Nurse health: Sleep

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Last year we focused on patient wellness. This year we shine a light on nurse health and wellness. Each month we'll dig into important topics for your health, such as sleep, nutrition, and exercise. In this first article, we discuss sleep, including the importance of sleep, the negative effects of not sleeping enough, and how to create positive changes in the work environment.

The ins and outs of sleep

At this time, a full and complete understanding of sleep is lacking, but what's known is that sleep is necessary for overall well-being. It's beneficial for cognitive function, growth, hormonal control, appetite, the immune system, short- and long-term memory, stress reduction, and overall health. It also provides a time for restoration and repair. When sleeping, body functions slow, including metabolism, which can drop by 20% to 30%. Sleep also correlates with changes in the peripheral nervous, endocrine, cardiovascular, respiratory, and muscular systems.

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Although often associated with sleep, circadian rhythm broadly describes a 24-hour day-night pattern that carries out essential functions and processes and is highly influenced by light. For the purposes of this article, circadian rhythm pertains to the sleep-wake cycle. Sleep preferences vary among individuals; for example, some people are more active in the morning and prefer to wake up early, whereas others prefer to wake up late and be more active at night. Along with the hypothalamus (the area of the brain that plays a major role in sleep), the circadian rhythm causes alertness with light exposure and initiates melatonin production to aid in sleep.

There are two types of sleep: non-rapid eye movement sleep (NREM) and rapid eye movement sleep (REM). NREM sleep is split into three stages, with each stage of sleep progressively getting deeper. With NREM sleep, physiologic functions slow, muscles relax, and vital signs drop.

NREM stage 1 is a light stage of sleep and accounts for approximately 5% of total sleep time. When in NREM stage 1, a person will wake easily, especially if sensory stimuli are present, such as a light source or noise. If you've ever felt yourself jump and wake, you were most likely in this stage of sleep.

NREM stage 2 is also a light stage of sleep, although it's a deeper sleep than stage 1 and makes up approximately 50% of our total sleep time. Individuals in this stage of sleep are easily aroused, but less so than when in NREM stage 1. In NREM stage 2, the person will start to relax,

brain and muscle activity slows, and vital signs start to decrease.

NREM stage 3 is a deep sleep, accounting for 20% to 25% of total sleep time. Individuals in NREM stage 3 are difficult to wake and may be disoriented if awoken. In this stage, the parasympathetic nervous system takes over, which further reduces vital signs and leads to muscle relaxation. When in this stage of sleep, brain and muscle activity are further reduced and the person won't move around much. This is a restorative stage that helps with cellular repair. Additionally, during NREM stage 3, human growth hormone is released, which also aids cellular repair.

REM sleep is a period of restoration and it also helps with memory storage and learning. This stage of sleep makes up approximately 25% of total sleep time. During REM sleep, the brain is active, the eyes move rapidly, and the muscles twitch. An individual's vital signs may fluctuate, pulse may become irregular, gastric secretions increase, and deep tendon reflexes decrease when in REM sleep.

Before falling asleep, a person will enter a presleep stage that typically lasts 10 to 30 minutes. In individuals who struggle with sleep, this presleep stage can last for 1 hour or more. Throughout the night, a person cycles between NREM and REM sleep. Each person typically cycles four to six times per night, with the length of each cycle approximately 90 to 110 minutes. The REM phase begins at the end of the 90- to 110-minute cycle. With each cycle of REM sleep, the length of time a person is in the REM stage will increase, highlighting the importance of sleeping throughout the night without waking. Frequent awakenings can negatively impact the amount of REM sleep a person accumulates. When individuals don't get enough REM sleep, they may become confused and have difficulty with learning and concentration.

When discussing sleep, it's necessary to cover dreams as well. Many people believe that dreaming only occurs during REM sleep, but it happens in both NREM and REM. In stage 3 NREM, individuals dream, but the dreams are less vivid than dreams in REM sleep. It's believed that dreams occurring during REM sleep play an important role in memory and stress adaptation. It's interesting to note that personality may affect dreams; for example, individuals who are creative tend to have vivid dreams.

By the numbers

Insufficient sleep has been associated with medical errors and decreased quality of patient care. Individuals who are awake for 17 hours or more show performance similar to being under the influence of alcohol, and the effects increase with each additional hour awake. Research has shown that staying awake for 18 hours or more results in impairments similar to someone with a blood alcohol concentration (BAC) of 0.05; after 24 hours, this increases to a BAC of 0.10. In the US, a BAC of 0.08 is defined as legally drunk.

Research has shown that working 12.5-hour shifts increases the risk of patient care errors by three times when compared with nurses working 8.5-hour shifts. The second half of a 12-hour night shift is associated with increased attention lapses and reduced reaction times. Fatigue can also lead to difficulty concentrating, irritability, decreased motivation, slowed reaction time, difficulty communicating, and increased errors and injuries.

Factors affecting sleep

Up to 70 million adults in the US have sleep-wake problems. A variety of factors can affect sleep and lead to sleep-wake problems, such as:

- activity
- diet
- nicotine
- caffeine
- alcohol
- drugs (both illegal and legal)
- illness
- emotional stress
- environment
- work schedules.

consider this

You're working your regularly scheduled shift in a long-term-care facility. It's your last 12-hour shift for the week, after working 12-hour shifts on the 2 previous days. Near the end of your shift, the nurse scheduled to take over for you calls out. You're unable to find a replacement nurse and must work an additional 8 hours. While working the additional 8 hours, you make a medication error and your resident is sent to the hospital and subsequently admitted. Could you have done anything differently? How can this problem be addressed at a system level?

Physical activity is helpful for sleep but can be a hinderance if completed less than 2 hours before bedtime. Diet is also important to consider when it comes to sleep. It's recommended that heavy, spicy meals be avoided before bed. Light snacks won't typically cause difficulty with sleep.

Nicotine and caffeine are stimulants and, as such, may make falling asleep and staying asleep difficult. Alcohol can disrupt REM sleep and acts as a diuretic, leading to frequent nighttime awakenings. When taking medication, individuals should know what they're taking; why they're taking it; and any associated adverse reactions, particularly those that affect sleep.

Illnesses that cause symptoms such as pain, breathing difficulty, nausea, anxiety, and depression can cause sleep difficulties. The two biggest components in the environment affecting sleep are noise and light. Both should be avoided to promote effective sleep.

Shift work and long work hours can lead to inadequate amounts of sleep for nurses. Shift work is defined as working hours outside of the 7 a.m. to 6 p.m. time frame and long hours is defined as working more than 40 hours per week or 8 hours per shift. Nurses who work night shift are at increased risk for sleep problems. Research has shown that night-shift nurses sleep less than nurses working other shifts. Over half of nurses working the night shift report sleeping 6 hours or less per day. Working three or more night shifts in a row has also been associated with sleep disruptions.

Health risks associated with poor sleep

Sleep problems have been associated with negative short- and long-term health outcomes and an increased risk of motor vehicle crashes.

In the short term, poor sleep may lead to hormone imbalance, anorexia, weight loss, anxiety, restlessness, irritability, and impaired judgment. Lack of sleep can cause increased levels of cortisol, known as the stress hormone, and ghrelin, known as the hunger hormone. It's also associated with decreased levels of leptin, a protein made in fat cells that helps regulate hunger. Decreased leptin levels lead to increased hunger and subsequent weight gain. In addition to hormone problems, insufficient sleep can increase sympathetic nervous system activity, leading to increased BP and heart rate.

In the long term, insomnia and insufficient sleep can cause chronic health problems. Poor sleep is associated with an increased risk of the following conditions:

- cardiovascular disease
- hypertension
- myocardial infarction
- stroke
- diabetes mellitus
- metabolic syndrome
- obesity
- gastrointestinal disorders
- musculoskeletal disorders
- cancer
- adverse reproductive outcomes
- psychological disorders
- depression.

