

Prevention, Identification, & Management of Fatigue in Graduate Medical Education

Adapted from the Office of Graduate
Medical Education Duke University
Hospital

During this course you will:

- Complete a pre-course test
- Complete a module about stress and fatigue
- Complete a post-course test that must be passed

Pre-Course Test

1. The Accreditation Council on Graduate Medical Education requires all training programs to “...educate *faculty and residents ...to recognize the signs of fatigue...and adopt and apply policies to prevent and counteract the potential negative effects.*”

True or False

2. Restricting duty hours alone precludes fatigue.

True or False

3. Sleep deprivation may result in which of the following:

- a. increased sympathetic activity
- b. hypoxemia
- c. diminished motor coordination
- d. All of the Above

4. Fatigue may be caused by all of the following EXCEPT:
- a. too little sleep
 - b. normal work day
 - c. fragmented sleep,
 - d. disruption of the circadian rhythm
5. The problem of disruption in natural circadian rhythm may be exacerbated as programs implement solutions, such as “night floats” to adhere to duty hour requirements

True or False

6. Symptoms of sleep deprivation include all of the following EXCEPT:
- a. attention to detail
 - b. increased tolerance for risk
 - c. irritability
 - d. increased errors

7. Ways to minimize sleep deprivation include: get out of bed, stand up, turn on lights, try to nap every 12 hours, consider the use of prophylactic caffeine.

True or False

8. The prevention, treatment and management of resident fatigue are a shared responsibility of which of the following:

- a. Accrediting bodies
- b. Program/Institution
- c. Residents
- d. All of the Above

9. Practical strategies for sleep and fatigue include the following: develop a healthy sleep routine, take naps, drive safely, and caffeine.

True or False

10. Caffeine is a substitute for sleep.

True or False

Introduction

- The Accreditation Council on Graduate Medical Education requires all training programs to “...educate *faculty and residents ...to recognize the signs of fatigue...and adopt and apply policies to prevent and counteract the potential negative effects.*”
- *Examples of such policies are:*
 - specialty -specific duty hour requirements such as maximum of 80 duty hours per week
 - in -house call no more frequently than one in three nights
 - a minimum of one 24- hour period off each week
 - a minimum of 10 hours free between consecutive duty periods
 - and duty periods of no more than 24 hours with up to an additional 6 hours for continuity or education.
- The American Medical Association Council on Ethical and Judicial Affairs considers physicians attending to their own health and wellness, as well as the health of their colleagues, an ethical imperative.

- Parallel to the focus on “duty hours” are efforts to increase the awareness of fatigue’s impact on trainee well-being, learning, and patient safety. These include dissemination of:
 - evidence -based information regarding the prevention, recognition and management of fatigue,
 - awareness of institutional sleep experts and options, and
 - access to national and specialized resources.

- Restricting duty hours ALONE does not preclude fatigue.
- Training Programs strategies to adhere to the 80-hour workweek may result in unintended adverse consequences. These may include:
 - 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.
 - Programs may miss identifying persistent fatigue.
 - Although perhaps better rested, resident stress may increase if residents are concerned about losing significant learning opportunities, procedural experience, and interaction with colleagues.
 - Residents may feel support is lacking from senior residents and faculty who may have an inadequate understanding of this mandate and perhaps are resentful of restrictions on duty hours.

Sleep Deprivation

- Results in adverse physiologic changes such as hypoxemia, insulin resistance, increased sympathetic activity, a blunted arousal response, immunologic changes, and diminished motor coordination.
- impairs cognitive processes resulting in diminished attention, vigilance, decision-making, and memory.
- increases tolerance for risk and decreases motivation for learning.

Fatigue

- Fatigue has been linked to resulting in serious accidents. It is estimated to be responsible for 15-20 percent of transportation accidents, more than attributed to drugs and alcohol combined.
- The Institute of Medicine highlights the importance of medical errors as a major cause of mortality and morbidity. Fatigue probably contributes to at least some of these errors.

Fatigue

- Fatigue, called by some authors “excessive daytime sleepiness”, and may be due to a variety of factors. These may exist on their own or in combination and include:
 - too little sleep,
 - fragmented sleep,
 - disruption of the circadian rhythm (such as occurs with night float work)
 - a myriad of other conditions which may masquerade as fatigue such as anxiety, depression, thyroid disease or other medical conditions, or medication side effects,
 - primary sleep disorders.

Fatigue and Residents

- Residents may have issues with:
 - Duration of sleep
 - Although there is individual variation, most adults require an average of 8.2 hours of sleep each night. Residents may not have developed “good sleep habits” in college and medical school for adequate sleep even on their nights “off”.
 - Sleep disruption
 - Though “in bed”, trainees may be interrupted by frequent phone calls, pages, the need to follow up on patients, or to supervise more junior trainees. Residents may also be interrupted by the interruptions of residents who share the same call space. Even the “anxiety” of call, or anticipation of sleep interruption can impair sleep.

Fatigue and Residents

- Disruption in 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 awake. Energy lows, for example, characteristically occur around 3-7 am and 3-5 PM. 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.
- Display symptoms of “fatigue” or attribute symptoms to fatigue when the etiology is in fact anxiety, depression, stress, burnout, or career dissatisfaction.
- Residents, as do other individuals, may have a primary, undiagnosed sleep disorder such as obstructive sleep apnea, narcolepsy, and insomnia.

Sleep Debt

- 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 2-3 nights.
- Adverse health consequences may occur if sleep debt is allowed to accumulate.
- Sleep debt requires several consecutive full nights 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

A multicenter survey of residents in a variety of specialties suggests that residents have Epworth Sleepiness Scale (a sleep scale which assess an individual's tendency for dozing) values comparable to patients with diagnosed sleep disorders such as sleep apnea and narcolepsy.

- In-service training exam scores among family practice residents correlated with their amount of “sleep” prior to the test. Internal medicine residents post-call were less accurate in ECG interpretation.
- 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.
- 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.
- Cognitive and procedural abilities declined among sleepy pediatric residents. 20% of anesthesia residents indicated that sleepiness prevented them from performing clinical duties and 12% attributed errors to fatigue.
- Residents self reported decay of professionalism, empathy, and attentiveness to patient well being when tired.

The Literature on Sleep, Fatigue and Residents

- 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 error,
 - significant weight change,
 - increased use of alcohol and other medications “to cope”.
 - Residents reported sleeping on average fewer than six hours per night.

The Literature on Sleep, Fatigue and Residents

- Several studies have examined the relationship between sleep deprivation and fatigue to the well being of the health care provider.
 - Needle stick accidents increase by 50% at night (compared to the day), increasing the risk of exposure to blood borne pathogens.
 - Motor vehicle collisions increase. Pediatric house officers were more likely than faculty to fall asleep while at the wheel either while driving or stopped at a traffic light (49% of the residents vs. 13% of the faculty) and more likely to have a motor vehicle accident (20 vs. 11). Most incidents occurred post-call. Nearly 60% of ER residents reported a near miss motor vehicle collision, 80 percent of which followed their work on a night shift. The risk increased with the number of night shifts they did per month.

Symptoms and Signs of Sleep Deprivation

- Psychomotor function after 24 hours without sleep is equivalent to a blood alcohol content of 0.08%, a level recognized legally as inebriation.
- As is true with alcohol, one cannot depend on the individuals to perceive their own degree of impairment.
- Studies confirm residents, as true of other individuals, can't adequately evaluate their own degree of sleepiness. Furthermore, the ability to recognize "sleepiness" declines the sleepier someone is.

Symptoms and Signs of Sleep Deprivation

- Characteristic symptoms of sleepiness may be unrecognized. These include:
 - repeatedly yawning and nodding off during conferences,
 - “micro sleeps”...a few seconds of “Sleep” the “awake” resident may not even recognize
 - increased tolerance for risk,
 - passivity,
 - inattention to details,
 - decreased cognitive functions,
 - Irritability,
 - motor vehicle collisions (or near misses),
 - increased errors,
 - impact on sleep process itself,
 - voluntary and involuntary latencies (the time to fall asleep) shorten,
 - increased number of “micro sleeps”.

Symptoms and Signs of Sleep Deprivation

- One of the first skills lost is the ability to do something quickly. If you slow down at a task, you may be able to compensate. But if the task requires a quick response, errors are more likely. Time pressure + fatigue is a major risk.
- Of particular significance for residents, perhaps, is sleep inertia, the confusion and dysfunction that occurs upon awakening from sleep during deep NREM sleep, sleep in the middle of the night, or following a period of sleep deprivation.
 - This disorientation may include a period of amnesia for the period of awakening.
 - The impairment from sleep inertia may be greater than that from sleep loss.

