**Sleep**

Circadian Rhythms (about a day)

* Biologic rhythms exist in plants, animals, and humans.
* In humans, these are controlled from within the body and synchronized with environmental factors, such as light and darkness.
* The most familiar biologic rhythm is the circadian rhythm. It is a sort of 24-hour internal biologic clock.
* Although sleep and waking cycles are the best known of the circadian rhythms, body temperature, blood pressure, and many other physiological functions also follow a circadian pattern.

**ANATOMY & PHYSIOLOGY REVIEW Reticular Activating System**

Nerve impulses from the senses reach the reticular activating system (RAS), which is in the reticular formation (located in the brainstem) with projections to the hypothalamus and cerebral cortex. The nerve fibers in the RAS relay impulses to the cerebral cortex for perception by the person.



**Types of Sleep**

Two types of sleep:

* **NREM** (non–rapid-eye-movement) sleep
* **REM** (rapid-eye-movement) sleep.

During sleep, NREM and REM sleep alternate in cycles. Changes in the architecture of one’s sleep can be linked to physiological or psychosocial changes.

NREM sleep occurs when activity in the RAS is inhibited. About 75% to 80% of sleep during a night is NREM sleep.

NREM sleep divided into three stages;

 **Stage 1**

* Is the stage of very light sleep and lasts only a few minutes.
* During this stage, the person feels drowsy and relaxed, the eyes roll from side to side, and the heart and respiratory rates drop slightly.
* The sleeper can be readily awakened and may deny that he or she was sleeping.

**Stage 2**

* Is the stage of sleep during which body processes continue to slow down. The eyes are generally still, the heart and respiratory rates decrease slightly, and body temperature falls.
* An individual in stage 2 requires more intense stimuli than in stage 1 to awaken such as touching or shaking.

**Stage 3**

* Is the deepest stage of sleep
* During deep sleep or delta sleep, the sleeper’s heart and respiratory rates drop 20% to 30% below those exhibited during waking hours.
* The sleeper is difficult to arouse.
* The person is not disturbed by sensory stimuli, the skeletal muscles are very relaxed, reflexes are diminished, and snoring is most likely to occur. This stage is essential for restoring energy and releasing important growth hormones.

**Physiological Changes During NREM Sleep**

* Arterial blood pressure falls.
* Pulse rate decreases.
* Peripheral blood vessels dilate.
* Cardiac output decreases.
* Skeletal muscles relax.
* Basal metabolic rate decreases 10% to 30%.
* Growth hormone levels peak.
* Intracranial pressure decreases.

**REM Sleep**

REM sleep usually recurs about every 90 minutes and lasts 5 to 30 minutes. Most dreams take place during REM sleep but usually will not be remembered unless the person arouses briefly at the end of the REM period.

During REM sleep, the brain is highly active, and brain metabolism may increase as much as 20%.

* During REM sleep, levels of acetylcholine and dopamine increase, with the highest levels of acetylcholine release occurring during REM sleep.
* Because both of these neurotransmitters are associated with cortical activation, it makes sense that their levels would be high during dreaming sleep.
* This type of sleep is also called paradoxical sleep because electroencephalogram (EEG) activity resembles that of wakefulness.
* Distinctive eye movements occur, voluntary muscle tone is dramatically decreased, and deep tendon reflexes are absent.
* In this phase, the sleeper may be difficult to arouse or may wake spontaneously.
* Gastric secretions increase, and heart and respiratory rates often are irregular.
* It is thought that the regions of the brain that are used in learning, thinking, and organizing information are stimulated during REM sleep.

**Sleep Cycles**

During a sleep cycle, people typically pass through NREM and REM sleep, the complete cycle usually lasting about 90 to 110 minutes in adults.

In the first sleep cycle, a sleeper usually passes through the first two stages of NREM sleep in a total of about 20 to 30 minutes.

Stage 3 lasts about 50 to 60 minutes. After stage 3 NREM, the sleep passes back through stages 2 and 1 over about 20 minutes.

Thereafter, the first REM stage occurs, lasting about 10 minutes, completing the first sleep cycle. It is not unusual for the first REM period to be very brief or even skipped entirely. The healthy adult sleeper usually experiences four to six cycles of sleep during 7 to 8 hours.



Figure 45–1

Time spent in REM and NREM stages of sleep in an adult.

The duration of NREM stages and REM sleep varies throughout the sleep period. During the early part of the night, the deep sleep periods are longer. As the night progresses, the sleeper spends less time in stage 3 of NREM sleep. REM sleep increases and dreams tend to lengthen. Before sleep ends, periods of near wakefulness occur, and stages 1 and 2 NREM and REM sleep dominate.

**Functions of Sleep**

* The effects of sleep on the body are not completely understood.
* Sleep exerts physiological effects on both the nervous system and other body structures.
* Sleep in some way restores normal levels of activity and normal balance among parts of the nervous system.
* Sleep is also necessary for protein synthesis, which allows repair processes to occur.
* The role of sleep in psychological well-being is best noticed by the deterioration in mental functioning related to sleep loss.
* Individuals with inadequate amounts of sleep tend to become emotionally irritable, have poor concentration, and experience difficulty making decisions.

**Normal Sleep Patterns and Requirements**

Although it used to be believed that maintaining a regular sleep/wake rhythm is more important than the number of hours actually slept, recent research has shown that sleep deprivation is associated with significant cognitive and health problems. Although reestablishing the sleep/wake rhythm (e.g., after the disruption of surgery) is important, it is appropriate to allow and encourage daytime napping in hospitalized clients.

**Newborns :**Newborns sleep 12 to 18 hours a day

Toddlers: Between 12 and 14 hours of sleep are recommended for children 1 to 3 years of age.

**Preschoolers:** The preschool-age child (3 to 5 years of age) requires 11 to 13 hours of sleep per night, particularly if the child is in preschool.

**School-Age Children:** The school-age child (5 to 12 years of age) needs 10 to 11 hours of sleep per night, but most receive less because of increasing demands (e.g., homework, sports, social activities). They may also be spending more time at the computer and watching TV.

**Adolescents:** Adolescents (12 to 18 years of age) require 9 to 10 hours of sleep each night; however, few actually get that much sleep.

* As children reach adolescence, their circadian rhythms tend to shift. Research in the 1990s found that later sleep and wake patterns among adolescents are biologically determined; the natural tendency for teenagers is to stay up late at night and wake up later in the morning. A psychosocial factor affecting later bedtime in the adolescent population is the desire for greater independence. The use of the Internet, watching television, and cell phone usage disrupts the ability to fall asleep due to blue-spectrum light exposure (Carskadon, 2011).

**Sleep Deprivation and Sleep Problems in Teens**

 Has difficulty waking in the morning for school.

 Falls asleep in class or during quiet times of the day.

 Increases the use of caffeinated beverages like coffee, soda, or energy drinks.

 Feels tired, making it difficult to initiate or persist in projects such as a school assignment.

 Is irritable, anxious, and angers easily on days when he or she gets less sleep.

**Adults**

Most healthy adults get 7 to 8 hours of sleep per night (National Sleep Foundation, n.d.d).

However, individual needs do vary—some adults may be able to function well (e.g., without sleepiness or drowsiness) with 6 hours of sleep, and others may need 10 hours to function optimally.

* Nurses need to teach adults the importance of obtaining sufficient sleep and provide tips on how to promote sleep that results in the client waking up feeling restored or refreshed. See Client Teaching later in this chapter.

**Older Adults:** Older adults (65 to 75 years) usually awaken 1.3 hours earlier and go to bed approximately 1 hour earlier than younger adults (ages 20 to 30).

* Older adults may show an increase in disturbed sleep that can create a negative impact on their quality of life, mood, and alertness.
* Some older clients with dementia may experience sundown syndrome. Although not a sleep disorder directly, it refers to a pattern of symptoms (e.g., agitation, anxiety, aggression, and sometimes delusions) that occur in the late afternoon (thus the name). These symptoms can last through the night, further disrupting sleep (National Sleep Foundation, n.d.b).

**Factors Affecting Sleep**

Both the quality and the quantity of sleep are affected by a number of factors.

* Sleep quality is a subjective characteristic and is often determined by whether a person wakes up feeling energetic or not.
* Quantity of sleep is the total time the individual sleeps.

**Illness**

Illness that causes pain or physical distress (e.g., arthritis, back pain) can result in sleep problems. People who are ill require more sleep than normal, and the normal rhythm of sleep and wakefulness is often disturbed.

Respiratory conditions can disturb an individual’s sleep. Shortness of breath often makes sleep difficult, and people who have nasal congestion or sinus drainage may have trouble breathing and hence may find it difficult to sleep.

People who have gastric or duodenal ulcers may find their sleep disturbed because of pain, often a result of the increased gastric secretions that occur during REM sleep.

Certain endocrine disturbances can also affect sleep.

* *Hyperthyroidism* lengthens presleep time, making it difficult for a client to fall asleep.
* *Hypothyroidism,* conversely, decreases stage 3 sleep.
* Women with low levels of estrogen often report excessive fatigue. In addition, they may experience sleep disruptions due, in part, to the discomfort associated with hot flashes or night sweats that can occur with reduced estrogen levels.

Elevated body temperatures can cause some reduction in delta sleep and REM sleep.

The need to urinate during the night also disrupts sleep, and people who awaken at night to urinate sometimes have difficulty getting back to sleep.

**Environment**

Environment can promote or hinder sleep.

* The person must be able to achieve a state of relaxation prior to entering a period of sleep.
* Noise in the environment—can inhibit sleep.
* The absence of usual stimuli or the presence of unfamiliar stimuli can prevent people from sleeping.
* Hospital environments can be quite noisy, and special care needs to be taken to reduce noise in the hallways and nursing care units. In fact, some hospitals have instituted “quiet times” in the afternoon on nursing units where the lights are lowered and activity and noise are purposefully decreased so clients can rest or nap.
* Discomfort from environmental temperature (e.g., too hot or cold) and lack of ventilation can affect sleep.
* Light levels can be another factor. A person accustomed to darkness while sleeping may find it difficult to sleep in the light.
* Another influence includes the comfort and size of the bed.
* A person’s partner who has different sleep habits, snores, or has other sleep difficulties may become a problem for the person also.

LIFESPAN CONSIDERATIONS Sleep Disturbances

**Children**

* Learning to sleep alone
* Trained night feeder.
* Sleep refusal
* Night terrors.

**Adults**

* New jobs, pregnancy, and babies are common examples that often disrupt the sleep of a young adult.
* The sleep patterns of middle-aged adults can be disrupted by the need to take care of older parents and/or chronically ill ­partners in the home.

**Older Adults**

* Side effects of medications
* Gastric reflux disease
* Respiratory and circulatory disorders, which may cause ­breathing problems or discomfort
* Pain from arthritis, increased stiffness, or impaired immobility
* Nocturia
* Depression
* Loss of life partner and/or close friends
* Confusion related to delirium or dementia.

**Interventions to promote sleep:**

* Reduce or eliminate the consumption of caffeine and nicotine.
* Be sure their environment is warm and safe, especially if they get out of bed during the night.
* Provide comfort measures, such as analgesics if indicated, and proper positioning.
* Enhance the sense of safety and security by checking on clients frequently and making sure that the call light is within reach. Answer the call light promptly.
* If lack of sleep is caused by medications or certain health ­conditions, interventions should focus on resolving the ­underlying problem.
* Evaluate the situation and find out what the rest and sleep disturbances mean to the client. They may not perceive sleeplessness to be a serious problem, but will just do other activities and sleep when tired.

**Lifestyle**

* Following an irregular morning and nighttime schedule can affect sleep.
* Moderate exercise in the morning or early afternoon usually is conducive to sleep, but exercise late in the day can delay sleep.
* The person’s ability to relax before retiring is an important factor affecting the ability to fall asleep. It is best, therefore, to avoid doing homework or office work before or after getting into bed.
* Night shift workers frequently obtain less sleep than other workers and have difficulty falling asleep after getting off work.

**Emotional Stress**

* Stress is considered by most sleep experts to be the one of the greatest causes of difficulties in falling asleep or staying asleep.
* A person who becomes preoccupied with personal problems (e.g., school- or job-related pressures, family or marriage problems) may be unable to relax sufficiently to get to sleep.
* Anxiety increases the norepinephrine blood levels through stimulation of the sympathetic nervous system. This chemical change results in less deep and REM sleep and more stage changes and awakenings.

**Stimulants and Alcohol**

* Caffeine-containing beverages act as stimulants of the central nervous system (CNS). Drinking beverages containing caffeine in the afternoon or evening may interfere with sleep.
* People who drink an excessive amount of alcohol often find their sleep disturbed.

**Diet**

* Weight gain has been associated with reduced total sleep time as well as broken sleep and earlier awakening.
* Weight loss, on the other hand, seems to be associated with an increase in total sleep time and less broken sleep.
* Dietary l-tryptophan—found, for example, in cheese and milk—may induce sleep, a fact that might explain why warm milk helps some people get to sleep.

**Smoking**

* Nicotine has a stimulating effect on the body, and smokers often have more difficulty falling asleep than nonsmokers. Smokers are usually easily aroused and often describe themselves as light sleepers.

**Motivation**

* Can increase alertness in some situations (e.g., a tired person can probably stay alert while attending an interesting concert or surfing the web late at night).

**Medications**

Some medications affect the quality of sleep.

* Most hypnotics can interfere with deep sleep and suppress REM sleep.
* Beta-blockers have been known to cause insomnia and nightmares. Narcotics, such as morphine, are known to suppress REM sleep and to cause frequent awakenings and drowsiness.
* Tranquilizers interfere with REM sleep.
* Although antidepressants suppress REM sleep, this effect is considered a therapeutic action. In fact, selectively depriving a depressed client of REM sleep will result in an immediate but transient improvement in mood.
* Clients accustomed to taking hypnotic medications and antidepressants may experience a REM rebound (increased REM sleep) when these medications are discontinued.