Many nurses report feeling sleepy when driving home after a night shift,

increasing the risk of motor vehicle crashes. When compared with individuals sleeping 8 hours or more per night, those who sleep 6 to 7 hours are twice as likely to be involved in a crash and those who sleep 5 hours or less are four to five times more likely to be involved in a crash. It has been estimated that 100,000 motor vehicle crashes occurring in the US each year are related to driver fatigue. Of these accidents, approximately 1,550 deaths and 71,000 injuries occurred, and it's believed that the actual numbers may be higher due to difficulty determining if fatigue is a related factor and inconsistent reporting.

Sleep hygiene

So, what can you do to achieve better sleep? To practice sleep hygiene, spend time in the sun to help boost the circadian rhythm, have a regular routine, practice relaxation techniques (such as deep breathing, meditation, progressive muscle relaxation, or taking a warm bath), and keep your bedroom dark and noise free. Avoid sleep aids, stimulants, alcohol, and heavy meals/carbohydrates before bed.

It's recommended that people go to bed and wake up at the same time each day and night, even on weekends/days off. If you feel that you must nap, it's recommended that naps be kept to a minimum of 20 to 30 minutes in length. It's also important to get out of bed and do a quiet activity, such as reading, if you can't fall asleep within 30 minutes. Keep in mind that quiet activities shouldn't involve electronic devices because they can impair sleep.

In addition to practicing sleep hygiene, nurses can help develop policies within healthcare organizations that promote sleep health. Consider the following:

- Set limits on the length of shifts, number of hours worked per week, and number of shifts assigned per week. It's recommended that nurses not be scheduled for shifts longer than 12 hours in length.
- Avoid scheduling night shifts longer than 8 hours.
- Develop schedules that allow for at least 10 hours off between shifts.
- Avoid working more than 40 hours per week.
- Develop educational programs addressing sleep, including the importance of sleep for both nurse and patient safety.
- Have a procedure in place for transporting nurses who are too tired to drive home. Alternately, sleep rooms can be made available for these nurses.
- Develop staffing plans, particularly for extreme conditions, such as natural disasters or massive influxes of patients as seen in the current COVID-19 environment.
- Create policies that allow nurses to reject assignments if they feel fatigued or unsafe.
- Eliminate mandatory overtime practices.
- Develop predictable schedules.
- Ensure that breaks are taken.

The American Nurses Association (ANA) highlights the importance of shared responsibility between nurses and their employers. The ANA supports and encourages both individual nurses and employers in recognizing the importance of sleep. Rest and sleep should be considered when it comes to assigning and accepting patient assignments and shifts, including on-call shifts. Employers should carefully consider

Costs to employers

Fatigue and poor sleep can lead to significant financial expenditures for employers through:

- increased healthcare premiums
- workers' compensation costs
- early disability
- recruitment costs
- training costs
- legal fees.

the implications of policies, such as those pertaining to mandatory overtime. Employers should also regularly review schedules to ensure that appropriate staffing levels are maintained and scheduled hours are safe and appropriate (see *Costs to employers*).

Nurses to the rescue

As a nurse, you need to advocate for yourself and your patients by not allowing yourself to be put in a situation in which you could harm your patient or yourself due to lack of sleep. Nurses working in management positions should ensure an atmosphere where safety and a healthy work environment are top priorities. By working together, nurses and employers can address the problem of insufficient sleep and create a safer working environment, ultimately improving patient and nurse safety, in addition to patient and nurse satisfaction. ■

on the web

ANA:
www.nursingworld.org/practice-policy/nursing-excellence/official-position-statements/id/addressing-nurse-fatigue-to-promote-safety-and-health

National Institute for Occupational Safety and Health:
www.cdc.gov/niosh/docs/2015-115/default.html

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