

HEALTH & Safety

Shift Workers Give Sleep Short Shift

Sleep isn't the only problem associated with shift work.

Shift work—that is, working at times that fall outside the typical 7 AM to 6 PM workday—is unavoidable for a significant percentage of the health care workforce. After all, patients need around-the-clock care. For some shift workers, the hours and days they're on duty change constantly, whereas others work a regular schedule but with irregular hours. Approximately 17% of all workers in the United States now do shift work.¹

Sleep deprivation is a common problem for these workers. Thirty-three percent of them average less than six hours of sleep per night on workdays even though the American Academy of Sleep Medicine says most

adults need an average of seven to eight hours to feel alert and well rested.^{2,3} Inadequate sleep may be an annoyance to workers, but it has health and safety implications for health care practitioners and the patients they care for.

ADVERSE HEALTH EFFECTS

Shift work is one of several factors contributing to sleep deprivation and sleep disorders. A 2006 report from the Institute of Medicine estimated that 50 to 70 million Americans are chronically sleep deprived, yet most of the general public—and health care workers specifically—are unaware of the prevalence of sleep deprivation and of its far-reaching

health consequences.⁴ Shift work is associated with gastrointestinal disorders,⁵ including peptic ulcers⁶ and duodenal ulcers in *Helicobacter pylori*-infected patients,⁷ type 2 diabetes,⁸ various cancers,⁹⁻¹¹ hypertension,⁹ and stroke.¹² Haupt and colleagues reported in 2008 that shift work is a risk factor for atherosclerosis and myocardial infarction,¹³ and women doing shift work for more than six years have been shown to be at greater risk for coronary heart disease.¹⁴ Shift work also plays havoc with circadian rhythms, changing temperature and catecholamine production.^{15,16} Studies have also demonstrated that shift work affects women's fertility and fetal development.^{17,18}

The psychosocial stresses associated with shift work can have significant mental health effects. In a study of health care providers in Canada, a high degree of self-reported work stress was significantly associated with shift work.¹⁹ Anxiety and depression are more prevalent in shift workers, who also tend to be dissatisfied with their jobs.²⁰ Nurses who work rotating, evening, or night shifts have higher stress levels than their daytime counterparts.^{5,21} Kageyama and colleagues found that, for female staff nurses in Japan, there are “close and complicated relations” between smoking and working the night shift.²² (For more on the associations between shift work and health, including the results



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of numerous early studies, see the 2002 review article by Shields.²³⁾

In addition to its direct health effects, shift work is associated with increased levels of fatigue and sleepiness.^{24, 25} Forcing the

the *Exxon Valdez* Alaska oil spill.^{28, 32}

In 2004 Landrigan showed that hospital interns who worked 77 to 81 hours per week and were on call for 24 or more

injured on the job or to make a medication or procedural error in their work.³⁰

The night- or variable-shift nurses in that study were also twice as likely to be involved in automobile accidents, a tendency that holds true for all shift workers. In a 2008 poll conducted by the National Sleep Foundation, 60% of Americans said they'd driven when they felt sleepy and 37% said they'd fallen asleep at the wheel during the previous year.³⁴ The association between road accidents and drowsy drivers, including physicians and interns doing shift work, has been well established.^{35, 36}

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body to do the opposite of what the circadian system naturally tends to do (be active during the day and resting or asleep at night) diminishes the quality and quantity of sleep and makes it more difficult to stay awake and alert during the shift hours.^{26, 27} Studies have shown that increased sleepiness resulting from shift work reduces sensorimotor skills and coordination.²⁸

