

## UNDERSTANDING THE INTERSECTION OF SLEEP AND SHIFT WORK

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### OBJECTIVES

- Describe the importance of sleep to health and safety.
- Review the sleep cycle and how interruptions contribute to short sleep.
- Describe healthy sleep habit strategies for shift workers.
- Outline administrative practices for managers to help staff improve sleep.

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“Sleep is for Sissies”

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THE SLEEP-HEALTH PARADIGM

- Sleep is essential to health.
- Short sleep=  $\leq 6$  hours/24-hour period.
- 30% of US workers report short sleep.

CDC, 2012

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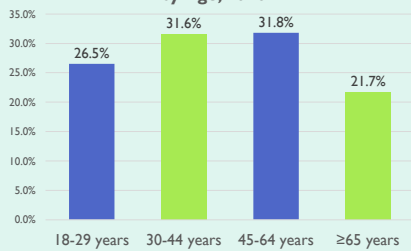
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US Workers Experiencing Short Sleep by Age, 2010



CDC, 2012

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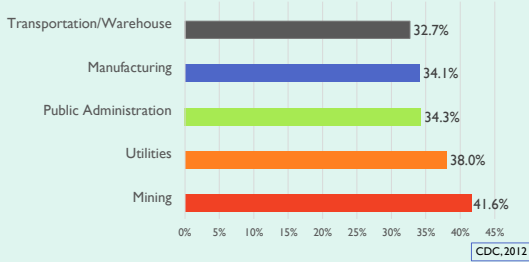
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### US Workers Experiencing Short Sleep by Industry, 2010



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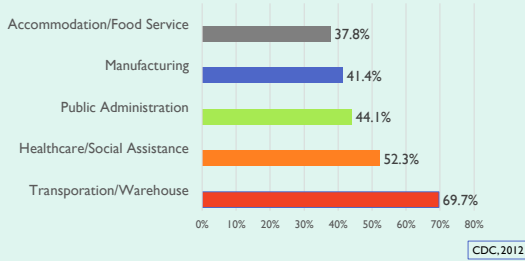
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### US NIGHT SHIFT Workers Experiencing Short Sleep, 2010



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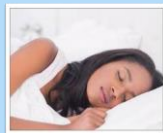
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### THE SLEEP-HEALTH PARADIGM

Sleep is an active restoration process.



NIOSH, 2015

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SHORT SLEEP IMMEDIATE SYMPTOMS:

- Microsleeps
- Poor cognition
- Irritability/Mood disturbances
- GI symptoms



NIOSH,2015

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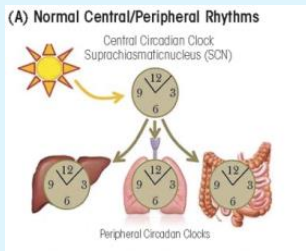
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Synchronized Circadian System



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SUPRACHIASMATIC NUCLEUS

A.K.A. -- Circadian Rhythm Clock

Regulates:

- Body temperature
- Melatonin
- Cortisol
- Leptin
- Grehlin
- Digestion
- Insulin/glucose balance

Czeisler & Buxton,2017

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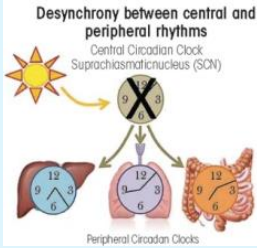
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### Desynchronized Circadian System



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#### LONG-TERM HEALTH ISSUES RELATED TO SHORT SLEEP

- Hypertension
- Cardiovascular disease
- Obesity
- Metabolic syndrome
- Diabetes
- Cancer (most studied: breast)
- Reproductive issues
- Depression, anxiety

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#### CHRONIC HEALTH PROBLEMS EXACERBATED BY SHORT SLEEP:

- Rheumatoid arthritis
- Asthma
- Hypertension
- Cardiovascular disease
- GI disorders
- Diabetes
- Psychiatric/mood disorders
- Drug & alcohol abuse
- Seizure disorders

Sood, 2003

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RISK FOR REOCCURRENCE OF MAJOR CARDIAC EVENT

Short sleep: risk ↑ 29%

Obstructive sleep apnea: risk ↑ 12%

Night shift work: risk ↑ 15%

All three factors = 2 fold increased risk

Barger et al., 2017

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SLEEP = HEALTHY LIVING



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SLEEP AND SAFETY:  
HOW SLEEP IMPACTS SAFETY ON AND OFF THE JOB.



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SHORT SLEEP =  
POOR DECISION MAKING

- Increases impulsivity and risk taking
- Decreased self-awareness of poor performance

Lamond & Dawson, 1999; Williamson & Feyer, 2000

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**Short sleep = decreased cognition  
= increase accidents/injuries.**

- 15% higher risk for evening shift
- 28% for night shift
  
- 13% higher risk for 10-hr shifts
- 28% increase for 12-hr shifts
  
- Increased risks for consecutive night shifts worked

Folkard & Lombardi, 2006

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SHORT SLEEP = \$\$\$ LOST

Estimated annual cost to United States economy

**\$411 Billion Dollars**



Hafner et al., 2016

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OFF DUTY RISKS: DROWSY DRIVING

Short sleep leads to increased driving risks.



