

occupational **health** helpline

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24/7 health effects: shift and night-working

an employer's guide

Fact Sheet 10

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in conjunction with



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1. 24-hour society

The 24-hour society is an exciting, challenging aspect of modern life. Services are provided and goods are produced at all hours of the day and night. Twenty-four hour opening at supermarkets has become a way of life for both shop-workers and the public.

Traditional shift-working industries have been joined by high profile international city law firms and bankers working through the night together with all the support staff they would have during the day: secretaries, graphic designers, accountants.

Manufacturing, hospitals, newspapers, bakers, long-haul truckers, airports, the police, are just some of the sectors where people have traditionally needed to work continuously. More recently relaxation in licensing laws has meant that far more employees in restaurants, bars and clubs are working later into the night. Call centres too offer a growing number of services twenty-four hours a day: 24-hour banking, legal advice lines, NHS direct etc.

Demanding work schedules are a fact of life in modern society, but 24-hour living can also harm your health. Shift-work schedules can be a physical and mental strain and mistakes from a fatigued shift-worker also can affect the public's safety or health.

Shift-working is not new. How do we make sure that the 24/7 society works to our advantage? A better understanding of how shift work and fatigue in particular affect the body and people's lives will help us plan for healthier safer and more productive workplaces 24 hours a day.

2. 24-hour rhythms: biological and social

Shift-work puts the worker out of synchronisation with the general rhythms of life. These rhythms are the biological rhythms of the body in relation to night and day, morning and evening; and the social rhythms of society and family which stem from these.

biological rhythms

Biological rhythms (also known as circadian rhythms) include the rhythms of sleep, body temperature, metabolism and alertness. These form the body's internal clock and they are all inter-related. Most people sleep when their inner body temperature is at a minimum. One of the reasons that the daytime sleep after a night shift is shorter than the night sleep of shift-workers is that these people are trying to sleep when their inner body temperature is trying to wake them up.

social rhythms

Social life is based on the shared rhythms of sleep, mealtimes, work and recreation. Shared meals and shopping, evenings with friends and family, TV, weekend football matches, barbeques, celebrations, these are the glue that holds our social support networks together. Shift-work brings a separation from these shared rhythms of general life and can separate the shift-worker from family and friends.

3. health and shift work

“Working outside standard office hours can lead to sleep disruption, gastro-intestinal disorders and even an increased risk of heart disease.” [The Lancet '1]

digestive problems

Peptic ulcers and other stomach disorders are five times higher among shift-workers with night-shifts, compared to day workers or shift workers without night-shifts.² This is caused by unsuitable food taken in unsuitable quantities at unsuitable times:

- shift-work interferes with mealtimes and during night shifts canteens are often not available.
 - people eat at home, but earlier or later than normal times
 - eating at work where the food is often cold and not always of good quality
- food is frequently consumed hurriedly and in uncomfortable rooms during a short pause in work rather than a proper break.
- night and shift-workers drink more coffee and other caffeinated beverages and also smoke more tobacco; caffeine and tobacco when taken in quantity, can cause digestive problems
- digestive systems are more problem-prone when they are sleep deprived
- eating patterns are not easily changed but the availability of healthy food and proper breaks taken in a pleasant area do make a difference

cardiovascular problems

The risk factors for cardio-vascular disease are prevalent in shift-working: digestive and sleeping disorders, tobacco smoking, stress and anxiety. Heart disease detected early can be brought under control therefore shift-workers health should be monitored regularly.

sleep disturbances

- sleep after night work is usually shorter and less refreshing or satisfying than sleep during the normal night-time hours
- brain and body functions slow down during the normal night-time and early morning hours
- combination of sleep loss and working at the body's low point can cause excessive fatigue and sleepiness
- cumulative sleep debt can have a large impact on observed performance and safety standards
- for specific sleep disorders eg sleep apnoea, medical advice should be sought

To assist in adjustment to shift and night working and to reduce fatigue there are many lifestyle strategies available, which can be used (see section 9). It is not recommended that sleeping tablets be used as a long term solution as they do not produce good quality sleep and people can feel groggy for some time after they wake, which can effect their personal life as well as their work.

Melatonin: This hormone is not licensed for use in the UK. The use of melatonin by night workers to aid sleep is controversial. Melatonin is a hormone produced by the pineal gland. It interacts with other hormones to regulate the body chemistry in ways that are not completely understood. A rise in Melatonin levels is one of the precursors to sleep. The health effects of long-term use of this hormone are unknown. Any individual thinking of purchasing this from abroad and self-prescribing a medication that is unlicensed in the UK should see their GP first.

women's health

More women have gradually moved into shift and night-working as the laws preventing women working at night have been removed. Research into links between women's health and shift-work has been inconclusive. There have been a variety of studies, some of which show higher incidence of irregular menstrual cycles amongst shift-workers and that irregular working hours can carry a risk of miscarriage, prematurity and low birth weight. However women's lives are full of complex family demands, which may also have a bearing on their health.³

Breast cancer: research into a possible link with shift-work has been inconclusive⁴ therefore current advice to women is therefore to follow NHS guidance on breast awareness⁵.

anxiety and depression

Increased levels of anxiety and depression are found among shift workers⁶

- happy social and domestic life is an important foundation for good mental health and shift-work can put a strain on this
- frequent switching from a day to night schedule is physically and emotionally stressful
- concern in preserving sufficient and satisfying relationships can lead the shift worker to organise his/her daily life in a stressful and unhealthy manner eg not taking enough sleep or interrupting sleep to eat with the family
- shift-work can interfere with the roles within the family
- free time with children may be more limited
- there may be relationship problems between partners
- some people experience difficulty keeping their social relationships going when their availability is constantly changing
- depression is related to chronic fatigue
- when a person feels they have no choice but to accept shift or night work

Strategies for improving sleep and eating habits can improve the general feeling of wellbeing particularly on night shift.

