions in order to get a better night’s sleep. Additionally, CBT may help a woman to deal with her overall symptoms of
menopause, regardless of whether they are disrupting her sleep. For example, if a perimenopausal woman is significantly distracted by her symptoms and spends an inordinate amount of time analyzing her symptoms and feelings, she may have some sleep difficulties and might be less productive in general because she spends time thinking about her condition. Through CBT, a woman may be able to reconsider her reactions to her symptoms and control how she responds to physical and emotional changes that occur with menopause, which may relieve some of the stress of the situation. In this way, the woman may be better able to handle the changes that occur with menopause and not let them take over every aspect of her life.

Not all women respond to menopause with panic over symptoms, nor do they allow negative symptoms of menopause control their lives, yet they still suffer from sleep disorders. Restless legs syndrome affects approximately 10 percent of the general population, but the risk for developing the condition increases with advancing age and it is twice as common in women than it is in men.[13] Additionally, periodic limb movement disorder may also become more common among menopausal women. Studies are ongoing but there may be a relationship in the increase of periodic limb movements at night and decreased levels of estrogen. Periodic limb movements may also be more likely to occur in women who already have obstructive sleep apnea or who take certain types of medications, including some kinds of antidepressants.[13]

Hormone therapy (HT) is one treatment option that may be used in managing symptoms of menopause but could also be helpful as treatment for insomnia and limb movement disorders during sleep. Hormone therapy most commonly is prescribed for menopausal women to help with symptoms
of hot flashes, night sweats, mood swings, and vaginal dryness. The hormones that are supplemented are estrogen and progestin; sometimes, testosterone may also be prescribed.[11]

Hormone therapy is available in various forms for use. Women may use HT through oral pills, vaginal cream, nasal spray, skin gel, or skin patches. There are some risks associated with using HT and women who take hormones to reduce menopause symptoms should be advised of their risks. The risk of blood clots is greater, particularly when using estrogen-only hormone therapy. HT may also increase the risk of certain types of cancer, including breast cancer and uterine cancer. It is recommended that to reduce the risk of breast cancer, women who use HT limit its duration to 5 years or less. Combinations of estrogen and progesterone therapy are recommended to reduce the risk of uterine cancer among women who have not had hysterectomies.[11]

Older women who have cardiovascular disease may be at higher risk of complications if they use hormone therapy to control symptoms of menopause. Estrogen HT may increase the risk of heart disease, stroke, deep vein thrombosis, and pulmonary embolism among women who use it; the risk is even greater among those who smoke.[11] Although there are a number of risks associated with using hormone therapy, many of these can be reduced by combining certain types of supplements or changing the method of administration. A woman’s physician who knows her complete medical history and current symptoms associated with menopause must regulate use of hormone therapy.

Hormone therapy has been shown to have a positive impact on sleep among postmenopausal women. Various studies have shown that use of
combinations of progesterone and estrogen supplements, as well as progestin-only and estrogen-only supplements have had favorable outcomes related to sleep. The most commonly reported positive effects were decreases in the number of waking episodes after going to sleep and less fragmented sleep overall. The studies indicated that better sleep is most often achieved in women who experience insomnia as a result of menopause symptoms because the hormone therapy may reduce hot flashes that interrupt sleep.[13]

For women who are unable to use hormone therapy for management of menopause symptoms and insomnia, there are alternative medications available. Some physicians may prescribe antidepressants, which may help with hot flashes and mood swings and could further improve poor sleep habits related to insomnia. Some types of antidepressants that may be used in this situation include paroxetine (Paxil®) and bupropion (Wellbutrin®). Gabapentin, a medication normally used as an anticonvulsant, has also been shown to reduce hot flashes in menopausal women and may be prescribed as well.[11]

Treatment of other sleep disorders that may more commonly occur after menopause, such as obstructive sleep apnea or periodic limb movement disorders, involves management through standard treatments for these conditions. For example, although OSA may develop in an older adult woman who is postmenopausal, it is best treated with standard treatment of OSA, which is the use of CPAP, rather than using hormone therapy or antidepressants. Management of sleep problems in older women who have gone through menopause is important to maintain quality of life and to reduce the incidence of other health problems, such as depression. The practitioner should carefully assess the patient’s sleep issues, lifestyle
factors, and risks for other illnesses before prescribing the appropriate therapy or treatment to manage sleep problems that occur after menopause.

