

Risks Associated With Shift Work

Sleep, sleepiness, performance, safety

Drake and coworkers⁸ indicated that 32 percent of night workers (majority of shift hours between 9 p.m. and 8 a.m.) and 26 percent of rotating shift workers (shifts that change periodically from days to evenings or nights) experienced long-term insomnia and excessive sleepiness and were unable to adapt their sleep adequately on these shifts. Sleep loss makes people sleepier while awake, which may affect the shift worker's ability to perform activities safely and efficiently, both on and off the job. Increased sleepiness (or decreased alertness) in shift workers on the job has been demonstrated with subjective reports,⁹ objective performance testing,¹⁰ and EEG recordings showing brief, on-the-job sleep episodes.¹¹ Sleepiness is most apparent during the night shift, and poor daytime sleep appears to be a contributing factor.¹² A meta-analysis combining injury data from several studies indicated that injury risk increased by 18 percent during the afternoon/evening shift and 34 percent during the night shift compared to morning/day shift.¹³ These results are consistent with worksite observations of increased subjective sleepiness and decreased reaction time during night shifts, and progressive decreases in total sleep time from early to late in the workweek.¹⁴

Social and familial disruptions

Because shift workers often work in the evening and sleep during the day, they frequently sacrifice participation in social and family activities. Furthermore, shift workers in continuously operating organizations such as hospitals are regularly required to work weekends and holidays, when much social and family interaction occurs.^{15, 16} Consequently, too little time with family and friends is the most frequent and most negatively rated complaint among shift workers. The extent to which such disruptions occur depends both on the worker's schedule, type of family, gender, presence of children, and the degree of flexibility in the worker's social contacts and leisure pursuits.¹⁵⁻¹⁷ For families, shift work often conflicts with school activities and the times when formal child care services are available, making arranging for the care of children more challenging,¹⁷ affecting both the worker and the family's social adjustments.

Long-term effects and vulnerable groups

Although the specific contribution of shift work to other illnesses is not clear, several diseases have been associated with these work schedules. Gastrointestinal (GI) complaints are common in shift workers and could be due to changes in circadian rhythms of GI function, sleep deprivation leading to stress response and changes in immune function, or the types of foods that are available during these shifts.^{18, 19} Schernhammer and colleagues²⁰ reported an increased risk of colon cancer in nurses working 3 or more nights per month for 15 or more years.

Psychological complaints are frequently reported, including depression and other mood disturbances, personality changes, and relationship difficulties.²¹ A review of 17 studies suggests that shift work increases risk for cardiovascular disease by 40 percent compared with day workers.²² Possible mechanisms include decreased glucose tolerance, insulin resistance, elevated cortisol levels, and increased sympathetic activity. A systematic review of reproductive outcome studies concluded that shift work was associated with a modest increase in spontaneous abortion, preterm birth, and reduced fertility in women.²³ The effect on reproduction in men was not analyzed due to an inadequate number of studies. A meta-analysis of 13 studies examining night work and breast cancer reported that night work was associated with a moderately elevated risk among women.²⁴ The authors hypothesized that exposure to light at night reduces melatonin levels, increasing risks for cancer.

Shift work also may exacerbate preexisting chronic diseases, making it difficult to control symptoms and disease progression. Shift work interferes with treatment regimens that involve regular sleep times, avoiding sleep deprivation, controlling amounts and times of meals and exercise, or careful timing of medications that have circadian variations in effectiveness. Sood²⁵ suggests several conditions that may be exacerbated by shift work: unstable angina or history of myocardial infarction, hypertension, insulin-dependent diabetes, asthma, psychiatric illnesses, substance abuse, GI diseases, sleep disorders, and epilepsy requiring medication. Costa²⁶ adds to this list chronic renal impairment, thyroid and suprarenal pathologies, malignant tumors, and pregnancy. Aging is also associated with less tolerance of shift work, which may be due to age-related changes in sleep that may make it more difficult for older people to initiate and maintain sleep at different times of the day.²⁷ These sleep changes may begin as early as the 30s and 40s, so some workers who initially adapted well to shift work during their younger years may show more symptoms as they grow older.

Risks Associated With Long Work Hours

The number of studies examining long work hours is less extensive, but a growing number of findings suggest possible adverse effects. A meta-analysis by Sparks and colleagues⁵ reports that overtime was associated with small but significant increases in adverse physical and psychological outcomes. A review by Spurgeon and colleagues⁶ concluded that the adverse overtime effects were associated with greater than 50 hours of work per week, but little data are available about schedules with fewer than 50 hours. An integrative review by Caruso and colleagues²⁸ reported that overtime was associated with poorer perceived general health, increased injury rates, more illnesses, or increased mortality in 16 of 22 recently published studies. Dembe and colleagues,²⁹ examining data from the National Longitudinal Survey of Youth, found a dose-response relationship, such that as the number of work hours increased, injury rates increased correspondingly. Trinkoff and colleagues^{30, 31} found that long work hours were related to the incidence of musculoskeletal injuries and needlesticks in nurses. Overall, these studies indicate that caution is needed in implementing schedules with extended work hours. Determining the number of work hours critically associated with risk for a specific job would require examining how extended hours interact with other factors contributing to fatigue, such as work load, competing responsibilities, and opportunities for rest and recovery. Additional information on the effect of long work hours can be found elsewhere in this book.

Coping Strategies

Efforts to promote adaptation to (or ease the difficulties of coping with) shift work and long work hours include strategies for employers and strategies for workers. Most suggestions to date were written for shift work, but they may also be relevant for long work hours. A sampling of strategies suggested in the literature for shift work include designing new work schedules and rest breaks during work, altering circadian rhythms with bright light or blue light, optimally timing physical activity or other work demands, improving physical conditioning, using caffeine, planning dietary regimens, stress reduction, support groups, and family counseling.³²⁻³⁹ Caldwell and Caldwell³⁶ suggest using behavioral and administrative strategies fully before considering pharmacologic aids since these stimulants and sedatives can be addictive and questions remain about the safety and effectiveness of long-term use. Taking naps during work is another intervention that has been associated with improvements in alertness^{40, 41} and is an accepted practice in some Asian countries. More research is needed to determine the optimum length and timing of the nap and a practical environment at work to take a nap. Empirical evaluations and applications of the other techniques have begun and will be useful for some workers, but more research is needed to develop strategies that can be easily applied by workers in a wide range of demanding work schedule situations. Another type of strategy are work hour limits such as the recent Institute of Medicine recommendation⁴² (p. 13) that work hours for nurses be limited to 60 hours per 7-day period and 12 hours per day.