MORE ACCIDENTS AND MISTAKES

Working longer hours, as many shift workers do—including the related fatigue and sleepiness they experience—is associated with accidents in the workplace.²⁹ Shift workers are more likely than day-shift workers to make mistakes on the job and to be involved in accidents, increasing their risk of job-related injury and illness.^{30, 31} Worker fatigue was a key contributing factor in several major industrial accidents, including the nuclear accidents at Three Mile Island in Pennsylvania, and Chernobyl, Ukraine; the Bhopal, India, release of methyl isocyanate; and

hours every third night made more “serious” medical mistakes than those who worked no more than 63 hours per week with no extended shifts.³³ The errors included medication, procedural, and diagnostic mistakes. A 1992 survey by Gold and colleagues of nurses at a Massachusetts hospital found that, compared with those who worked only day or evening shifts, nurses who worked either the night shift or variable shifts got less sleep and were about twice as likely to be

PRACTICAL INTERVENTIONS

So what's a shift worker to do? A variety of studies have explored ways to lessen the difficulties that accompany shift work.³⁷ For example, Kerin and Aguirre found that permitting workers to design their schedules by choosing the days and times they worked resulted in less fatigue, turnover, and absenteeism, as well as better morale.²⁶ In a similar study, shift workers who were able to exercise some control over the

Strategies for Better Sleep^{40, 41}

- Establish—and stick to—regular to-bed and wake-up times, even on your days off.
- Avoid nicotine and alcohol.
- Avoid caffeine for several hours before bedtime.
- Exercise regularly, but not within three hours of bedtime.
- Devise a bedtime routine that helps you relax.
- Make sure your bedroom is dark and quiet, or use a sleep mask and earplugs.
- Wear dark glasses to minimize your eyes' exposure to daylight as you travel home after work.



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days and hours they worked reported lower levels of stress associated with work and family life.³⁸ A 2005 review of whether night-shift workers benefitted from on-site naps found that they had reduced sleepiness and fatigue and improved alertness.³⁹

But for many, customized schedules and on-the-job naps are merely the stuff of dreams. Follow the tips in *Strategies for Better Sleep*^{40,41} to improve the quality of the sleep you do manage to get. ▼

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REFERENCES

- McMenamin TM. A time to work: recent trends in shift work and flexible schedules. *Mon Labor Rev* 2007;3-15.
- National Sleep Foundation. *Sleep, performance and the workplace*. Washington, DC; 2008 Mar. Sleep in America polls; <http://www.sleepfoundation.org/sites/default/files/2008%20POLL%20SOF.PDF>.
- American Academy of Sleep Medicine. *Sleep Deprivation*. Westchester, IL; 2008. Fact Sheets; <http://www.aasmnet.org/Resources/FactSheets/SleepDeprivation.pdf>.
- Colten HR, Altevogt BM, editors. *Sleep disorders and sleep deprivation: an unmet public health problem*. Washington, DC: National Academies Press; 2006.
- Sveinsdottir H. Self-assessed quality of sleep, occupational health, working environment, illness experience and job satisfaction of female nurses working different combination of shifts. *Scand J Caring Sci* 2006;20(2):229-37.
- Segawa K, et al. Peptic ulcer is prevalent among shift workers. *Dig Dis Sci* 1987;32(5):449-53.
- Pietrojusti A, et al. Shift work increases the frequency of duodenal ulcer in *H pylori* infected workers. *Occup Environ Med* 2006;63(11):773-5.
- Morikawa Y, et al. Shift work and the risk of diabetes mellitus among Japanese male factory workers. *Scand J Work Environ Health* 2005;31(3):179-83.
- Hirose T. An occupational health physician's report on the improvement in the sleeping conditions of night shift workers. *Ind Health* 2005; 43(1):58-62.
- Davis S, et al. Night shift work, light at night, and risk of breast cancer. *J Natl Cancer Inst* 2001;93(20):1557-62.
- Straif K, et al. Carcinogenicity of shift-work, painting, and fire-fighting. *Lancet Oncol* 2007;8(12):1065-6.
- Brown DL, et al. Rotating night shift work and the risk of ischemic stroke. *Am J Epidemiol* 2009;169(11):1370-7.
- Haupt CM, et al. The relation of exposure to shift work with atherosclerosis and myocardial infarction in a general population. *Atherosclerosis* 2008;201(1):205-11.
- Kawachi I, et al. Prospective study of shift work and risk of coronary heart disease in women. *Circulation* 1995; 92(11):3178-82.
- Froberg JE, et al. Shift work. A study of catecholamine excretion, self-ratings and attitudes. *Studia Laboris Salutis* 1972;11:10-20.
- Folkard S, et al. Short and long-term adjustment of circadian rhythms in 'permanent' night nurses. *Ergonomics* 1978;21(10):785-99.
- Bisanti L, et al. Shift work and subfertility: a European multicenter study. European Study Group on Infertility and Subfertility. *J Occup Environ Med* 1996;38(4):352-8.
- Nurminen T. Shift work, fetal development and course of pregnancy. *Scand J Work Environ Health* 1989; 15(6):395-403.
- Wilkins K. Work stress among health care providers. *Health Rep* 2007; 18(4):33-6.
- Shields M. Unhappy on the job. *Health Rep* 2006;17(4):33-7.
- Coffey LC, et al. Nurses and shift work: effects on job performance and job-related stress. *J Adv Nurs* 1988; 13(2):245-54.
- Kageyama T, et al. Associations of sleep problems and recent life events with smoking behaviors among female staff nurses in Japanese hospitals. *Ind Health* 2005;43(1):133-41.
- Shields M. Shift work and health. *Health Rep* 2002;13(4):11-33.
- Sallinen M, et al. Sleepiness in various shift combinations of irregular shift systems. *Ind Health* 2005;43(1):114-22.
- Harma M, et al. The effect of an irregular shift system on sleepiness at work in train drivers and railway traffic controllers. *J Sleep Res* 2002;11(2):141-51.
- Kerin A, Aguirre A. Improving health, safety, and profits in extended hours operations (shiftwork). *Ind Health* 2005;43(1):201-8.
- Roach GD, et al. Changes in the concentration of urinary 6-sulphatoxymelatonin during a week of simulated night work. *Ind Health* 2005;43(1):193-6.
- Petrilli RM, et al. The impact of sustained wakefulness and time-of-day on OSPAT performance. *Ind Health* 2005;43(1):186-92.
- Dong X. Long work hours, work scheduling and work-related injuries among construction workers in the United States. *Scand J Work Environ Health* 2005;31(5):329-35.
- Gold DR, et al. Rotating shift work, sleep, and accidents related to sleepiness in hospital nurses. *Am J Public Health* 1992;82(7):1011-4.
- Dembe AE, et al. Nonstandard shift schedules and the risk of job-related injuries. *Scand J Work Environ Health* 2006;32(3):232-40.
- Folkard S, et al. Shiftwork: safety, sleepiness and sleep. *Ind Health* 2005; 43(1):20-3.
- Landrigan CP, et al. Effect of reducing interns' work hours on serious medical errors in intensive care units. *N Engl J Med* 2004;351(18):1838-48.
- National Sleep Foundation. *Drowsy driving*. n.d. <http://www.sleepfoundation.org/article/sleep-topics/drowsy-driving>.
- Akerstedt T. Consensus statement: fatigue and accidents in transport operations. *J Sleep Res* 2000;9(4):395.
- Steele MT, et al. The occupational risk of motor vehicle collisions for emergency medicine residents. *Acad Emerg Med* 1999;6(10):1050-3.
- Kogi K. International research needs for improving sleep and health of workers. *Ind Health* 2005;43(1):71-9.
- Fenwick R, Tausig M. Scheduling stress: family and health outcomes of shift work and schedule control. *The American behavioral scientist* 2001; 44(7):1179-98.
- Takeyama H, et al. The nighttime nap strategies for improving night shift work in workplace. *Ind Health* 2005; 43(1):24-9.
- National Sleep Foundation. *Debunking sleep myths*. n.d. <http://www.sleepfoundation.org/sleep-facts-information/debunking-sleep-myths-1>.
- National Sleep Foundation. *Shift work and sleep*. n.d. <http://www.sleepfoundation.org/article/sleep-topics/shift-work-and-sleep>.