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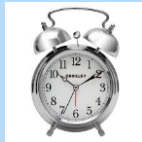
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THE SLEEP CYCLE:  
HOW IT WORKS

Sleep regulation components:

1. Homeostatic sleep drive
2. Circadian rhythms



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THE SLEEP CYCLE:  
HOW IT WORKS

Homeostatic Sleep Drive

- Sleep pressure increases the longer we are awake.
- The pressure decreases with sleep
- Reaches an ideal level with high quality sleep



Czeisler & Buxton, 2017

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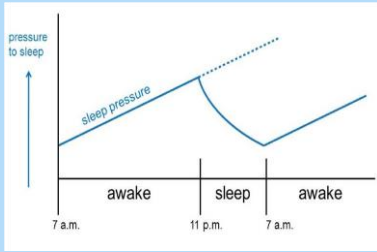


Figure 2.3. Homeostatic sleep drive is the pressure to sleep ("sleep pressure" on graph). (NIOSH, 2015, Module 2, p. 18)

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THE SLEEP CYCLE:  
HOW IT WORKS

Circadian Rhythms and Light

- Light resets the circadian clock.
- Artificial light can effect sleep and circadian rhythms.
- Blue light most disruptive to sleep.

Czeisler & Buxton, 2017

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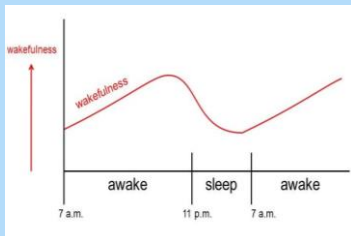


Figure 2.5: Circadian Rhythms That Promote Wakefulness (NIOSH, 2015, Module 2, p. 22)

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### Synchronization of Homeostatic and Circadian Processes

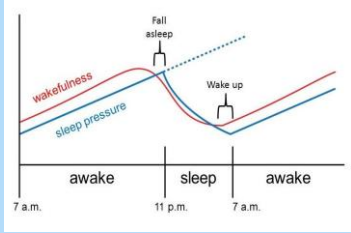


Figure 2.6a. Homeostatic sleep pressure drive and circadian wakefulness rhythm are normally synchronized. (NIOSH, 2015, Module 2, p. 23)

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### Desynchronization of Homeostatic and Circadian Processes

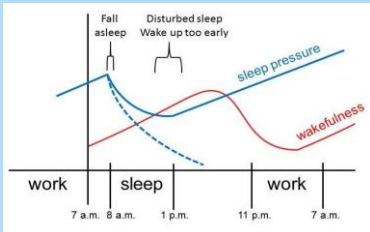


Figure 2.6b. Working night shift leads to loss of synchronization of the homeostatic sleep pressure drive and circadian wakefulness rhythm. (NIOSH, 2015, Module 2, p. 24)

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QUALITY SLEEP:  
STRATEGIES FOR SHIFT WORKERS

- Block out light
- Block out noise
- Cool room temperature
- Comfortable sleeping location



NIOSH, 2015

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QUALITY SLEEP:  
STRATEGIES FOR SHIFT WORKERS

- Use bedroom for sleep and intimacy only
- Eat light during night shift
- Prior to bedtime avoid:
  - exercise
  - nicotine
  - caffeine
  - alcohol




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QUALITY SLEEP:  
STRATEGIES FOR SHIFT WORKERS

- Keep consistent wake/sleep times
- Treatment for sleep conditions
- Nap before work
- Nap during work?




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QUALITY SLEEP:  
STRATEGIES FOR SHIFT WORKERS

- Know your chronotype
- Consider matching shift timing to your preferred sleep time




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QUALITY SLEEP:  
STRATEGIES FOR SHIFT WORKERS

- DO NOT DRIVE DROWSY:
- Get a ride
- Take a nap
- Caffeine
- Caffeine/nap combo




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**Signs of Drowsy Driving Include:**

- Repeated yawning
- Difficulty focusing
- Daydreaming
- Blanking out
- Lane drifting
- Irritability
- Missing exits/traffic signals
- Bobbing head

NIOSH, 2015

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ADMINISTRATIVE PRACTICES TO PROMOTE WELL-RESTED STAFF



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ADMINISTRATIVE PRACTICES TO PROMOTE WELL-RESTED STAFF

**Scheduling strategies:**

- Keep consecutive night shifts to a minimum
- Shift rotation: slow or fast?
- Forward rotations
- Staff involvement in scheduling
- Avoid overtime hours
- Shorter shifts ( $\leq 8$ hrs) on evenings and nights

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*"I was going to ask how working with a severely limited staff was, but I think I can already guess."*

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ADMINISTRATIVE PRACTICES TO PROMOTE WELL-RESTED STAFF

Improve on-the-job conditions:

- Scheduled breaks
- Strategies for leaving work on time
- Planned NAPS!
- Adequate environment
- Avoid scheduling meetings after night shift

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ADMINISTRATIVE PRACTICES TO PROMOTE WELL-RESTED STAFF

Additional measures:

- Educate staff
- Evaluate the role of fatigue in accidents and injuries
- Positive work environment




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FINAL COMMENTS

- Strong evidence of the importance of sleep to health and safety.
- Stay abreast of the sleep research.
- Safety culture needs to embrace sleep health.
- Healthy sleep requires employees and employers to work together.

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### QUESTIONS?

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