**Treatments**

Although sleep disorders can be common among older adults as a result of increased incidences of chronic disease, injuries, and changes in body systems associated with aging, there are many treatments available that can successfully treat sleep disorders. The older adult has several options for treatment, depending on his or her background and health history, but by trying different therapies to find one that works the best, sleep no longer needs to be fragmented and disrupted from nighttime sleep problems.

**Behavior Modification**

One of the most common types of therapy used in the treatment of depression is cognitive-behavioral therapy (CBT). This process may also be used to help some people overcome sleep disorders as well. CBT helps the person consider his or her thoughts that are contributing to symptoms and works to change thought patterns before they develop into negative and depressing feelings. It also helps the client to consider which behaviors might contribute toward symptoms and change those behaviors as well.

CBT may be particularly helpful in treating patients with insomnia. The specific method of therapy is known as cognitive-behavioral therapy for insomnia, or *CBT-I*. This method considers both the thoughts and behaviors of the person and how they contribute to insomnia. The techniques taught through CBT-I can first help a person to consider what thoughts they frequently have that could be contributing to insomnia. If there are persistent worries, anxiety, or ruminations that keep a person up at night,
these can be changed while working with a therapist. Additionally, some people have pre-conceived ideas about how they should sleep or the quality of their sleep, which may or may not be realistic. Through CBT-I, the person with insomnia can work through and change these thoughts so that they have realistic expectations about sleep that will not be confounded.\[10\]

The behavior component of CBT-I then helps the person to look at what behaviors may be contributing to insomnia and then make changes in those behaviors in order to improve sleep. The therapist may teach the affected person different techniques about how to improve sleep, such as by first improving the sleep environment and making it quiet, dark, and comfortable, with little to no outside noise. The process may also teach good sleep hygiene, involving going to bed and getting up at about the same times each day, and only using the bedroom for sleep or sexual activity, not for reading, watching television, or other activities that may occur.

Other techniques that may be taught through CBT-I include paradoxical intention, in which the affected person actively tries not to fall asleep. This technique is also referred to as remaining passively awake. It is thought that during this time, actively trying not to fall asleep helps the person to let go of the worries of not being able to sleep. When anxiety about not getting to sleep is removed because the person is trying not to sleep, he or she may actually be better able to fall asleep.\[10\]

Biofeedback and relaxation training are two other methods that may be incorporated into CBT-I to make falling asleep easier. Biofeedback involves recognizing those physical reactions that may be preventing sleep. For example, a person who has anxiety about not being able to sleep may become aware that their heart rate increases and that they feel tense.
Through biofeedback, the person recognizes these symptoms and learns to change them so that they are not so prominent and do not contribute to sleep deprivation. Relaxation training involves learning how to calm the mind and the body through mental imagery, meditation, or prayer, which may then help to induce sleep.[10]

It is important that older adults who are experiencing sleep deprivation and symptoms of depression seek help from a medical professional who can pinpoint how to treat one or both symptoms. In some situations, treating depression through medication and CBT may help to improve sleep deprivation. Alternatively, treatment of sleep deprivation and sleep disorders may improve symptoms of depression. In this method, it is not always so important to know which came first — the depression or the sleep problems — but instead, coming up with an effective treatment method of one condition may eventually help the other.

**CPAP and BiPAP**

Continuous positive airway pressure (CPAP) is the most common form of treatment for obstructive sleep apnea and in some cases of central sleep apnea. Use of CPAP may be prescribed after a patient undergoes a sleep study that determines if he or she is having enough periods of apnea or hypopnea that result in frequent oxygen desaturations. The use of CPAP prevents apnea from occurring and reduces instances of desaturations to improve overall breathing and sleep quality.

If a patient presents with complaints of excessive daytime sleepiness and their history and physical exam is indicative of OSA, a sleep study is performed to gain a diagnosis and/or rule out the presence of other disorders. The sleep medicine specialist who diagnoses obstructive sleep apnea often recommends CPAP therapy to manage the condition.
apnea in the patient is also usually responsible for prescribing the parameters for CPAP use. Once a prescription is in place, the patient may go through a second sleep study where they wear the CPAP and the physician can determine if the levels of its use are beneficial or if there need to be adjustments.