To Minimize Impact of Sleep Deprivation

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

Prevention/Treatment/Management of Fatigue

- 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.
- The prevention, treatment and management of resident fatigue are a shared responsibility of accrediting bodies, Jersey Shore University Medical Center, programs, faculty and residents.

Accrediting Bodies

- Accrediting bodies have set “the rules.” These should be construed as minimums. Some states have additional regulations.

Programs/Institutions

- Programs/Institutions should:
 - adhere to JSUMC duty hour requirements and specialty specific duty hour requirements (whichever is the more stringent),
 - minimize prolonged work (> 24 hours of clinical duties),
 - protect periods designed to address sleep debt (i.e. the minimum of at least 24 hours off each week free from all clinical responsibilities)
 - reduce non–essential tasks and enhance learning during clinical time,
 - reduce non-essential interruptions (i.e. added ancillary services, triage of phone calls by charge nurse etc)
 - assist residents to identify co-existent medical issues which impair their sleep (i.e. undiagnosed sleep disorder, depression, stress),
 - educate regarding awareness and management of fatigue
 - Critically appraise the best way to implement shift work.
 - Provide napping resources
 - Explore options with residents to return home safely

JSUMC

- JSUMC should provide accessible call rooms with a conducive rest environment.
- If there are difficulties with call rooms contact Dr Rosenthal in the GME office at 732-776-4226.

Program Directors

- Program directors should directly ask about issues pertaining to getting adequate sleep, resident safety such as concerning post-call driving, and resident concerns about the balance between professionalism and work hour restrictions.
- Where an individual program has particular issues with fatigue, enlist residents in developing particular program solutions.
- Program Directors should recognize vulnerability and symptoms in residents and colleagues.
- Program Directors should notice that when Residents fall asleep during lecture.

Residents

- Residents must set priorities for “time off”.
- Residents should practice setting reasonable priorities, especially if this is something that you have not had sufficient practice with during your years in college and medical school. It will be an important habit for the rest of your career.
- Residents should consider sleep when switching shift with fellow residents.

Practical Strategies

- **Develop a healthy sleep routine.**

- Aim for 7-9 hours of sleep per night. This is especially true after a period of sleep loss, such as a busy rotation, is anticipated.
- On the days following your time “on call” and particularly your 24 hour period per week off, make sure you’re getting sufficient catch up sleep; at least enough to feel “rested” when you wake up. It’s tempting to try to “make up” everything you haven’t been able to accomplish due to your busy professional schedule, but make rest a priority.
- Keep to a routine when possible. Going to bed and arising about the same time may help.
- Get adequate exercise but avoid it directly before sleep.
- Eat right. Try not to go to bed hungry however eating a large meal within 3 hours of sleep may keep you awake.
- Make the bedroom comfortable with appropriate mattress, pillow, cooler temperature, sound and lighting level.
- Develop relaxation rituals before sleep such as reading, meditation, or listening to music. Your workday may have been extremely intense. You may come home to additional responsibilities, even enjoyable ones, such as spending time with a significant other or children. Decompressing helps sleep.
- Protect sleep time. Turn off the phone. Ask your family/significant others, friends to help you. Try not to incur a sleep debt from non work activities
- Get light exposure when you’re awake

Practical Strategies

- **Take naps**
- Naps can prevent and ameliorate some degree of fatigue. However, there are some caveats that should be observed.
 - Brief (1-2 hours) napping prior to prolonged period 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.
 - To be therapeutic during a shift, naps should ideally be frequent (every 2-3 hours) and brief (15-30 minutes);
 - 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.
 - Time naps during circadian window of opportunity, between 2-5 a.m. and 2-5 p.m.
 - 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
 - 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.

Practical Strategies

- **Safe Driving**

- 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.
- avoid driving if you're tired
- 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.
- Realize you may not perceive just how tired you are. Even if you feel perfectly well, you are still vulnerable
- Consider getting a ride home with a friend, use public transportation (when available) or even a taxi. A cab is less expensive than a ticket or an accident.
- Consider taking a nap before driving home post call. Strategically use caffeine
- Immediately stop driving if you find yourself becoming drowsy. Find a safe location and nap.

Practical Strategies

- **Caffeine**

- Using caffeine, a central nervous stimulant, “strategically” can help manage fatigue. **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
- 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.
- 400-600 mg (3-4 cups of brewed coffee) is a usual dose, but some individuals may be overly sensitive to this amount.