

FIREFIGHTER HEALTH

By Charles Czeisler, Laura Barger & Conor O'Brien, in conjunction with Orange County, FL, Fire Rescue

Sleeping in shared or dormitory-style rooms can make restful sleep difficult to achieve. Photo courtesy Orange County, FL, Fire Rescue

Managing Sleep, Health & Safety

What's the right approach for your department?

Hearth attacks and motor vehicle crashes are the two leading causes of death in firefighters. Sleep deficiency—whether instigated by short sleep duration, circadian misalignment associated with working overnight shifts, or a sleep disorder—increases the risk of these two adverse health and safety outcomes.

These and other negative consequences of sleep loss are of major concern, with more than half of firefighters reporting sleep disturbances.

Sleep deficiencies: a national snapshot

There are several aspects of firefighting that make obtaining sufficient quantity and quality of sleep particularly challenging for firefighters. First, firefighting requires 24-hour coverage, 7 days per week, 365 days each year, and most firefighters work 24-hour shifts. The number of alarms sounded each shift and policies restricting on-duty daytime sleep may limit sleep duration on duty. Even when permitted, daytime sleep following night work

is more difficult due to light streaming through windows, noise at the fire station, and the circadian clock's push for wakefulness during the day. Further, the circadian disruption inherent in shift work has been associated with an increased cancer risk. Finally, firefighters often live together while on duty at the fire station, often sleeping in the same room. Therefore, when one firefighter or paramedic is awakened for or returns from duty, makes noise or snores loudly, the sleep of others may be disturbed.

A nationwide survey of nearly 7,000 firefighters in 66 fire departments across the country found that 37 percent of firefighters were at high risk for a common sleep disorder. More than one out of four firefighters (28 percent) screened positive

for obstructive sleep apnea (OSA), which is commonly associated with loud snoring. Nearly one in 10 (9 percent) screened positive for insomnia, with another 6 percent screening positive for shift work disorder and 3 percent for restless leg syndrome.

Those firefighters who screened positive for a sleep disorder had twice the risk of a motor vehicle crash, near-crash or falling asleep while driving. They were also more than twice as likely to have cardiovascular disease, almost twice as likely to have depression or anxiety. Common sleep disorders are easily treated, but alarmingly, 83 percent of firefighters who screened positive for a sleep disorder were undiagnosed and untreated.

CHARLES A. CZEISLER, PhD, MD, is the director of the Sleep Matters Initiative, chief of the Division of Sleep and Circadian Disorders at Brigham and Women's Hospital, and the director of the Division of Sleep Medicine at Harvard Medical School.

LAURA K. BARGER, PhD, is an associate physiologist in the Division of Sleep and Circadian Disorders at Brigham and Women's Hospital and an assistant professor at Harvard Medical School.

CONOR O'BRIEN is a senior project manager in the Division of Sleep and Circadian Disorders at Brigham and Women's Hospital.

Sleep Matters Initiative

Fatigue education and awareness training programs are already required in commercial aviation, and similar programs have been instituted successfully for railroad workers, truck drivers and nurses. In an effort to improve the health and safety of firefighters, the Sleep Matters Initiative at Brigham Health in Boston, MA, offers a sleep health education and sleep disorders screening program tailored for firefighters. The program includes presentations on the basics of sleep and circadian rhythms, strategic use of caffeine, napping and other fatigue countermeasures, descriptions and screening for common sleep disorders, and sleep health monitoring.

In a randomized trial of a sleep health education and sleep disorders screening program in the Columbus, OH, Fire Department, firefighters assigned to stations that received such a program reported 46 percent fewer disability days than those assigned to control stations. Firefighters who received the education were also 24 percent less likely to report

an injury than firefighters who did not receive the training. In a department of approximately 1,200 active firefighters, such a reduction in disability day usage translates into an estimated annual savings of \$2.1 million, not including the medical costs and human suffering associated with injury and disability.