CPAP provides continuous, pressurized air to the patient that gently forces the structures at the back of the mouth and throat to remain open, instead of collapsing down onto themselves and causing an airway obstruction. When the patient with OSA wears CPAP while they sleep, the pressurized air keeps their airway open and they are unlikely to have periods of apnea that develop from airway obstruction.

CPAP comes to the patient as a small machine with a motor that generates the air. The machine is set for the prescribed amount of pressure, as ordered by the physician. Other features, such as adding humidity or supplemental oxygen, can also be added or adjusted with the machine, based on the physician’s order and/or patient preference. A tube extends from the machine to the patient; and, the end of the tubing is a mask that is placed over the patient’s mouth and nose. The generated air flows through the tubing to reach the patient as the mask is worn. Masks typically have bands that surround the head to keep them in place while being worn at night to sleep.

CPAP is most effective when it is worn for at least six hours at a time. Most people keep their CPAP machines in the bedroom and after getting ready for bed, turn on the machine to its settings and put on the mask. The machine performs the rest of the work while they go to sleep. CPAP has been
clinically proven to improve sleep in patients who suffer from sleep deprivation associated with obstructive sleep apnea.[35]

While CPAP may sound as if it is the answer to sleep problems associated with sleep-disordered breathing, there are some people who do not tolerate its use. The air pressure may be difficult to breathe against, particularly if the settings indicate a higher level of pressure. The air enters the mask at a continuous pace and it may be difficult to sleep with it in place. Some older adults do not like the enclosed feeling of the mask on the face; it may also take time to adjust to the feeling of constant airflow into the mouth and nose in order to go to sleep. Many people are able to adjust to wearing CPAP regularly, but it may take several practice sessions of wearing the mask and sleeping for short periods until they are ready to sleep for a full night with the machine.

The constant airflow from CPAP may also be extremely drying to the tissues of the mouth and nose. CPAP may cause nasal congestion and dry mouth in some people, and some older adults already suffer from these side effects as a result of other medications they may be taking. Skin breakdown on the face is another problem with the machine, which occurs most often when the mask does not fit properly. The fit of the mask may change over time and may need to be adjusted periodically. For example, if an overweight person was diagnosed with OSA and started using CPAP therapy, the fit of the mask on his or her face may change over time if weight is reduced. Patients who develop skin breakdown because of the mask should see their healthcare provider to ensure a proper fit of the mask.

Similar to CPAP, bi-level positive airway pressure (BiPAP) is another method of forced air that keeps the structures of the mouth and pharynx open to prevent collapse that leads to obstruction. BiPAP differs from CPAP in that
instead of the continuous flow of air associated with CPAP, BiPAP adjusts the pressure of the air upon inspiration and expiration. A person who uses BiPAP receives a higher amount of pressurized air when they breathe in compared to when they exhale. BiPAP is especially helpful for people with OSA who also have other disorders of breathing, including those with COPD.[35] The hypoventilation that often occurs with COPD may cause difficulties with exhaling against the constant pressure of the CPAP machine. Alternatively, the lower pressure from BiPAP may make it easier to breathe.

Of the two options, CPAP is typically used more often than BiPAP, although they both have advantages and disadvantages. Although it may take some time to adjust to using these devices, they can dramatically improve sleep in patients affected with OSA and reduce symptoms of chronic sleep deprivation. The regular use of CPAP or BiPAP therapy can make sleep much safer and more satisfying for the older adult who suffers from sleep-disordered breathing.

**Medication**

As people age, they often take more medications to manage symptoms of chronic disease or to maintain comfort for the changes taking place in their bodies. Many older adults take multiple medications on a daily basis and are at risk of negative interactions between different drugs. Medication prescription and compliance must be managed carefully to avoid negative drug interactions and to reduce side effects.

Unfortunately, many medications contribute to sleep problems. Some people take medicine to manage their physical conditions and health problems but end up creating other problems when they have sleep difficulties. For example, alpha-blockers, which are medications commonly used among
older adults for the management of hypertension, may cause a reduction in
total REM sleep and excessive daytime sleepiness.[59]

Some drugs are used to control pain or relieve discomfort, both of which can
improve sleep for many people; however, these drugs may also lead to
excessive drowsiness, which can cause a person to fall asleep at
inappropriate times. Alternatively, other common drugs can lead to chronic
insomnia and difficulties falling asleep. The type and amounts of medications
used can cause multiple interruptions in sleep patterns for affected
individuals.

