



CLOUD PEAK
ENERGY®

Fatigue Management

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Agenda

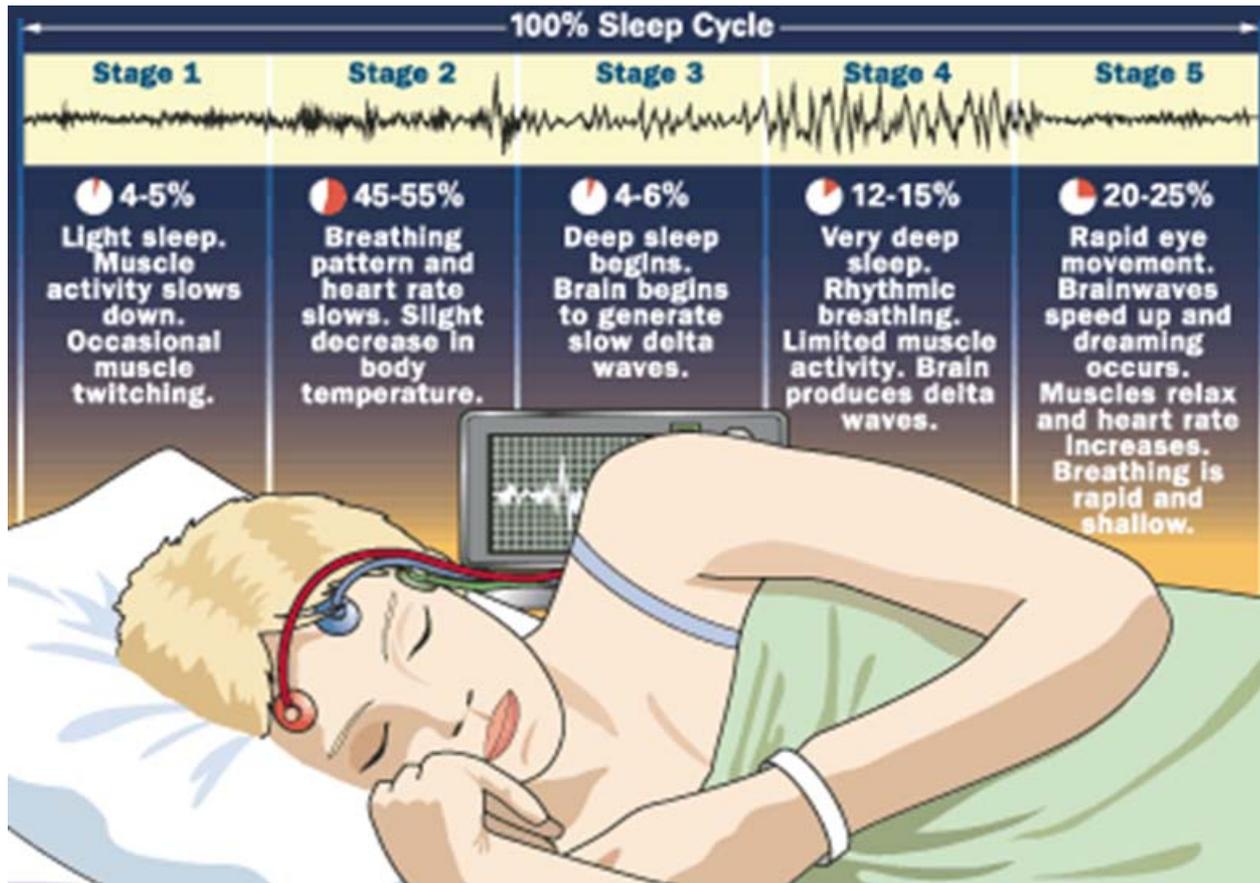
- **Body's Response to Sleep**
- **Sleep Deprivation**
- **Benefits of Sleep**
- **Getting Better Sleep**
- **Sleep and Shift Work**

Poor Sleep is a Serious Problem

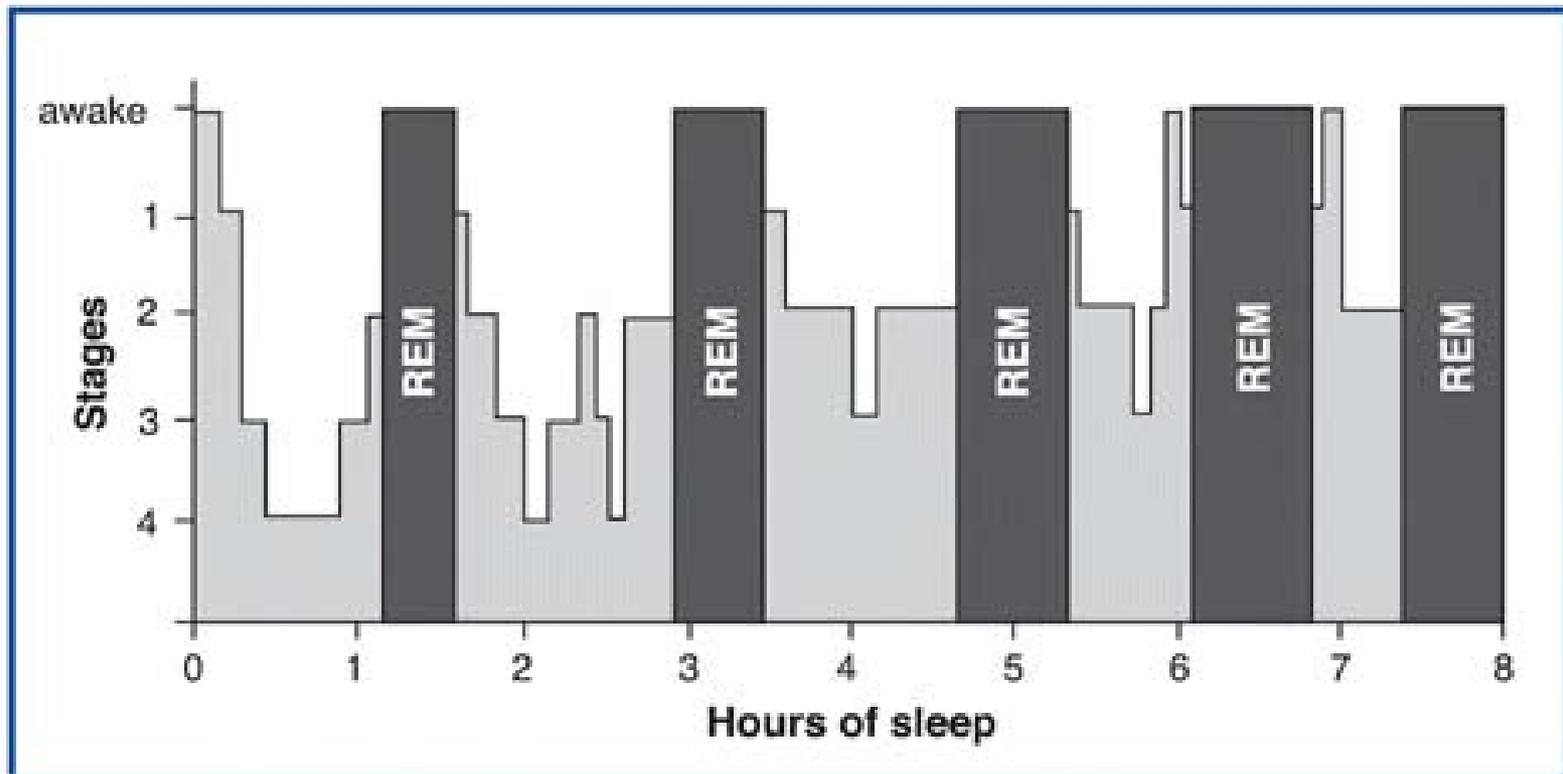
- Thirty to forty percent of the U.S. population suffers from occasional insomnia.
- Lack of sleep is directly linked to poor health, increased risk of diabetes, heart disease, and obesity.
- A few nights of bad sleep can lead to physical ailments such as headaches, stomach problems, and sore joints.
- We do not adapt to sleep deprivation. Performance and alertness decrease as sleep deprivation increases.
- According to the National Highway Traffic Safety Administration, one in five drivers admits to have fallen asleep at the wheel.
- Three in ten working adults say they have missed work or made errors at work because of sleep-related issues.

Types of Sleep

- **The brain does not shut down passively and uniformly during sleep.**
 - It passes through several different patterns of activity in an orderly fashion.
 - Several discrete stages of sleep based on different combination of brain wave pattern, eye movement, and muscle tone.
- **Sleep is divided into two major types:**
 - Non-REM, or quiet sleep
 - REM, or dreaming sleep



Sleep Architecture

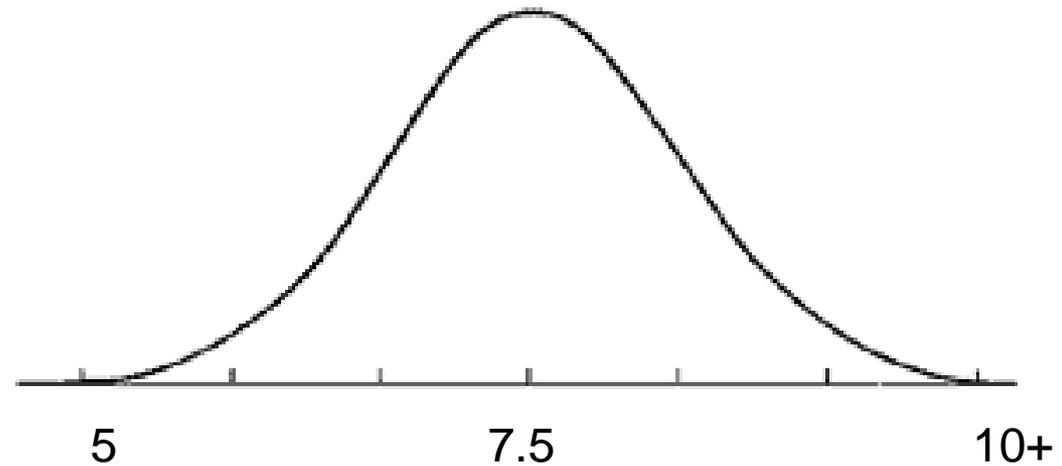


Sleep Need

Types of Sleepers

Short/Standard/Long

- Short sleepers: 5 hours of sleep or less
- Standard sleepers: 7-8 hours of sleep
- Long sleeper: 10+ hours of sleep



Standard/Larks/Owls

- Standard sleepers: 10:30pm-6:30am
- Larks: "Early to bed, early to rise"
- Owls: Go to bed late, sleep late



90 Minute Cycle

Alarm Clock	6 hours	7.5 hours	9 hours
5:00 am	11:00 pm	9:30 pm	8:00 pm
5:30 am	11:30 pm	10:00 pm	8:30 pm
6:00 am	12:00 am	10:30 pm	9:00 pm
6:30 am	12:30 am	11:00 pm	9:30 pm
7:00 am	1:00 am	11:30 pm	10:00 pm
7:30 am	1:30 am	12:00 am	10:30 pm
8:00 am	2:00 am	12:30 am	11:00 pm

Best to sleep in 90 minute intervals.

Sleep Deprivation

Sleep Debt: Body needs a certain amount of sleep to function at its best.

Sleep Debt Exercise: For simplicity we'll use 8 hours of sleep.

- Monday: 5 hours of sleep (3 hour debt)
- Tuesday: 6 hours of sleep (2 hour debt)
- Wednesday: 7 hours of sleep (1 hour debt)
- For those three days you have built up 6 hours of sleep debt (3+2+1) for that week.

Constant weekly sleep debt leads to sleep deprivation.

Sleep Deprivation

Partial Sleep Deprivation

- Occurs when you get some sleep, but not 100 percent of what you need.
- Work performance decreases, headaches, stomach problems, sore joints.
- Higher risk of falling asleep on the job and while driving home.

Complete Sleep Deprivation

- Simple tasks suddenly become hard.
- Hand-eye coordination and reaction time decrease.
- Mood swings, depression, increased feelings of tension.

Sleep Deprivation

Microsleeps and Automatic Behavior

- **Microsleeps** are brief episodes of sleep that occur in the middle of an ongoing wakeful activity.
 - “Nodding-off” while driving.
- **Automatic behavior** refers to a period of several minutes or more during which a person is awake and performing routine duties but not attending to their surroundings or responding to changes in their environment.
 - Driver who keeps his car on the road but misses his intended exit.
- **Microsleeps and automatic behavior play a role in thousands of tragic transportation accidents a year.**



Repaying Sleep Debt

Short-term:

- If you've built up ten hours of sleep debt over a week, several days of getting the sleep you need, plus an additional hour or so per night, should take care of the debt.

Long-term:

- If you have accumulated hundreds (even thousands) of hours of sleep debt due to a lifetime of bad sleep habits, it won't take you years to repay, just a few weeks.

You don't have to make up every hour.

Benefits of Sleep

Alertness/Performance

- Studies show that people who get enough sleep vs. those who don't outperform on driving simulators and reaction time tests.
- When you are well rested, you feel vigorous and can take on problems at work.

Memory/Concentration/Creativity

- Getting enough sleep is associated with improved memory and creativity.
- Instead of wasting time, you become more efficient during work and at home.

Better Health

- Short-term sleep debt is associated with headaches and stomach discomfort.
- Long-term sleep debt is linked to obesity, heart problems, diabetes and shorter life spans.
- People who get sufficient sleep after months/years of sleep debt see improvement in their overall health.

Six Steps to Getting Better Sleep

1. Recognize the Importance of Sleep

- Sleep is essential to good health, so you need to block out sufficient time to get the sleep your body needs.

2. Adopt a Healthy Lifestyle

- Healthy habits, like regular exercise, healthy diet, avoiding tobacco and excessive alcohol set the stage for good sleep.
- Research shows that exercise provides three critical benefits: you fall asleep faster, attain a higher percentage of deep sleep, and awaken less often during the night.
- Strive to maintain a high-fiber, low-fat diet that's rich in fruits, vegetables and whole grains.

3. Maintain Good Sleep Habits

- Keep a regular sleep/wake schedule.
- Practice stress management techniques before bed.
- Avoid too many naps.
- If you can't sleep get out of bed.

4. Optimal Sleep Environment

- Dark, cool room.

5. Watch Out for Sleep Saboteurs

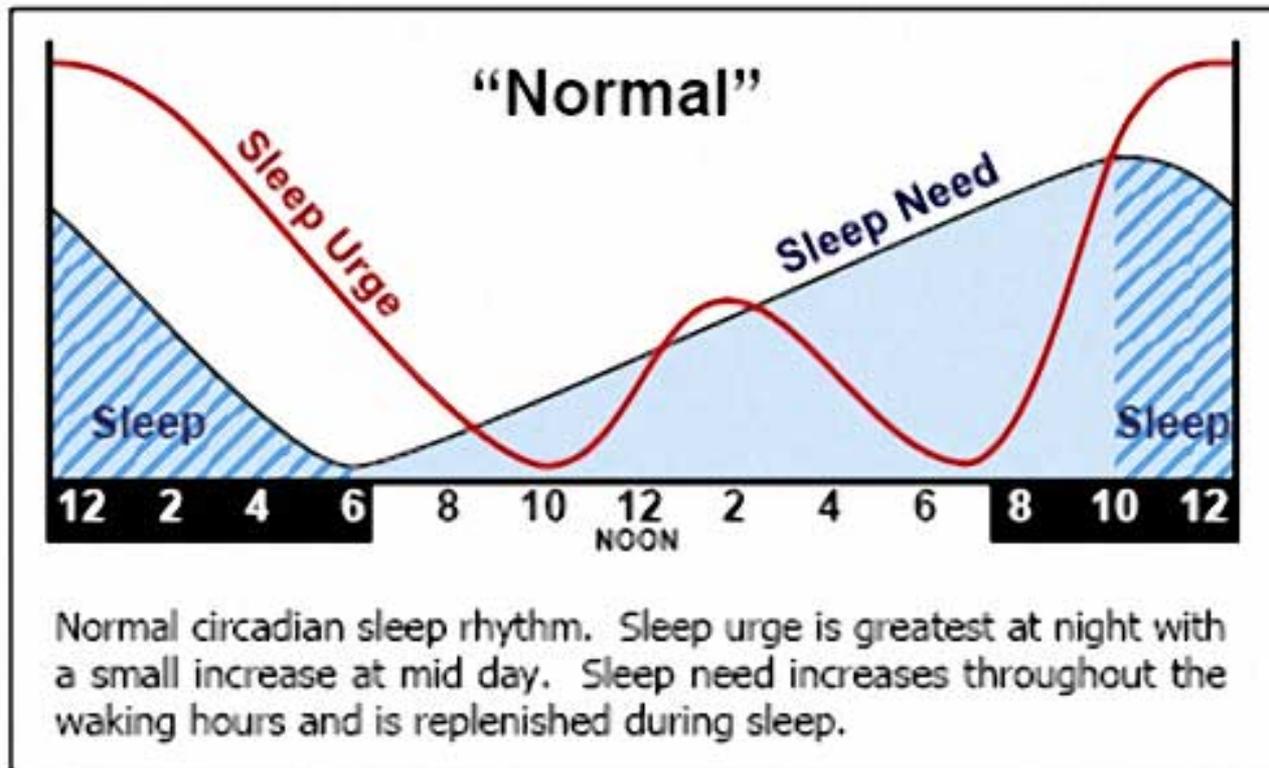
- Limit caffeine and alcohol.
- Quit tobacco.
- Right balance of fluids.
- Avoid foods that give you heartburn.

6. Seek Help

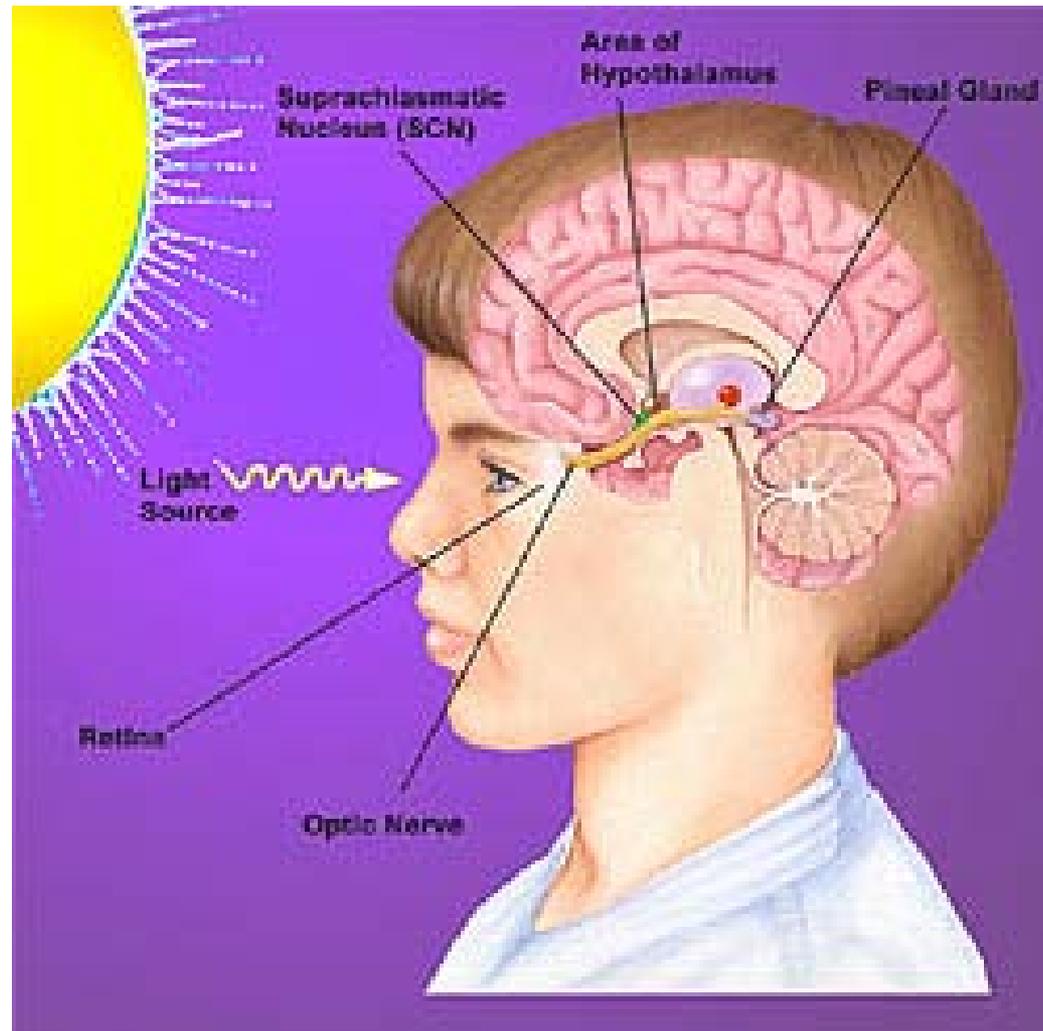
- Talk to your doctor.
- Go to a sleep lab.

Shift Work and Sleep: Circadian Rhythm

- Internal clock: controls the ups and downs of physiological patterns.
- Circadian rhythm of sleep and wakefulness makes your desire for sleep stronger between midnight and dawn.



Influence of Light

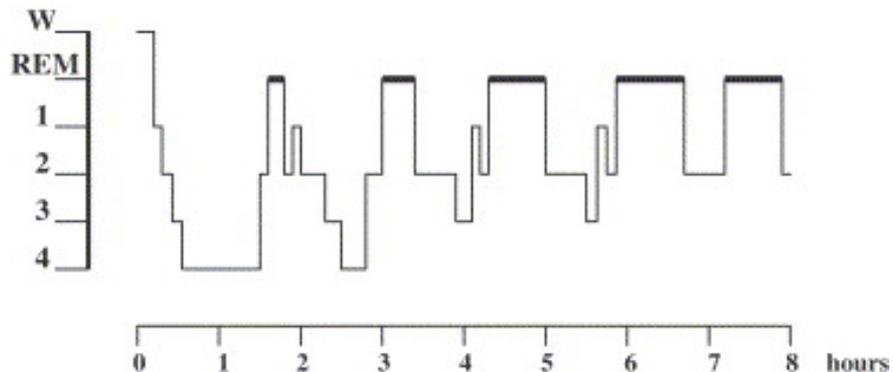


Shift Work and Sleep

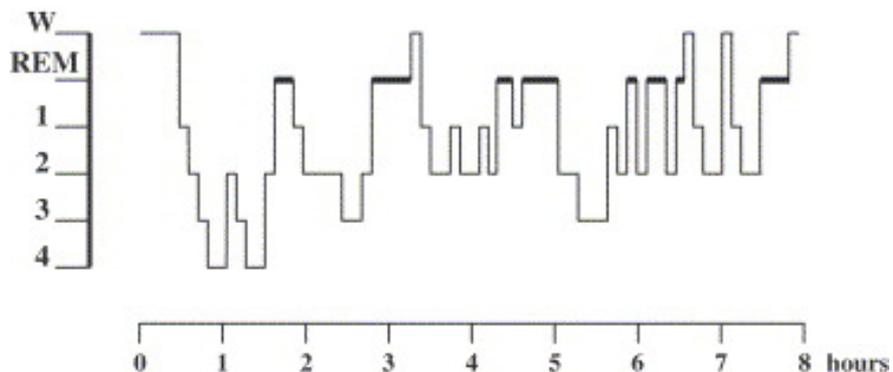
- **Shift work is challenging because it forces you to live out of sync with the natural circadian rhythm.**
- **Shift workers need to be alert at times when their bodies are naturally drawn to sleep, and they must try to sleep at times when their bodies are geared for wakefulness.**
- **No matter how many days, months, years a person works at night, the morning sunlight that greets him/her when the night shift ends sends a message to the brain that it is time to wake up.**
- **It doesn't help people that tend to revert to a traditional sleep/wake schedule on days off, so they can spend leisure time with family and friends.**
- **Bottom line: Most shift workers live in a state of constant circadian disruption.**

Night Sleep vs. Day Sleep

Night sleep pattern

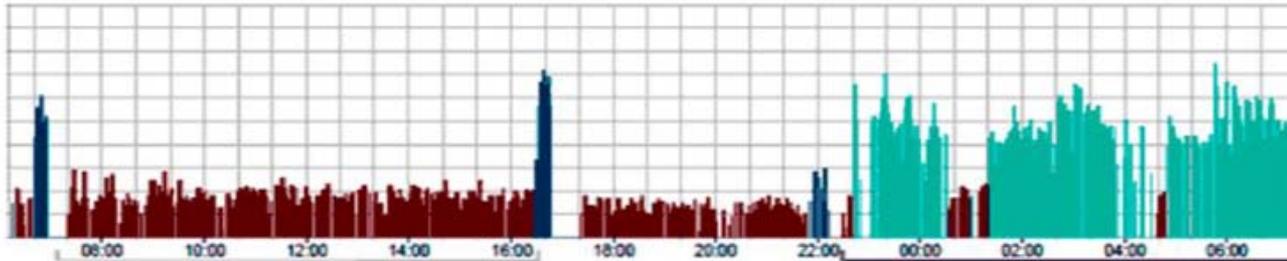


Shift worker sleeping during the day

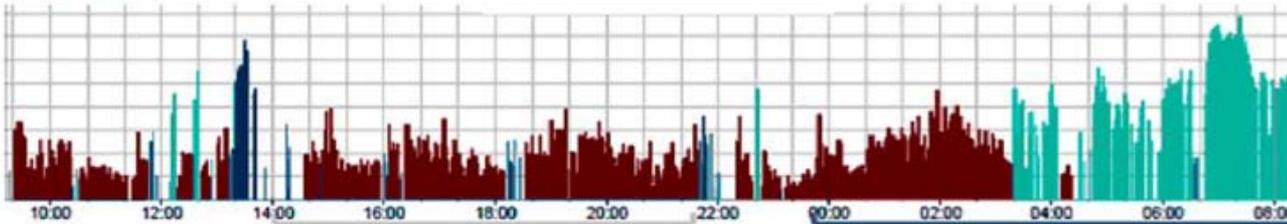


Recovery Time

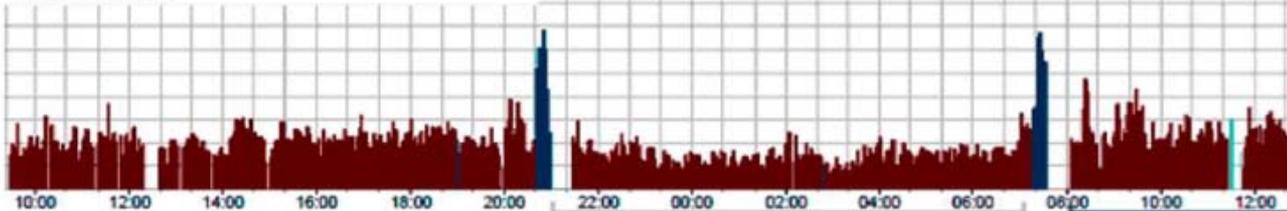
Early shift



Late shift



Night shift



Factors That Influence Sleep and Shift Workers

Eight-hour vs. Twelve-hour Day

- Twelve-hour days are more favorable among employees but they lead to greater sleep deprivation.

Fixed vs. Rotating

- Employees on a fixed schedule can adjust to sleeping a bit better; but no one can ever completely adjust to working nights and sleeping days all the time.

Speed of Rotation

- Faster schedules allow less time for shifting the circadian cycle.

Direction of Rotation

- Forward-rotating (days-evenings-nights) schedules are theoretically easier to adapt to than backward-rotating (days-nights-evenings) schedules.

Shift Change Time

- Morning shift changes between 6 am and 8 am tend to be best. An early changeover can make it easier for people on the night shift to fall asleep when they get home, but may lead those on the day shift to become sleep deprived, since they need to rise so early

Coping Strategies for Shift Workers

Make Sleep a Priority

- Very important that spouse/family understand.

Develop Sleep Strategy

- Aim for 4.5 hours right when you get home.
- Aim for 3 hours of sleep before work in the evening.

Create a Haven for Sleep

- Dark, cool room, block out the sun, outside noises, turn the phone off.

Protect Your Sleep

- Tell your friends and family.
- Schedule appointments for late in the afternoon, or on days off.

Use Strategic Naps

- If you are working night shift, sleep in 90 minute blocks.
- Try taking a 90 minute nap before you go to work.
- Take a 15 minute nap on your lunch break on overnights.

Avoid Morning Sunlight

- Wear sunglasses on the way home from work.
- Don't stop and run errands after getting off night shift.

Guard Against Alertness Lapses

- Overnight hours are high-risk time for accidents, with predawn typically the toughest.

Be Wise with Caffeine

- Limit yourself to one or two cups a shift, at times that you need it.

Night Shift Nutrition

- **Nutrition is a very important aspect of fatigue management.**
- **By eating healthy meals and snacks, you can give your body enough energy that it helps to ward off fatigue.**
- **Digestive system is not fully functioning at night, it shuts down and can only process small amounts of food at a time.**
- **Before night-shift (dinner time/5pm), have a larger meal. Something high in healthy protein and high in complex carbs.**

Skip large meals over night and opt for “grazing” instead.

Grazing uses small snacks throughout your shift, instead of packing one large meal at break time, such as:

- Nuts, seeds, trail mix
- Low fat cheese and crackers
- Rolled up slices of deli meats
- Veggies and dried fruit
- Yogurt

Stay Hydrated

Staying hydrated all day helps keep your body’s systems active and working properly.

Energy Drinks

- **If you're skimping on sleep, you might not want to count on high-sugar, low-caffeine "energy drinks" to keep you alert for long.**
- **Studies have shown that after the initial 30 minutes of “help” a person’s alertness declines at a rapid pace. Often decreasing alertness more than before consumption.**
- **Better option than energy drinks, is a cup of plain black coffee. The caffeine in the coffee is more likely to help your attention levels.**
- **Just remember with coffee, limit it to two cups a day and try to avoid it two hours before bedtime.**

Summary

- **Sleep is when your body and mind recover.**
- **Ninety minute cycles.**
- **Repay your sleep debt.**
- **Eat a healthy well-balanced diet.**
- **Avoid coffee and caffeine two hours before bedtime.**



**If you have questions, please feel free to email me at
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