Further, considering the differences among fire departments—number of firefighters, the number of trainers, the experience in implementing wellness programs, and technology available in firehouses—we compared three different methods of administering the sleep health and education program using three different methods:

- Expert-led: The research team presented the sleep health education and sleep disorders screening program in-person.
- Train-the-Trainer: Fire department trainers attended a two-day course taught by the research team and then lead the program in their department.
- Online: The program was provided via website.

In each method, firefighters listened to the educational program and then were screened for common sleep disorders. Those who scored at risk for one or more sleep disorders were notified either by mail or online, and encouraged to seek additional evaluation from a board certified sleep specialist in their area (sleepeducation.org/find-a-facility).

Eight fire departments enrolled in this part of the study: two Expert-led departments, two Train-the-Trainer departments and four Online departments. Although all groups showed improvement in the knowledge of sleep-related topics following the education, the Expert-led group had the highest improvement rate. Firefighters in the Expert-led departments were also twice as likely to seek clinical evaluation if identified as at risk for a sleep disorder.

In all groups, the majority of firefighters rated the program as important, and indicated that the information was useful and that they would recommend the program to other fire departments. At the conclusion of the study, 42 percent of firefight-



POWERHAWK
P4 RESCUE TOOL

ONE TOOL - MULTIPLE OPERATIONS

The POWER HAWK P4 gets into places and performs jobs other tools cannot!

- Heavy-duty spreading, cutting, and crushing in one super-compact tool
- Interchangeable spreader and cutter tool attachments - change in seconds!
- Completely self-contained
- NO hydraulics means high-efficiency direct power and very long battery run times
- Patented Rotating Powerhead

POWER HAWK
TECHNOLOGIES, INC.

In Partnership with **RESQTEC**

www.powerhawk.com 1-800-PWR-HAWK (797-4295)

Request information at firehouse.com/10064060

FIREFIGHTER HEALTH

ers participating in focus groups reported that they had positive changes in their sleep behavior, such as paying more attention to their fatigue level, improving their sleep environment and taking more naps.

In all methods, there are challenges associated with the use of such programs in operational fire departments. Scheduling all firefighters for additional training when they already have heavy training loads can be difficult. Confidentiality is required for sleep disorders screening, and this portion of the program may be more accepted by firefighters when it is done by a group outside the fire department administration.

The challenges, however, are vastly outweighed by the potential improvement in the health and safety of firefighters. The sleep health education and screening program is not “one size fits all”; rather the methods can be modified to meet the department’s needs. Each fire department should select the method that is best suited for conducting a program in order to successfully improve the health and safety of their firefighters.

Implementing sleep health education and sleep disorders screening in fire departments could lead to a decrease in crashes, accidents, injuries, lost work time and poor health outcomes in firefighters, and provide major cost savings for fire departments.

Implementation strategies

As a progressive, data-driven fire department, Orange County, FL, Fire Rescue (OCFR) regularly participates in high-level research efforts that impact the profession. Operation Stay Alert—developed by sleep scientists at Brigham Health and Harvard Medical School in Boston, and supported by a FEMA Assistance to Firefighters (AFG) grant—was poised to add a body of knowledge about an important topic that would benefit firefighters nationwide.

The department was selected to participate in the Train-the-Trainer model, in which the Brigham Health/Harvard team trained its firefighter safety staff members, who then taught classes to the rest of the firefighters in the department.

Training focused on educating OCFR participants about the risks of sleep deprivation and sleep disorders in firefighters, and how to manage them more effectively. This included topics ranging from sleep hygiene, post-shift recovery sleep, and in-station sleep patterns.

OCFR had a high degree of participation, driven by our assurance of strict confidentiality. Initially, firefighters were concerned that issues identified could impact their career if released to management. There was also concern as to whether findings would be a catalyst to alter the highly preferred 24-hour shift schedule. However, no identifiable personal information was given to the management team; only de-identified aggregate data was summarized in reports. This anonymity reinforced to participants the department’s commitment to both their health and their privacy.

With the help of the Sleep Matters Initiative team at Brigham Health and Harvard Medical School, OCFR’s peer fitness trainers have become subject-matter

How to Build Public Safety Facilities: Fire, Police and EOC’s

FIREHOUSE



Station Design Conference

May 14–16, 2019

Crowne Plaza Hotel, Rosemont, IL



Firehouse’s Station Design Conference offers attendees a personalized opportunity to learn the latest in station design innovations, technology and concepts focused on safety and health. With a focus on networking with fire chiefs, officers, city managers and architects from across the United States, you will learn from experts and hear from end users on all levels of a new facility from site selection through to final acceptance of the facility.

The 2019 conference will add a Law Enforcement track, with a focus on police, EOCs and shared public safety facilities.

Brought to you by

FIREHOUSE

Visit FHStationDesign.com for more information.

#StationDesign19

Request information at firehouse.com/12389445

experts, and having that asset moving forward proved to be a key benefit of using the Train-the-Trainer model.

Furthermore, the department unexpectedly found a study within the study that provided an additional benefit. The partnership with the Brigham Health/Harvard team provided a clearer understanding of the limitations and benefits of each available training delivery model. Following the study, OCFR adopted all three methods of training models, and regularly discusses the options when coordinating its own training efforts.

For example, Expert-led classes are provided for live-fire exercises and other critical, high-risk skills. In the Expert-led model, full-time training officers and credentialed adjunct instructors personally lead training evolutions. Crews attending Expert-led training are taken offline, where they can focus on the training material without interruption. Although this training model can be more costly, it is important to consider when clear, con-

The High Price of Sleep Problems

Sleep disorders and sleepiness cost the United States approximately \$411 billion annually. The National Safety Council and the Brigham Health Sleep Matters Initiative have launched a Fatigue Cost Calculator (nsc.org/tiredatwork) to enable individual employers to estimate the economic impact of sleep disorders and sleep deficiency among their employees. The calculator itemizes for individual employers the increased healthcare costs associated with undiagnosed and untreated obstructive sleep apnea and chronic insomnia. It also estimates the increased fatigue-related costs of accidents, motor vehicle crashes and injuries, and absenteeism.

sistent messaging and trainer expertise is critical to life safety.

The Train-the-Trainer model is used for efforts such as instruction on the operation of new equipment and ongoing skill maintenance and reinforcement. In this method, a group of battalion chiefs, captains, or firefighters can be trained prior to delivering the training to crews at the station level. This model allows instructors to train in-service crews without taking units offline. Although crews are available to respond to emergency calls during Train-the-Trainer-delivered classes, these

interruptions in drills can hamper training efforts.

For time-sensitive topics in which the department needs to reach all 1,300 employees rapidly, such as for notification of policy updates or prerequisite training required prior to expert-led efforts, Online training is often used. With this model, information can be quickly disseminated, and verification of training completion obtained through the department's Learning Management System. However, distractions can affect the retention of information provided during online training.



I'M A WILDLAND FIREFIGHTER

*My face & lungs need protection in my line of work.
I was tired of choking on ash & smoke and getting peppered with burning embers.
I GOT THE BEST...I GOT A HOT SHIELD!*



HOTSHIELD USA
MAKERS OF THE BEST FACE MASKS & HELMET SHROUDS ON THE PLANET

5021 Verdugo Way, Ste 105-301, Camarillo, CA. 93012
Office: (310) 710-2624 • Fax: (805) 504-9530
info@hotshield.com • www.hotshield.com

FIREFIGHTER HEALTH

Another key implementation following the Brigham Health/Harvard study is within the department's Safety & Wellness Program. The program now incorporates the role of cardiac health and other sleep-related topics into its wellness educational programs. Beginning with recruit school, the department's wellness coordinator educates recruits about the importance of sleep and fatigue management. Ongoing education by the Safety & Wellness program promotes to all firefighters how to use their time off between shifts to recover effectively.

Following the study, Orange County Fire Rescue adopted many principles of fatigue risk management and expanded the fatigue policy in its standard operating procedures (SOPs) and collective bargaining agreement. Rules include limitations on overtime and mandatory rest periods before and after work shifts.

Lessons learned: practical application of the study

OCFR identified several actionable steps that could be implemented for the improved health of its members:

- It is the department's goal to effectively train, reinforce and support the principles of sleep hygiene.
- The department has implemented a state-of-the-art station alerting system so only responding crews are affected by station tones and lighting. Each bunk is programmed by unit responding. For example, if the rescue crew gets a call and the engine isn't required to respond, the engine crew is not disturbed by station tones.
- During extended operations, incident action plans (IAPs) are broken into operational periods of front-line crews, and incident commanders are rotated out for rest.
- Individual bunk rooms outfitted with blackout shades and sound-attenuating walls should be used instead of group sleeping areas. OCFR has created division walls between bunks as buffers in existing stations. All future fire station designs provide for individual sleep rooms.
- Compensatory daytime sleep is encouraged between calls for service at the fire department. NASA has demonstrated in commercial aviation that cockpit napping

is one of the best ways to improve performance from top-of-descent to landing.

- Continuous positive airway pressure (CPAP) systems, a treatment that uses mild air pressure to keep airways open, are regularly used at the stations by those who suffer from sleep apnea to improve health and safety for affected firefighters, and to reduce snoring and thereby minimize sleep disruption to other firefighters.

Crews have been instructed in a CRM approach to vehicle operation in which all crewmembers assist the driver in staying alert and watching for unseen hazards while driving.

- Research showed low-dose caffeine over a longer period of time is the most effective manner of maintaining alertness during extended bouts of wakefulness. The department includes caffeine education, including instruction on the risks of the overuse of caffeine, during annual fitness assessments, multi-company drills and live-fire burn training. Vitals are taken prior to physical training, and firefighters who exceed the maximum blood pressure levels are ineligible to participate.
- The department continually promotes self-awareness and supervisory responsibility in recognizing indicators of fatigue. A formal rehab process and Rehab Unit are in place for field personnel. These include rotation of crews for fatigue as well as providing proper nutrition, hydration, vital checks and cooling mechanisms on fire scenes, during extreme heat and for extended operations.
- Crews have been instructed in a crew resource management (CRM) approach to vehicle operation in which all crewmembers assist the driver in staying alert and watching for unseen hazards while driving.

Final thoughts

Despite firefighters' expectations to the contrary, they are not superhuman

and do require quality sleep to perform optimally. Chronic sleep deficiency can increase the risk of a variety of serious health disorders, making fatigue management every bit as critical to firefighter wellness as using breathing apparatus, eye protection and gloves.

In an industry that demands long work shifts in which firefighters provide service both day and night, interruption of normal sleep habits is inevitable. However, much can be done through sleep health education, screening for common sleep disorders, individual awareness, management philosophy and operational procedures to mitigate the effects of sleep deficiency. The end goal, after all, is to both survive and thrive for a 30-year career.

To learn more about the Sleep Matters Initiative, visit BrighamandWomens.org/SleepMatters. ■

References

Barger, LK, Rajaratnam, SMW, Wang, W, et al. "Common Sleep Disorders Increase Risk of Motor Vehicle Crashes and Adverse Health Outcomes in Firefighters." *Journal of Clinical Sleep Medicine*. March 15, 2015. 11(3);233-40.

Barger, LK, O'Brien, CS, Rajaratnam, SMW, Qadri, S, et al. "Implementing a Sleep Health Education and Sleep Disorders Screening Program in Fire Departments: A Comparison of Methodology." *Journal of Occupation and Environmental Medicine*. 2016.

Hafner, M, Stepanek, M, Taylor, J. "Why sleep matters—the economic costs of insufficient sleep: a cross-country comparative analysis." 2016. Santa Monica, CA: RAND Corporation.

Sullivan, JP, O'Brien, CS, Barger, LK, et al. "Harvard Work Hours, Health and Safety Group. Randomized, prospective study of the impact of a sleep health program on firefighter injury and disability." *Sleep*. Jan. 1, 2017. 40(1). doi: 10.1093/sleep/zsw001. PMID: 28364446.

For More
Safety & Health

firehouse.com/safety-health

Reproduced with permission of copyright owner. Further reproduction prohibited without permission.