Medications are prescribed for a variety of different reasons and some may
be used for longer periods than others. Some medications can cause sleep
disorders and erratic behavior after the patient has stopped taking them. For
example, withdrawal from certain types of benzodiazepines and
antidepressants may lead to symptoms of REM behavior disorder.

Regardless of the type of medication used, most have side effects, although
not all are associated with sleep. For every medication prescribed by a
healthcare provider, as well as those medicines and supplements available
over the counter, the patient should discuss the implications of use with a
caregiver or health practitioner. Because of the incidence of sleep problems
among older adults and the frequency of medication use, careful
management of interactions and side effects of all drugs is necessary to
prevent sleep difficulties and further symptoms of poor health.

Medications are a common and valid form of treatment for many types of
sleep disorders. However, medication therapy should be considered very
carefully in older adults, as many elderly patients are already taking more
than one medication; use of multiple medications increases the risk of adverse effects and reactions between medicines. Additionally, some medication taken by elderly patients may cause further sleep disturbances and so must be managed.[5] It is important to consider what medication is being added to an elderly patient’s number of medicines that they take at home on a daily basis before considering medication to treat sleep disorders.

**Stimulant Drugs**

Stimulant drugs may be used to treat periods of excessive daytime sleepiness associated with hypersomnia conditions, including idiopathic hypersomnia and narcolepsy. There are currently three medications approved by the U.S. Food and Drug Administration in the treatment of excessive daytime sleepiness: modafinil, armodafinil, and sodium oxybate. Sodium oxybate has the added benefit of reducing periods of cataplexy in patients with narcolepsy in addition to reducing excessive daytime sleepiness.[6]

Modafinil is a stimulant medication that may treat drowsiness associated with narcolepsy, but it is also prescribed in other situations where sleep disorders cause excessive daytime sleepiness. Modafinil has been shown to improve daytime sleepiness by 50 percent among patients who take it for drowsiness. It also does not impact the body’s production of cortisol or melatonin, both of which are hormones released while a person sleeps, which further avoids disruption of sleep patterns. Modafinil is less likely to be abused as a stimulant, although there is a risk of habit formation.[6]

Unfortunately, modafinil must be used with some caution in older adults because the safety of its use in this population has not been completely examined. According to a literature review by Narcolepsy Network, research
participants in safety and effectiveness studies using modafinil ranged in age from 17 to 68 years old. Because these studies have not taken into account the use of modafinil in adults older than 68, it may be difficult to determine the effects of modafinil in older adults and elderly patients.[5]

In the past, providers were likely to prescribe stimulant medications such as methylphenidate (Ritalin®) and dextroamphetamine (Dexedrine®), which were used to reduce drowsiness and keep sleep-deprived people awake. They may still be used on occasion to treat sleepiness, but they have not been shown to be as effective as modafinil or armodafinil in the treatment of excessive drowsiness. Additionally, their effectiveness seems to wane over time, and the patient who takes them may need to take them continuously or more often over time to achieve the same effects.[6] These medications may not be appropriate for use among elderly clients as they may cause some unsafe side effects, including episodes of psychosis, anxiety, heart arrhythmias, and elevated blood pressure.[5]

**Antihistamine, Non-benzodiazepine and Benzodiazepine Drugs**

For people who suffer from insomnia, the opposite of stimulants are necessary and they may need medication to help them fall asleep. It should be noted that although sleeping pills and sedatives may cause a person with insomnia to fall asleep faster, the result is typically only temporary. The underlying causes of insomnia should also be addressed, which includes determining whether depression or anxiety are present or if there are other medical issues that might be contributing to insomnia.

Insomnia medications may be available by prescription or over the counter. Common medications that are available without a prescription and that can induce sleepiness include antihistamines, such as diphenhydramine
(Benadryl®), which may be combined with pain relievers if pain is a factor causing sleeplessness. While these drugs are easy to acquire, they may cause daytime drowsiness or grogginess upon awakening.

