Sleep in Medical Education

WELLToolkit

Version 1.0: Updated June 2020

Agenda

Physicians and Sleep

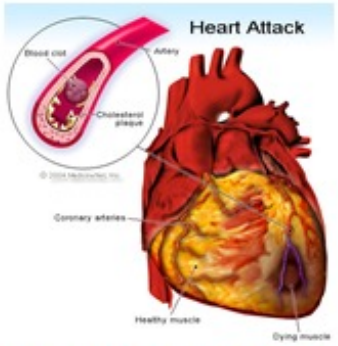
- Circadian rhythms and health
- Alertness and Performance
- Fatigue in medical education
- Practical interventions

Learning Objectives

1. Describe sources of and factors that contribute to fatigue within the clinical and training environment
2. Discuss the risks and impact of fatigue, both personally and professionally
3. Be able to recognize signs and symptoms of fatigue in oneself and others
4. Be aware of management strategies to help mitigate fatigue

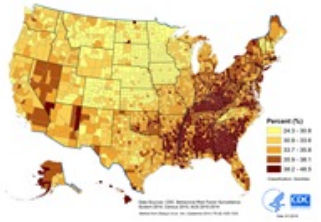
Sleep as it Pertains to Public Health & Safety

Colds, respiratory infections



Coronary Heart Disease

Insufficient Sleep < 7 hours



Obesity

Diabetes

Depression

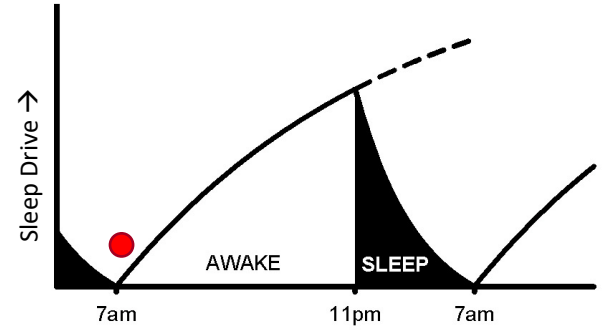
Substance Use

Early Mortality

Sleep and Individual Health

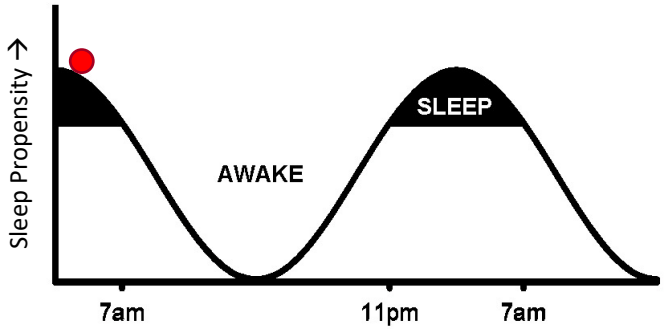
What controls sleep?

The HOURGLASS
How long you've been awake



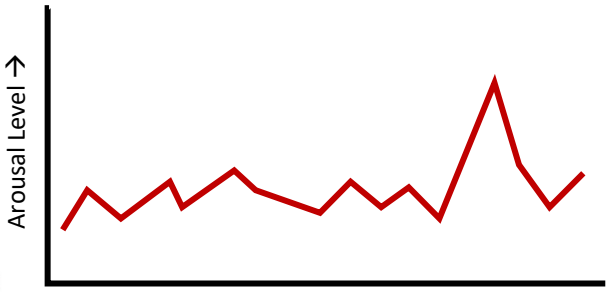
Sleep drive

THE CLOCK
Time of day



Circadian sleep-wake rhythm

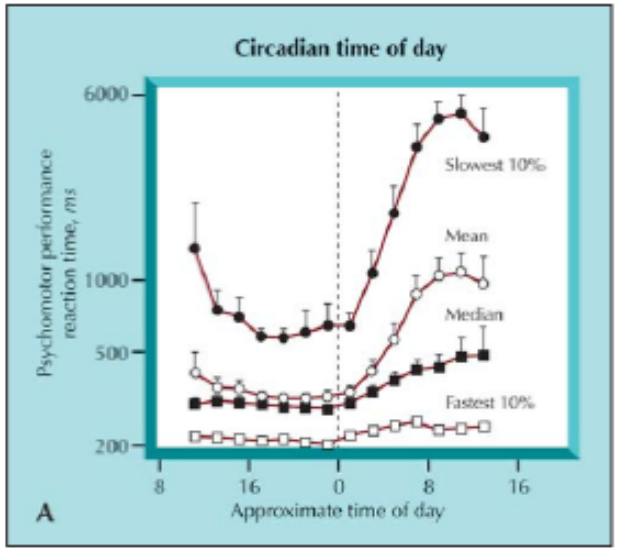
THE ALARM
Level of arousal

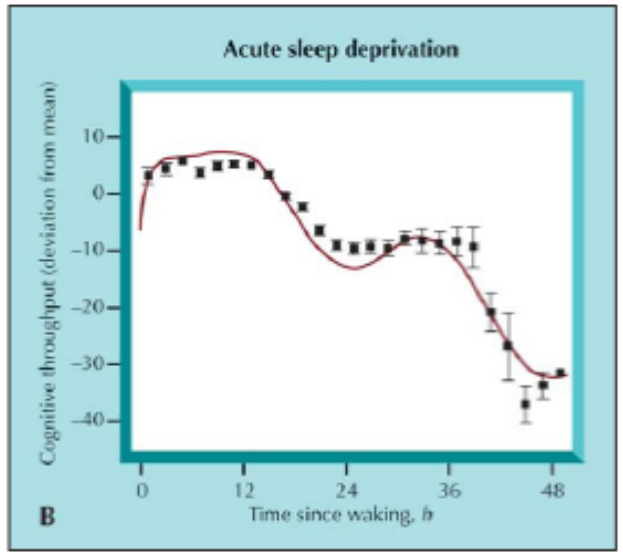


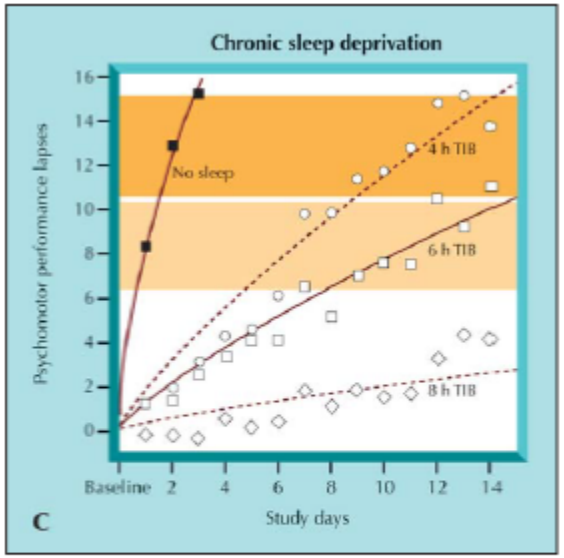
Moment-to-moment arousal

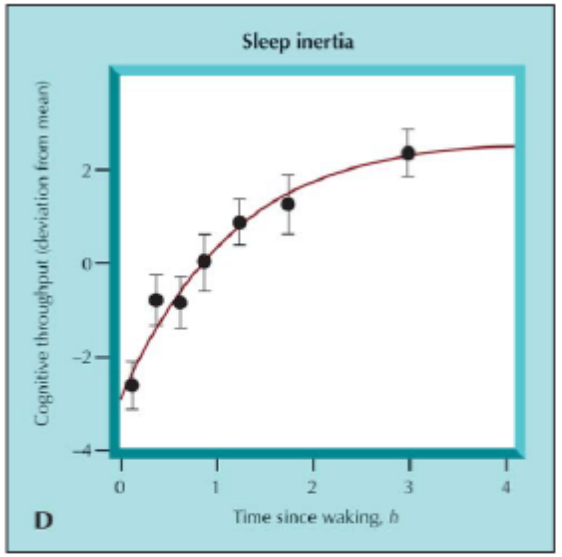
Alertness and Performance

- Number of hours awake (acute sleep loss): Performance quickly deteriorates with no sleep, but slower if we get 4, 6, or 8 hours
- Circadian phase (time of day): Reaction time and consistency are worse in the middle of the night
- Nightly sleep duration (chronic sleep loss): Performance worsens the more nights we have of restricted sleep
- Sleep inertia: It takes >1hr to fully wake and function efficiently









Barger, *J Curr Neurol Neurosci Reports* 2009; 9:155-164

In comparison to intoxication

Lamond and Dawson, *J Sleep Res*, 1999; 8:255-262

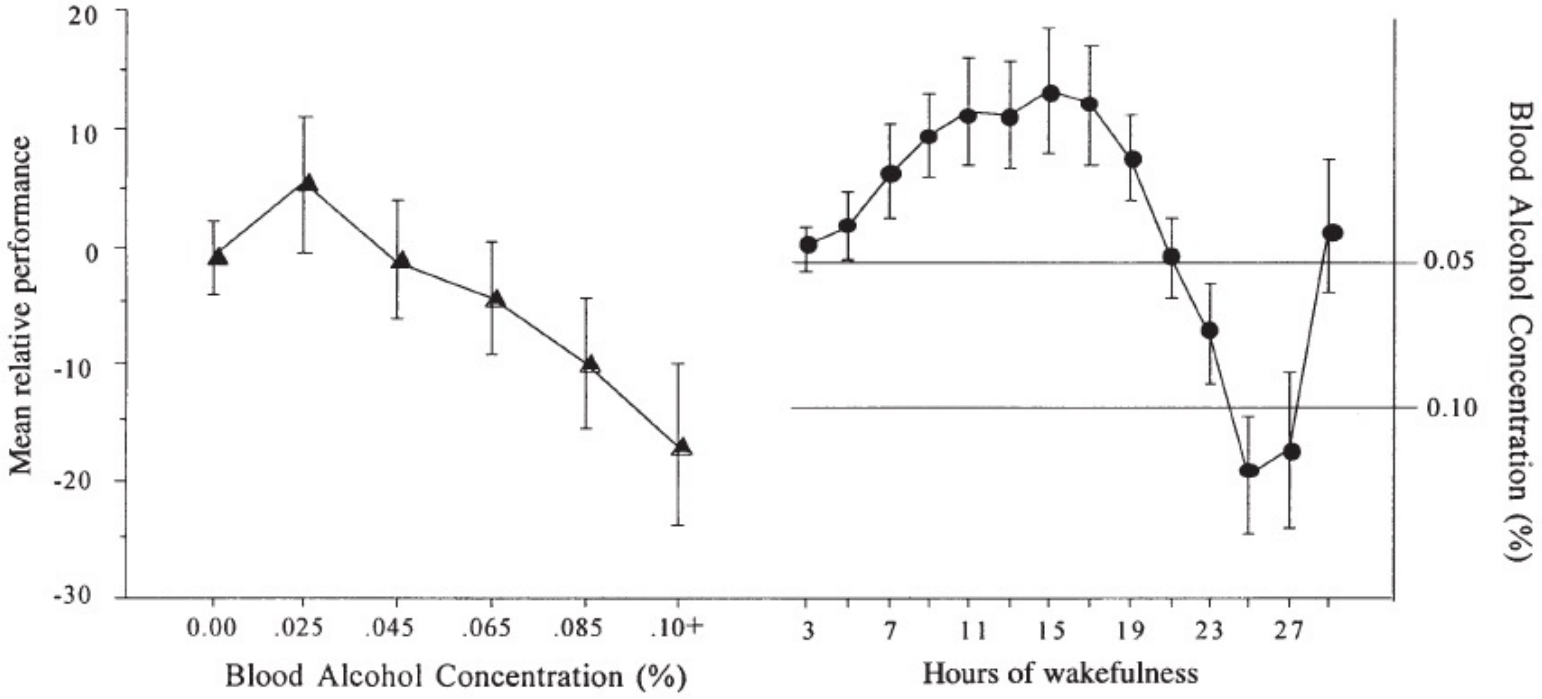


Figure 5. Mean relative performance levels for the unpredictable tracking task in the alcohol intoxication (left) and sustained wakefulness condition. The equivalent performance decrement at a BAC of 0.05% and 0.10% are indicated on the right hand axis. Error bars indicate ± 1 SEM.

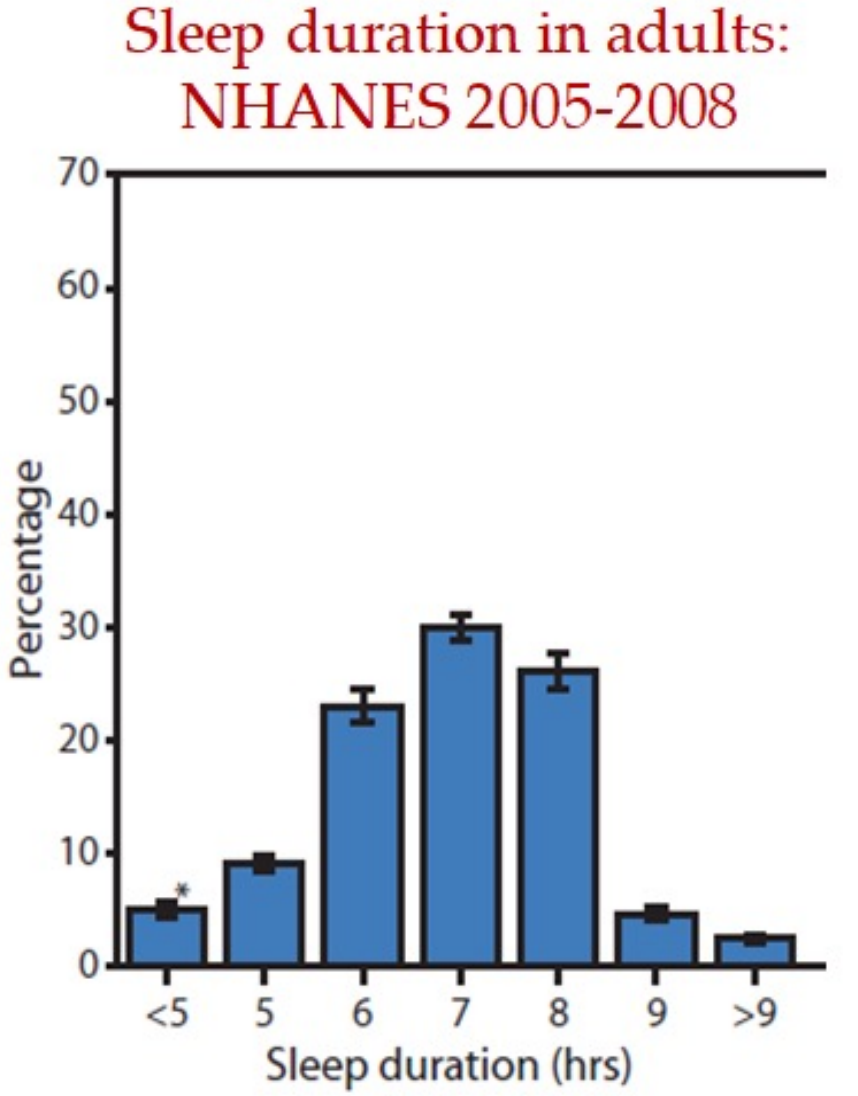
Factors contributing to fatigue in training – “a perfect storm”

- Prolonged wakefulness
- Reduced and disturbed sleep periods
- Volume and intensity of work
- Functioning at adverse circadian phase
- Shift variability
- Sleep, medical disorders

[1]Institute of Medicine, 2008

Myths we tell ourselves

- I’m one of those people who don’t need much sleep
- You can adapt to being sleep-deprived
- It’s better to “power through” call than to nap
- A night of recovery sleep gets you back to baseline
- The practice of medicine is fundamentally different from other professions
- Doctors are fundamentally different from other professionals



Weighted population estimates based on n = 10,896 U.S. adults >20 y.o.

	Work Shift ≥ 24 Hours	Work Shift < 24 Hours	Odds Ratio
Crashes	58	73	2.3 (1.6-3.3)
Near-misses	1,971	1,156	5.9 (5.4-6.3)
Commutes	54,121	180,289	

Facing the facts

A 2005 Harvard study revealed safety risks of motor vehicle accidents after extended shifts in medical trainees

Barger, *NEJM*, 2005

Signs of Drowsy Driving

- Trouble focusing on the road
- Difficulty keeping your eyes open
- Nodding off
- Yawning
- Drifting from your lane or missing signs or exits
- Not remembering driving the last few blocks/miles
- Closing your eyes at stoplights

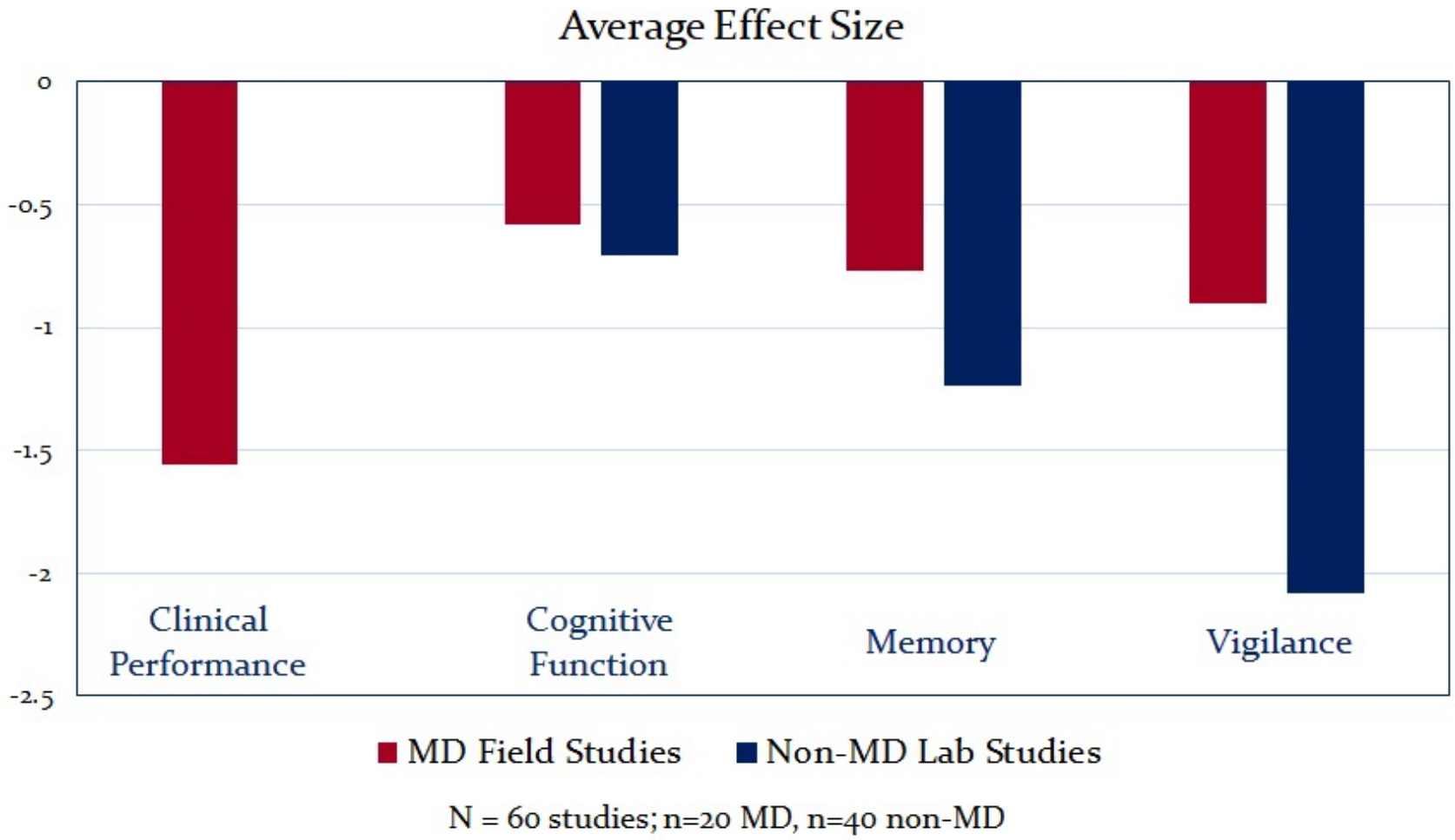
Safety regarding driving when fatigued

<u>NONE</u> of these help:

- Turning up the radio
- Opening the window
- Chewing gum
- Slapping or pinching yourself
- Washing your face with cold water

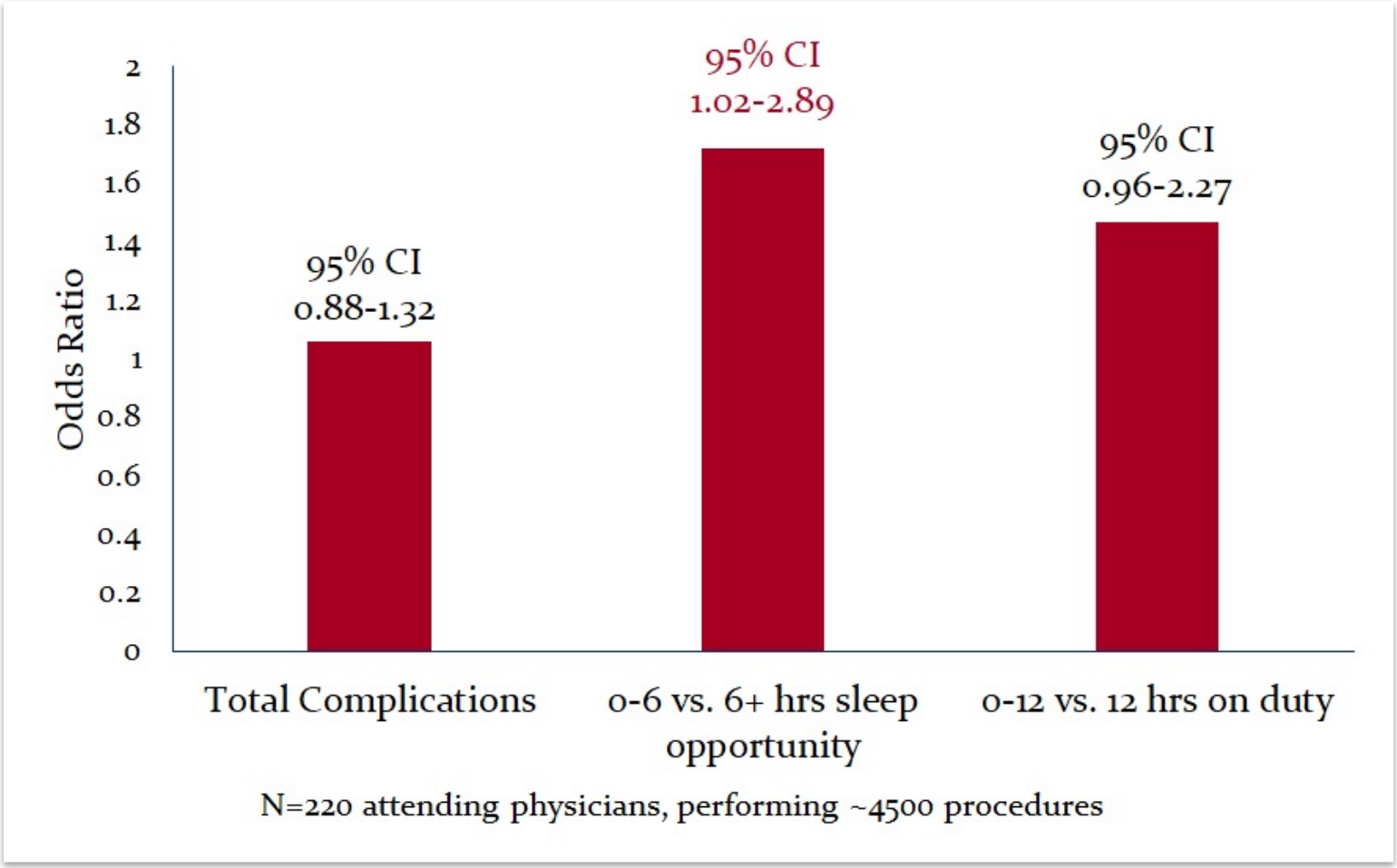
Make the smart choice <u>before</u> getting behind the wheel. Nap before driving or get a ride if you are overtired!!!

Meta-analysis on sleep loss and performance in residents and non-physicians



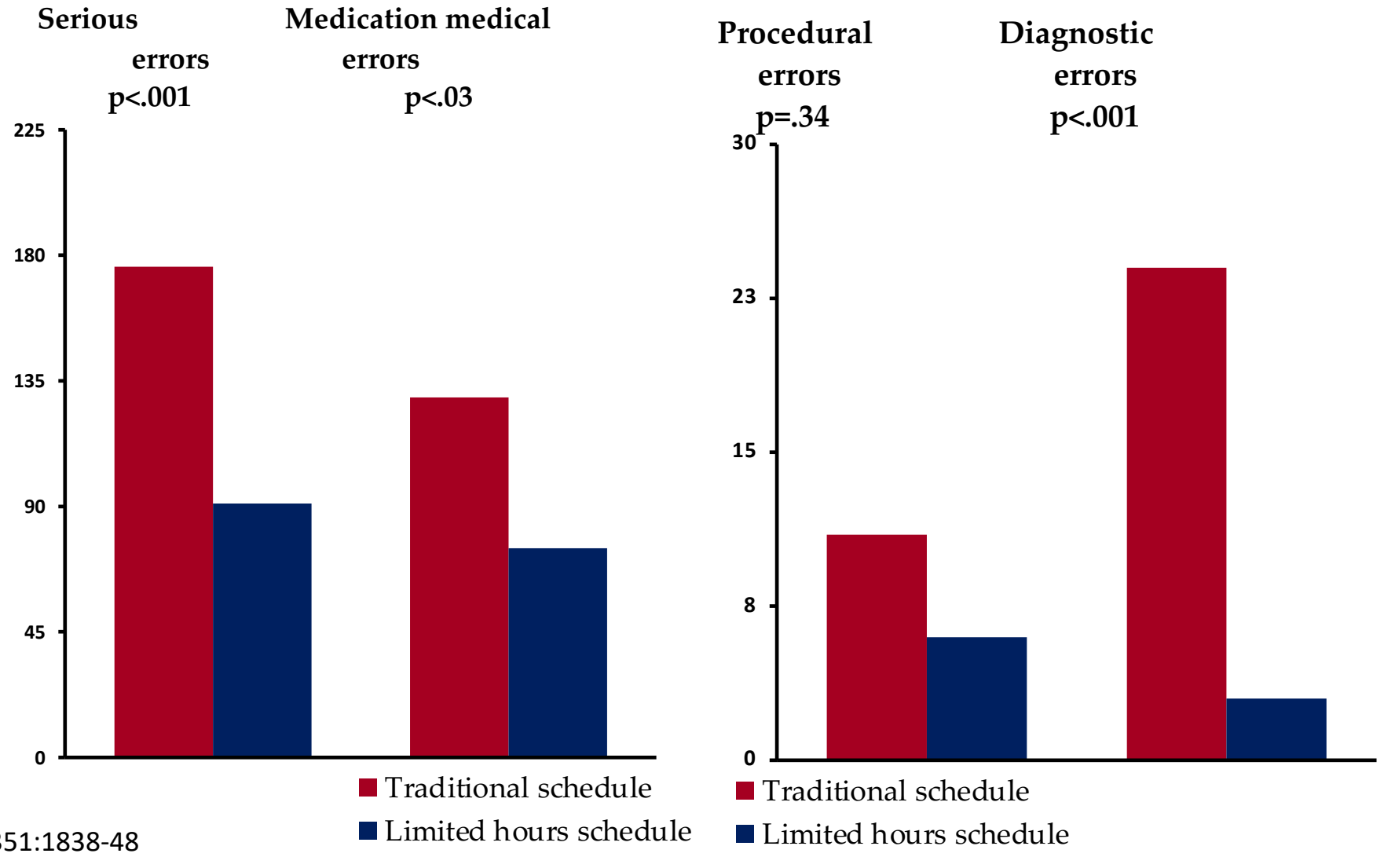
Philibert, *SLEEP*, 2005; 28: 1392=1402

Risk of complications by attending physicians after nighttime procedures



Rothschild, *JAMA*, 2009; 302: 1565-1572

Effect of traditional and limited work schedules on medical errors in interns



Landrigan, *NEJM* 2004; 351:1838-48

Sleepiness is underestimated

Anesthesia study (Howard, 2002)

- The residents did not perceive themselves to be asleep ~50% of times they ***had actually fallen asleep***
- The residents were wrong 76% of the time they reported having stayed awake

Recognizing sleepiness

Since sleepy people *underestimate* their level of sleepiness and *overestimate* their alertness, BEHAVIOR is a much better indicator of sleepiness:

- moodiness
- irritability
- impoverished speech or flat affect
- impaired problem solving
- sedentary nodding off
- medical errors
- micro-sleeps (5-10 second lapses in attention)
- repeatedly checking work
- difficulty focusing on tasks

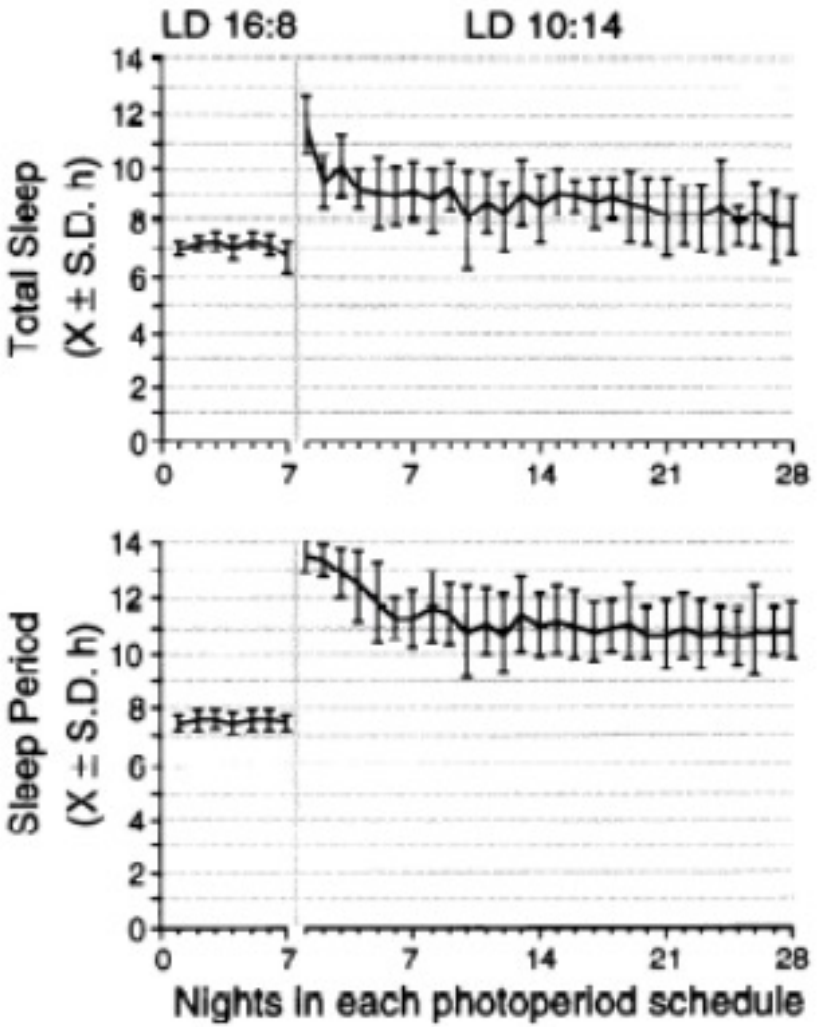
Managing Sleepiness: Naps

- Preventative (pre-call) vs. Operational (on the job)
- Duration
  - Short naps: ≤ 30 minutes (avoid sleep inertia)
  - Long naps: 30 to 180 minutes (more restorative)
- Timing: Circadian peaks in sleepiness: 0200-0500, 1400-1700
- Pros: Some sleep is (almost) always better than no sleep
- Cons: Sleep inertia and need adequate recovery time (15-30 minutes)
- Take-Home: Naps help, but *do not replace* adequate night sleep

Managing Sleepiness: Healthy Sleep Habits

- Get adequate duration of sleep (7 to 9 hours) *before* anticipated sleep loss
  - Avoid *starting out* with a sleep deficit
  - Cumulative sleep duration and sleep loss are important
- Maintain regular sleep-wake hours and routines
- Appropriate timing (centered on 3:00 AM)
- Protect and prioritize sleep time
  - Enlist family and friends
  - Minimize interruptions
- Exercise and engage in enjoyable activities

Laboratory study of sleep in 8 and 14 hours of darkness



Wehr, *Am J Physiol* 1993; R846-57

Managing sleepiness: Recovery from sleep loss

- Chronic sleep restriction compounds the effects of acute sleep loss
- Recovery from chronic sleep loss does not happen overnight
- 2-10 nights of extended sleep to achieve maximal alertness

Managing Sleepiness: Drugs

- **HYPNOTICS**
  - In certain situations, physicians may benefit from talking to their physician about prescribed medications and/or over the counter agents to help manage sleep-related issues
- **ALCOHOL**
  - Be aware that while alcohol can induce sleep, it is ill-advised as it can disrupt sleep later on
- **CAFFEINE**
  - Targeted use of caffeine can improve alertness, but beware because it has a relatively long half-life, and so it is advised to discontinue at least 8 hours prior to planned sleep

Managing Sleepiness: Night Shift

- Protect your sleep
- Ensure optimal sleep environment
- Nap before work
- Consider “splitting” daytime sleep into two shorter periods
- Get bright light when you need to be alert during night shift (especially first half)
- Avoid light exposure in the morning after night shift
- Consider using Melatonin for morning sleep

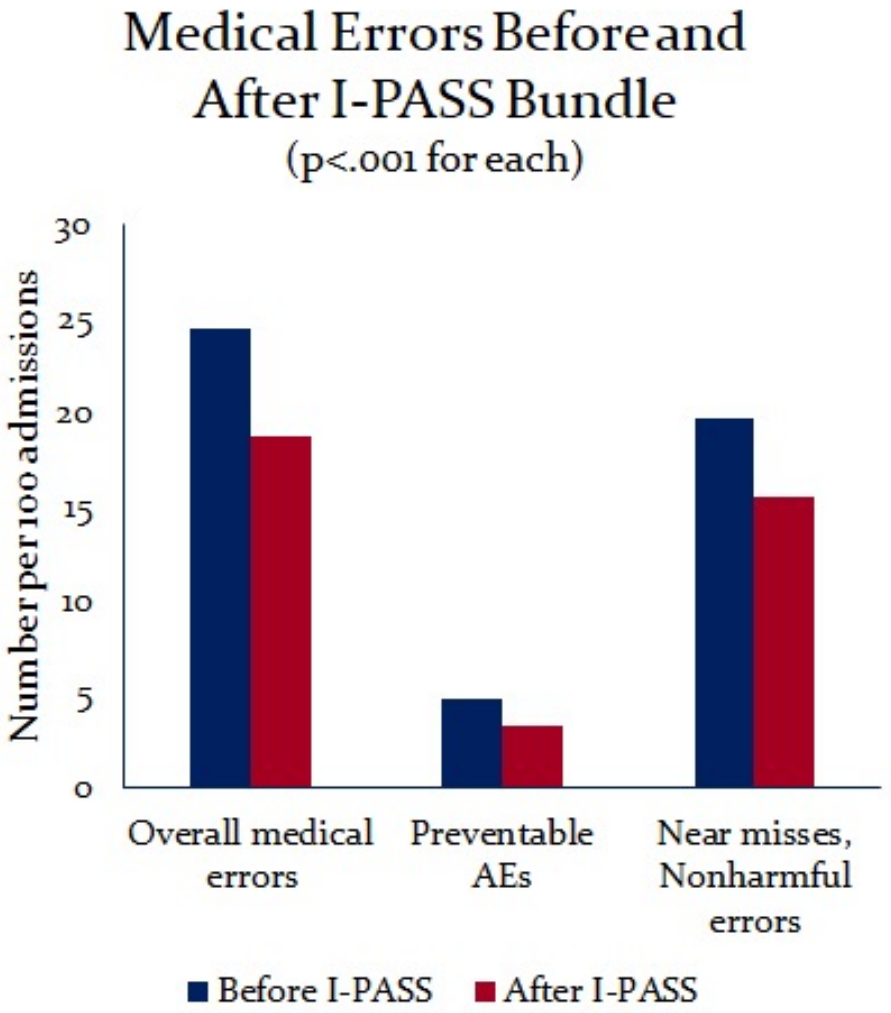
Changes in medical errors after implementing a systematic hand-off program

9-Hospital Intervention

- Mnemonic to standardize written, oral hand-offs
- Handoff and communication training
- Faculty development
- Sustainability

Study Outcomes

- Medical errors ↓ 23%
- Preventable AEs ↓ 30%
- Near misses ↓ 21%



Starmer, *NEJM*, 2014; 371: 1803-1812

Thank you!

For more information:

https://www.utoledo.edu/med/wellness/residents/

Please email questions to:

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