

# Shift Work:

## disrupting worker health and lives

### “...Shift work is definitely among one of the most serious occupational health problems of our time,”

according to an editorial in the March 2010 issue of the globally recognized *Scandinavian Journal of Work and Environmental Health*. The editorial goes on to say, “Considering the pervasiveness of shift work and its numerous and serious health effects, we cannot continue to delay taking preventive and curative public health actions in anticipation of further data.”

### What is shift work?

A standard work day consists of a shift scheduled between 7:00 am and 6:00 pm. Shift work can be defined as work scheduled outside of these “normal” hours. Examples include:

- evening schedule (begin after 3:00 pm and end before midnight);
- night schedule (begin after 11:00 pm and end before 11:00 am);
- rotating shift schedule (day, afternoon/evening, night);
- split shifts (two scheduled periods of work each day);
- on call; and
- irregular schedule.

### Who performs shift work?

One in four employed Canadians work shifts. One in five is engaged in shift work involving work at night.

Shift workers are employed in all sectors including manufacturing, health care and social assistance, accommodation and food services, warehousing, primary industries, public service and utilities. Among the millions working shifts here in Canada are nurses, truck drivers, police officers, firefighters, paramedics, miners, autoworkers, cleaners, gas station attendants and waitresses.

### How is worker health affected?

The human body functions according to a natural sleep-wake/day-night 24 hour cycle referred to as a circadian rhythm. This rhythm helps to maintain most internal functions ranging from body temperature and hormone levels to blood pressure and sleep/wake patterns. It is guided by environmental cues such as darkness and light and day and night. Shift work, particularly involving exposure to light at night, disrupts the circadian rhythm and thus how our body functions. This disruption has been linked with cancer and a range of other health, safety and social impacts in shift workers.

### Cancer

The International Agency for Research on Cancer (IARC) has designated shift work involving circadian rhythm disruption as “probably carcinogenic to humans” (Group 2A).

In their findings, IARC cited studies of nurses and female flight attendants who developed excess levels of breast cancer. Studies have also found elevated risks of prostate, colorectal and endometrial cancers for shift workers.

In 2009, the Danish National Board of Industrial Injuries became the first compensation system in the world to recognize the link between working night shifts and the development of breast cancer. Here in Ontario and across Canada, worker’s compensation systems don’t yet recognize the link.

It is suggested a few biological mechanisms are responsible for the elevated cancer risk including the suppression of melatonin production due to exposure to light at night. Melatonin is a hormone normally produced in the body at night. Disruption of the circadian gene function is another possibility.

Studies also suggest low levels of melatonin may either stimulate the growth of cancerous cells in the breast or encourage the production of higher levels of estrogen — a known promoter of breast cancer.

### Workplace injuries

Research suggest night, evening, rotating and irregular shifts are all linked with an elevated risk of workplace incidents resulting in injuries.

According to Dr. Cam Mustard, president and senior scientist, Ontario’s Institute for Work and Health (IWH), evidence suggests six to seven per cent of workplace injuries can be attributed to the higher risk of injury associated with shift work. A Canadian study published in October 2010 found the risk to be even higher at nine per cent. The authors of this study, *Shift Work Trends and Risk of Work Injury Among Canadian Workers*, reported the risk to be even more pronounced for women. They suggest because women are more likely to be responsible for childcare and household work, they may have more difficulties adjusting to shift work and maintaining regular sleep schedules.

Noted “sleepiness” expert Dr. Torbjorn Akerstedt, Stress Research Institute, Stockholm University presented evidence on this topic in April, 2010 at the *Scientific Symposium: The Health Effects of Shift Work*. He explained sleep after a night shift or before a morning shift is reduced by one to three hours

and that individual vulnerability for shift workers is mainly linked to sleepiness.

According to Mustard, who also presented evidence at the Symposium, the overall risks are understood to arise from shift worker fatigue due to sleep disturbance, long work hours and the resulting effect on circadian rhythms as well as typically lower levels of supervision and co-worker support during non-daytime shifts. The overall risk of incidents (defined by IWH as “accidents and injuries”) is highest during the night shift, followed by afternoons compared to morning shifts. Incident rates also increase on successive night shifts and increase as shifts go beyond eight hours.

Studies have also linked sleepiness and fatigue to an excess risk of vehicle traffic accidents both at work and travelling to and from work.

The connection between shift work and more chronic sleep disturbances is increasingly being recognized. According to the *International Classification of Sleep Disorders, 2<sup>nd</sup> Edition* (2005), the clinically recognized shift work sleep disorder (SWSD) can be defined as “the presence of excessive sleepiness (ES) and/or insomnia for at least one month, in association with a shift-work schedule.”

### Mental health and work-life balance

Anxiety, depression and stress are just some of the mental health issues reported by shift workers.

Working shifts can also complicate family, social and community life. Most social activities are scheduled at night or on weekends — times when shift workers may be working. Scheduling “quality” time with a spouse or children may be difficult. Fatigue may also impact “quality” time. Shift workers experience higher divorce rates compared to workers employed on day shifts.

According to a 2008 Statistics Canada report, cutting back on sleep is a common method for full-time workers to gain the time needed for lives external to work. And this was common practice with 70 per cent of evening workers and 63 per cent of rotating shift worker. This solution to balance work and life can lead to injuries and other health impacts caused by sleepiness and fatigue.

### Other health effects

A 2012 study led by Canadian researchers found shift work was associated with a 23 per cent increased risk of heart attack, 24 per cent increased risk of coronary event and five per cent increased risk of stroke. Shift work is also linked with reproductive



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health problems including excess risk of miscarriages, pre-term delivery, low birth weight and delayed fetal development. Studies have found shift workers to suffer excess gastrointestinal disorders including ulcers and heartburn. Shift work has also been linked with excess diabetes.

Violence or its potential is also a concern for shift workers who work alone or in other vulnerable situations.

### How can workers be protected?

Eliminating exposure to occupational hazards, including shift work, should always be the initial consideration when developing and implementing a workplace-specific prevention strategy. For instance, for pregnant or nursing workers, avoiding shift work is essential. Dr. Matteo Bonzini, an Assistant Professor of Occupational Health in the Faculty of Medicine of the University of Insubria in Italy, speaking in April 2010 at the Shift Work Symposium, stated the precautionary principle for pregnant women and shift work is “justified”. He explained “women should be advised against working non-traditional work schedules during pregnancy and should always be allowed to change to daytime work.”

Pregnant women and nursing mothers in Quebec, Manitoba and those under federal jurisdiction (Division VII, Part III, *Canada Labour Code*) have varying degrees of reassignment protection.

Shift work is often unavoidable.

Solutions must then be found to limit harmful exposure. Controlling exposure to light and dark has been used to help circadian rhythm adapt to shift work. These controls include bright light treatment and light filtering or blocking goggles or glasses.

According to researchers from the Ontario-based Institute for Work and Health (IWH) and the Occupational Cancer Research Centre (OCRC), existing evidence leads them to believe the combination of bright light treatment and wearing goggles or glasses to block or filter light may be more effective at promoting circadian adaptation than using either one of these approaches on their own.

To date, most efforts have focused on administrative controls related to shift scheduling and shift rotation, including:

- using forward shift rotations (clockwise — day to afternoon to night);
- fast rotation of shifts (change shift every 2-3 days) or slow rotation over longer periods of time (change shift every three weeks or longer);
- minimizing the number of consecutive shifts on nights (8 hour shift for 5 nights, 10 hours shift for 4 nights, 12 hour shift for 3 nights);
- providing adequate rest between shifts — more than 10 hours to allow for adequate sleep;
- providing adequate recovery period between shift change (min 24 hrs);
- avoiding early starts to day shift (before 6:00 am);
- limiting weekend work; and
- self or flexible scheduling (see below for more details).

Important to the success of these control measures is the involvement of

workers and/or their representatives. The IWH cites research that suggests shift system design, monitoring and evaluation should be done in a “participatory way” involving workers, worker representatives and supervisors. This approach is also supported by the results of the European Union (EU) Survey on Working which found the impacts of non-standard working hours on health may be lessened if workers can participate in designing and implementing their shift schedules; and if shift systems are individually tailored to the specific job demands and personal and social conditions of the workers involved.

The inclusion or involvement of shift workers on joint health and safety committees (JHSCs) is another aspect of this participatory approach.

Shift work awareness training for all workplace parties is another important component of any workplace-specific prevention strategy. More comprehensive training should be provided to joint committee members, health and safety representatives and supervisors. Each has specific and legally-mandated roles and responsibilities to protect worker health.

### What can workers do?

For the many who must work shifts, training can help to educate workers on individual coping strategies that can help mitigate potential health and work/life balance impacts.

#### Sleep

- establish a sleep schedule;
- establish a quiet, dark and comfortable place to sleep;
- prepare for sleep (relax, no excess exercise);
- get adequate sleep.

#### Diet

- maintain regular eating patterns;
- afternoon/evening workers should eat at dinnertime rather than the middle of their shift;
- night workers should eat lightly through the shift;
- avoid heavy meals before sleep;
- drink water and avoid caffeine, alcohol, junk food and fast food.

#### Family and social activities

- schedule time with family/friends;
- work on communication skills (ie. texting to increase contact with family and friends);
- stay active (physically, mentally).

### Is shift work regulated?

As with so many other occupational hazards, shift work is, for the most part, governed by the general duty clause both in Ontario and for federally-regulated workplaces.

#### Ontario

Employers are required to identify workplace hazards and take every precaution reasonable in the circumstances for the protection of a worker [Section 25, 2(h), *Occupational Health and Safety Act (the Act)*]. This must include protection from risk to health posed by shift work.

Employers are also required to:

- provide information, instruction and supervision to protect the health or safety of the worker [Section 25(2) (a)]; and
- acquaint a worker or person in authority over a worker with any

hazard in the work [Section 25(2)(d)].

Ontario’s *Employment Standards Act (ESA)* addresses shift work protection by mandating worker entitlements to “hours free from having to work.” In most cases, workers must receive 11 consecutive hours off work in a day [Section 18(1), *ESA*]. They must get eight hours off between shifts unless the total time for two shifts does not exceed 13 hours [Section 18(3), *ESA*]. Workers are also entitled to 24 consecutive hours off work each work week or 48 consecutive hours of work in every period of two consecutive weeks [Section 18(4), *ESA*].

#### Federal jurisdiction

Employers have a general duty to ensure the health and safety of their employees [Section 124, *Canada Labour Code (the Code)*, Part II]. Workers are entitled to one full day of rest per week [Section 173, *the Code*, Part III].

#### Other Canadian jurisdictions

The *Saskatchewan Occupational Health and Safety Regulations* mandates employers, in consultation with the joint occupational health committee, to assess the risks to worker’s health and safety posed by shift work and inform the worker of the nature and extent of the risks and the ways to eliminate or reduce those risks [Section 82(a)(b)]. Of course, this is in addition to the employer’s general duty clause [Section 3(a), *Saskatchewan’s OH&S Act*].

**NOTE:** To further address this issue the WHSC offers training and other related information products. To learn more, be sure to contact a WHSC training service representative near you.



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