Non-benzodiazepine medications are available by prescription and include zolpidem (Ambien®) and eszopiclone (Lunesta®), among other brands. These medications are generally short acting and can promote several hours of sleep when taken at bedtime. Alternatively, benzodiazepine medications also induce sleep and may be prescribed for some patients, but they may have more side effects and can be dangerous when taken with alcohol. Examples of benzodiazepines include triazolam (Halcion®) and alprazolam (Xanax®).[60]

When taking medications, older adults must consider the effects of use and consider dosing adjustments if necessary. Elderly patients may suffer more side effects from some medications, particularly those that can induce sleep; older adults may need to start with a lower dose of medication compared to young adults and increase the dose as tolerated. Some studies have suggested that medications to induce sleep pose more risks for older adults than the benefits they provide.[60] If an elderly patient takes a medication to help insomnia but then gets up during the night, he or she may be at greater risk of falling or becoming injured due to excessive sleepiness the medication provides. All medications prescribed for older adults should be carefully reviewed according to each patient’s history and health to determine what the most appropriate dose and therapy should be.

**Surgical Treatment**

Surgical intervention for sleep difficulties is most common for treatment of obstructive sleep apnea. Surgical options are considered in cases where
CPAP or BiPAP are not effective or tolerated by the patient or when sleep apnea is significant and other forms of treatment have not been helpful. Surgery for sleep apnea changes the structures of the mouth, jaw, and throat to reduce instances of airway obstruction caused by these structures.

The most common type of surgery performed for the treatment of sleep apnea is uvulopalatopharyngoplasty (UPPP). This procedure involves removing some excess soft tissue at the back of the throat, including parts of the uvula and the soft palate. The UPPP is designed to open the structures at the back of the throat to avoid occlusion and to make breathing easier. It can also help the muscles that normally work to keep these structures open to better do their job.

The UPPP can be extensive for some people and most require at least one overnight stay in a hospital afterward. There is an increased risk of bleeding afterward because of the high vascularity of the tissues involved. Additionally, many people who have this surgery complain that it is quite painful because of its location.

Mild-to-moderate sleep apnea may also be treated with a pillar palatal implant, which involves inserting small rods into the soft tissue at the back of the mouth. The body responds to these items as a foreign substance and increases inflammation in the area, which can lead to scarring and causes the tissue to become firm. This improves the amount of vibration that occurs that leads to snoring. The procedure is much simpler compared to UPPP and often can be done in a doctor’s office.

Some people have obstructive sleep apnea because of a large tongue or a tongue that falls back against the back of the throat while asleep. In these
cases, positional therapy may help to keep the patient from sleeping on his or her back, which contributes to the problem. Alternatively, a hyoid suspension may be performed to lift the tongue and prevent it from causing an occlusion. The hyoid suspension involves manipulating the hyoid bone, which is normally found beneath the tongue, and moving it forward so that the tongue is less likely to fall backward due to gravity during sleep.

There are a number of other surgical procedures that may be appropriate, depending on the patient’s condition and health. Other types of surgical procedures involve the tonsils and adenoids, the tongue, and the nasal septum. Some patients cannot tolerate extensive surgery but would be fine with a minor surgical repair. Others may need more extensive procedures to alter the structures of the mouth and jaw to reduce obstruction associated with OSA and to improve overall sleep.

**Summary**

Despite sleep problems that may more likely occur with aging, older adults do not need to suffer through sleep deprivation on their own. Sleep disorders and lack of sleep are not normal parts of getting older and should not be accepted as such. With testing and diagnosis, healthcare providers can identify those problems suffered by the elderly that impact sleep habits and work to find management strategies that will improve sleep quality and health overall.

Among the varied treatment methods for insomnia in elderly adults, medications are a common and valid form of treatment. It's important for the clinician to carefully consider the types of medications used when treating elderly patients for a sleep disorder, and to recognize that many elderly patients already take multiple medications, which increases the risk of
adverse effects and drug interactions. The category of medications, dosage, time of day and the rationale for usage, much be evaluated cautiously by the clinician managing a sleep disorder for the elderly patient.

This course on Sleep Disorders Part III focused on both the similar and the unique considerations of diagnosis and treatment in the elderly individual as compared to the child/adolescent and adult with a sleep disorder. Part IV of this series will focus more specifically on the common and alternative medication categories used in the treatment of sleep disorders across all age groups, which includes the indications and recommendations for short and long courses of medication treatment.

Footnotes:


