

## SLEEP DEPRIVATION, FATIGUE, AND RESIDENCY

- I. Restricting duty hours alone does not preclude fatigue. Of particular concern is that the very strategies that training programs may adopt in a good faith effort to adhere to the 80-hour workweek may result in unintended adverse consequences. Programs may feel their work is “done” if they demonstrate compliance with duty hours standards, even though 80 hours is twice the work week duration of the average employed American.



share the same call space. Even the “anxiety” of call or anticipation of sleep interruption can impair sleep. Call from home, now counted in the duty hours, may still put residents at risk due to sleep disruption with frequent phone calls.

- IX. Residency training may disrupt natural circadian rhythm. This problem may be exacerbated as programs implement solutions, such as “night floats,” to adhere to duty hour requirements. Night float systems and shifts may put residents on duty during periods in which there are predictable mismatches between endogenous rhythms of sleep and awakeness. Energy lows, for example, characteristically occur around 3-7 a.m. and 3-5 p.m. Residents may be more prone to errors during these times. It is extremely difficult to adapt to “shift work,” regardless of how it is scheduled or its duration. Over 90% of individuals never adapt and may be at risk for sub-optimal performance.
- X. Residents may also display symptoms of “fatigue” or attribute symptoms to fatigue when the etiology is in fact anxiety, depression, stress, burnout, or career dissatisfaction.
- XI. Finally, residents, as do other individuals, may have a primary, undiagnosed sleep disorder such as obstructive sleep apnea, narcolepsy, and/or insomnia.
- XII. Disruption in sleep leads to a sleep debt. Performance can be impaired with two hours less sleep than “normal” per night. Significant sleep debt may occur if sleep is sub-optimal over as few as two to three nights. Adverse health consequences may occur if sleep debt is allowed to accumulate. Sleep debt requires several consecutive full night’s sleep for adequate recovery, depending upon the number of days during which the sleep debt was accumulated as well as the individual’s susceptibility and ability to “recover.” Though it is difficult to quantify what is “sufficient,” the individual should feel “rested” after their recovery sleep period.

## THE LITERATURE ON SLEEP, FATIGUE, AND RESIDENTS

- I. There is a considerable body of literature on fatigue and GME trainees. A multi-center survey of residents in a variety of specialties suggests that residents have Epworth Sleepiness Scale (a sleep scale that assesses an individual’s tendency for dozing) values comparable to patients with diagnosed sleep disorders such as sleep apnea and narcolepsy.
  - a. In-service training exam scores among family practice residents correlated with their amount of “sleep” prior to the test.
  - b. Internal medicine residents post-call were less accurate in echocardiogram (ECG) interpretation.
  - c. Emergency room residents documented fewer components of a history and physical examination depending upon their shift. They also performed less well during a simulation of intubation skills.
  - d. Surgical residents demonstrated more errors and required more time than usual during simulations of common procedures. Measured postoperative complications increased by 45% for resident surgeons for those procedures they performed the day following their night on call.
  - e. Cognitive and procedural abilities declined among sleepy pediatric residents.
  - f. 20% of anesthesia residents indicated that sleepiness prevented them from performing clinical duties and 12% attributed errors to fatigue.
  - g. Residents self-reported decay of professionalism, empathy, and attentiveness to patient well being when tired.

- II. A national sample of first- and second-year residents correlated working more than 80 hours per week with a greater likelihood of personal accident or injury, serious conflict, significant medical

- V. Residents may be vulnerable to error when awakened during the night. Increased metabolic activity, such as exercise, may minimize effects. Although the research evidence is inconsistent and people react with a great deal of individual variability, be aware this phenomenon may occur and may color judgment and responses for the first 10 minutes (and up to 2 hours) following arousal.

To minimize its impact:

- a. get out of bed
- b. stand up
- c. turn on the lights
- d. try to nap every 12 hours; the earlier in a period of sleep deprivation “on call” the better
- e. consider the use of prophylactic caffeine

## PREVENTION/TREATMENT/MANAGEMENT OF FATIGUE

- I. It is probably inevitable there will be some sleep loss and fatigue in the course of medical training. However, it must be managed so it doesn't interfere with patient care and safety, education, and resident well-being. Developing strategies to minimize the effects of sleepiness in physicians is paramount. Learning to recognize and manage fatigue is essential. Anecdotal and empirical evidence to suggest that limits on work hours in and of themselves do not guarantee well-rested and optimally functioning residents. Work hour limits are difficult to enforce, particularly if residents have workaholic tendencies or if faculty does not support work hour restrictions. In addition, resident behavior outside of the workplace is difficult to govern (i.e. moonlighting activities, home responsibilities, et[s]-8 (i ( t)-1.1 or)-6.3 (k)-u6.3 (t)- (pons)-





- i. Get light exposure when you're awake.
- j. Naps – naps can prevent and ameliorate some degree of fatigue. However, there are some caveats that should be observed.
- k. Brief (one to two hours) napping prior to prolonged periods of sleep loss, such as 24 hours on-call, can enhance alertness. Consider a two-hour nap prior to a 24-hour period of expected wakefulness.
- l. To be therapeutic during a shift, naps should ideally be frequent (every 2-3 hours) and brief (15-30 minutes);
- m. Naps work best the “earlier” they are in a period of sleep deprivation. If you can pick just one nap, get it as early in the period of sleep deprivation as possible. Better to “top off the tank” early than wait till very fatigued.
- n. Time naps during the circadian window of opportunity, between 2-5 a.m. and 2-5 p.m.
- o. Longer naps, such as those more than 30 minutes duration may be counter-productive in terms of “sleep inertia”. But probably better than “no nap.” Instead, know how to counter sleep inertia – get moving, get upright, bright lights, caffeine, etc.
- p. Utilize quiet, environmentally comfortable locations for naps, ideally where there are no other interruptions such as colleagues dictating or using the computer. Hand over beepers and clinical responsibilities to another colleague when possible.

Recognize these are general guidelines but there is however a great deal of individual variability to napping.

- q. Safe Driving - driving can put you and others at risk. Motor vehicle collisions increase with fewer than five hours of sleep. The first ethical principle of physicians “primum non nocere” (first, no harm) applies to all we do as physicians, including driving. It takes four seconds to run off the road. Signs of drowsiness include difficulty focusing on the road or keeping your eyes open, nodding off, yawning, drifting from one lane to another, missing exits, and amnesia for some period of the drive.
- r. Consider how close you should live to the hospital. It may be appealing to live 30-40 minutes away, but this may increase your risk of driving home post-call.
- s. Avoid driving if you're tired
- t. Chewing gum, loud music, opening the windows...these strategies don't work to keep you “awake at the wheel” if you're tired... Instead, don't drive.
- u. Realize you may not perceive just how tired you are. Even if you feel perfectly well, you are still vulnerable
- v.



- a. **It is not a sleep substitute.** Tolerance quickly develops. If you intend to use caffeine to counteract fatigue, minimize the regular social use of caffeine so that it will be more effective when consumed. Caffeine may modulate symptoms but does not substitute for sleep.
- b. The effects of caffeine generally occur within 15-30 minutes. If you use it just before you drive home, its stimulant effects may not kick in until you are home and ready to go to sleep.
- c. Avoid regular caffeine use (the social use of caffeine) if you plan to use caffeine to abate sleepiness. Instead, use it for its “drug effect” when you are on call only.
- d. 400-600 mg (three to four cups of brewed coffee) is a usual dose, but some individuals may be overly sensitive to this amount.

Substance	Caffeine content
8 ounce cola	23 mg
8 ounces diet cola	35 mg
8 ounces brewed coffee	135 mg
8 ounces ice tea	40 mg
1 ounce dark chocolate	20 mg
Excedrin, 2 tablets	130 mg
No Doz maximum strength 1 tablet	200 mg

[Center for Science in the Public Interest](#) accessed 6/3/2007

- III. Caffeine facts:
  - a. Consider using caffeine 30 minutes

- e. Alcohol should not be used to enhance sleep and disrupts optimal sleep quality.
- f. Avoid the use of over