



*The National Healthy Sleep Awareness Project involves a partnership between the American Academy of Sleep Medicine, Center for Disease Control and Sleep Research Society. The long term goal of the project is to promote improved sleep health in the United States. The project will increase public awareness of the importance of healthy sleep. It also will promote the treatment and prevention of sleep disorders.*

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# First Responders and Increased Risk for Sleep Deprivation

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## CASE REPORT

DB is a 43-year-old man who presented to his primary care physician for his regular annual physical exam. During the discussion, DB reports he has been feeling tired a lot lately. His PCP asks how much sleep he gets every night. DB reports that as a firefighter, he often works long 24-hour shifts, typically 24 hours on, then 48 hours off. Sometimes, he has even worked the “Kelly” schedule of 24on/24off/24on/24off/24on/96off. He reports this can be very disrupting to his sleep schedule and family life. He is married with 2 kids at home. He previously worked a second job, but quit 6 months ago because he could not focus well at either job. DB reports sometimes drinking a 6-pack of Mountain Dew on his shifts at the firehouse, trying his best to stay awake, and sometimes taking Benadryl to help him fall asleep at night when he is home. He is afraid to take medications to help him sleep during the 24-hour shifts because they often get two or three emergency calls during his sleep block.

## DISCUSSION

Shift work disorder is characterized by complaints of insomnia or excessive sleepiness that occur in association with work hours that occur, at least in part, during the usual sleep episode. There are over 2 million first responders in the United States, including 1.16 million firefighters, 900,000 law enforcement officers and 248,000 emergency medical technicians, who are at risk of sleep deprivation and impaired alertness due to the rotating shift work schedules which can cause circadian misalignment.

Sleep is essential for optimal health. The American Academy of Sleep Medicine (AASM) and Sleep Research Society reviewed over 5,000 publications and developed a consensus recommendation that adults should sleep 7 or more

hours per night on a regular basis to promote optimal health. Sleeping less than 7 hours per night on a regular basis is associated with adverse health outcomes, including weight gain, obesity, diabetes, hypertension, heart disease and stroke, depression, and increased risk of death. Sleeping less than 7 hours per night is also associated with impaired immune function, increased pain, impaired performance, increased errors and greater risk of accidents.

Specifically, studies of firefighters show that firefighters are at risk for health problems and sleep problems due to the long work shifts, rotating schedules and grueling work. A study of nearly 7,000 firefighters showed that 37% screened positive for any sleep disorder including most commonly, obstructive sleep apnea (28%), insomnia (6%), shift work disorder (9%) and restless legs syndrome (3%). Firefighters who screened positive for sleep disorders were more likely to report a motor vehicle crash and self-report falling asleep while driving, cardiovascular disease, depression, anxiety and overall poorer health status, when compared to firefighters who did not screen positive for sleep disorders. Myocardial infarction and motor vehicle crashes are the most common causes of death in US firefighters.

Given the sleep problems encountered by firefighters, a prospective station-level randomized, field –based intervention study tested a Sleep Health Program on 1,189 firefighters. This program included a mandatory 30-minute educational session, a voluntary sleep disorders screening, with subsequent referral for diagnosis and treatment for respondents who screened positive. The 30-minute educational session provided information on firefighter mortality, fatigue, and the importance of sleep. Firefighters were provided with strategies to improve sleep hygiene, tips on caffeine use and effective napping to promote alertness, and brochures on sleep health topics from the AASM. Eye masks and ear plugs were distributed to firefighters. Compared to firefighters who did not undergo this education session, firefighters who received sleep health education had half the number of injuries, 24% less official injury reports, and less days off due to disability. Based on the screening tools, 42% of firefighters screened positive for one or more sleep disorders. The study investigators concluded “a specific sleep health education and sleep disorders risk screening program should be incorporated into workplace health and wellness initiatives to reduce the physical, mental and economic burden of avoidable sleepiness-related workplace injuries in firefighters.”

Additionally, the AASM has published evidence-based practice guidelines to help clinicians appropriately treat patients with shift work disorder.

**Planned sleep** schedules are indicated. Studies show that planned napping before or during the night shift is indicated to improve alertness, vigilance, improve reaction times, and decrease accidents during night shift work, without affecting post-shift daytime sleepiness.

**Timed light exposure** may be beneficial. Timed light exposure in the work environment and light restriction in the morning, when feasible, are indicated to decrease sleepiness and improve alertness during night shift work. Studies have tested multiple different light intensities (2,350 to 12,000 lux) administered during different portions of the shift for various amounts of time. Although the positive effects may vary per individual, studies report subjective improvement in work time performance tasks, alertness, and mood compared to ordinary light exposure.

**Administration of melatonin prior to daytime sleep** is indicated to promote daytime sleep among night shift workers. Melatonin taken prior to daytime sleep has been shown to improve daytime sleep quality and duration, but does not enhance alertness during the night time shift. Melatonin was tested in ranges of 0.5mg to 10mg, and effectiveness did not appear to correlate with dosage strength or form.

**Hypnotic medications may be used to promote daytime sleep among night shift workers.** Carryover of sedation to the nighttime shift with potential adverse consequences for nighttime performance and safety and abuse potential must be considered. Specifically, triazolam, temazepam, and zopiclone have been tested and resulted in improvements in the duration and quality of daytime sleep compared to control subjects, without improvement in nighttime alertness. Caution is advised as these medications may worsen other coexisting sleep conditions such as obstructive sleep apnea, and close follow-up is advised to monitor for adverse effects.

**Stimulants and alerting agents such as modafinil and caffeine are indicated to enhance alertness during the night shift.** While stimulants cannot substitute adequate sleep, studies show improved psychomotor performance during the night shift compared to placebo.

In summary, first responders, particularly firefighters who work long, overnight shifts are at high risk for sleep disorders. Studies support that all healthy adults need at least 7 hours of sleep daily. For first responders who may have difficulty getting 7 hours of sleep consistently every night, several treatment options

exist to improve alertness during the day or night, as well as options to improve ability to fall asleep and stay asleep during the day.

## CASE FOLLOW-UP

DB is referred to an accredited sleep center. He undergoes a thorough history and physical exam by a board-certified sleep medicine physician, who screens DB for common sleep disorders including obstructive sleep apnea, insomnia, restless legs syndrome, circadian disorders, hypersomnias, parasomnias, and sleep related movement disorders. She determines he has shift work sleep disorder. They discuss sleep hygiene techniques that can be successfully implemented at home and during his 24- hour shifts at the firehouse, including a quiet sleeping space, with black out curtains. He buys ear plugs to keep in his locker at the firehouse. He chooses to try melatonin instead of Benadryl to help him sleep during the daytime after learning about studies that support melatonin efficacy. They discuss options for improving his focus and alertness when working, which include judicious use of caffeine, appropriately timed naps during his shift, getting a full 7 hours of sleep prior to his 7am shift start, and he would like a prescription for modafinil medication when he is working at night. They figure out a sleep schedule to help him try to get at least 7 hours of sleep during a 24-hour shift at the firehouse, even if not all in one block of time, and also discuss how he can ‘catch-up’ sleep on days off, and still interact with his family and friends. He snores and is at increased risk of sleep apnea, so he is scheduled for a sleep study. If he starts continuous positive airway pressure (CPAP), they discuss options for him to be able to keep one CPAP machine at the firehouse and one CPAP machine at home.

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