Counselling or the availability of an employee assistance programme (EAP) may be of assistance to people experiencing problems with anxiety and depression.

4. alertness and fatigue

types of fatigue

1. physical fatigue: the effect of physical effort on the muscles, the heart and other body systems. Fatigue can also lead to a drop in the body's defence mechanisms leaving the worker prone to viruses.
2. mental fatigue: this is the most dangerous type of fatigue as it can result in errors of judgement. Typical signs include slow decision making skills, poor concentration, mood swings, irritability, poor motivation and working on 'autopilot'.

causes of fatigue in shift-workers

The causes of fatigue include the effect of working at times that are contrary to the body's natural inclinations; the need for concentration over long periods; excessive working hours; tasks where attention must be sustained for long periods; and those which are long, repetitive, paced, difficult, monotonous.

Biological rhythms mean that daytime sleep is rarely as refreshing as night-time sleep and daytime sleep is also easily disturbed by environmental factors such as children playing and doorbells.

Shorter and less refreshing or satisfying sleep over a long period can lead to sleep debt and long term fatigue. Sleep debt can be magnified by elements in the work environment: dim lighting, limited visual acuity (eg due to weather), high temperatures and high noise.

fatigue, safety and accidents

'Fatigue can be insidious. It may develop slowly and may not always be apparent to those concerned or to their supervisors. Nevertheless fatigue can lead to severe accidents. Fatigue may well result in failure to concentrate. This may in turn lead to an employee failing to ensure that they are in a safe position with the result that they are hit by a falling object or struck by a swinging load.' [HSE] ⁷

Fatigue has been cited as an important element in major international accidents such as Three Mile Island nuclear alert and the Exxon Valdez oil disaster. The HSE places fatigue from shift-work and overtime among the top factors in Major Accident Hazards ⁸

5. driving and fatigue

"Tiredness Kills"

MORE THAN 300 PEOPLE A YEAR ARE KILLED AND MANY MORE ARE SERIOUSLY INJURED
WHERE A DRIVER HAS FALLEN ASLEEP AT THE WHEEL ⁹

safer driving advice

- avoid driving for long distances after a long day's work
- don't drive after you have been drinking
- try to avoid making long trips between midnight and 6am when natural alertness is low
- you should not drive if you are taking medicines that make you feel tired
- never start a long trip if you're already tired
- plan to stop for a twenty minute break every 2 hours on a long journey
- share the driving if possible

OPENING A CAR WINDOW OR TURNING UP THE RADIO DOES NOT WORK

driving drowsy? what helps and what doesn't

Driver fatigue does not occur without warning. Studies have shown that drivers who fall asleep at the wheel first reach the stage of fighting off drowsiness by opening a window or turning up the radio.

This does not work. [Dept. for Transport] ¹⁰ Try the following instead:

- Plan a 15-minute break every two hours of your journey.
- Find a safe place to stop when you begin to feel drowsy - not the hard shoulder. Use a well-lit area, lock your car, take a short nap and resume the journey 15-20 minutes later.
- Caffeine (150mg) is an effective countermeasure to sleepiness. This combined with a short nap or doze (less than 15 minutes) is particularly effective. Drink two cups of coffee or a high-caffeine drink, then take a short nap to allow the caffeine to work. (Caffeine takes 15-20 mins to kick in.)
- Avoid making long trips between midnight and 6am when natural alertness is low

the ride home – driving after shift work

Driving home after work can be risky for the shift worker, particularly because they have been awake all night and the body needs to sleep. For the evening worker coming home around midnight, the risk of meeting drunk drivers is higher. If you are sleepy when your shift is over, try to take a nap before driving home. Remember, sleep can quickly overcome you when you don't want it to.

1. Drive defensively.
2. Don't stop off for a "night cap"
3. Take public transport where possible.

4. If you feel sleepy follow the advice in 'driving drowsy?' (above)

6. Legal Regulations

- Working Time Regulations - Night Work
- Horizontal Amending Directive [HAD]
- Road Transport Directive
- Night Workers Entitlement to Free Health Assessment
- Management of H&S Regulations 1992

The Working Time Regulations - Night Work

Employers are required to take all reasonable steps to ensure that the 'normal' hours of their night workers do not exceed eight hours in 24 hours, averaged over a 17-week reference period. 'Normal hours' will not include overtime unless it is required under the contract.

There is an actual limit of 8 hours in each 24-hour period where the work involves special hazards or heavy physical or mental strain. [[ACAS 2004](#)]

Special hazards or heavy physical or mental strain: Employers should ensure that if the work of a night worker involves these, that they do not work for more than eight hours in any 24-hour period. Special hazards or heavy physical or mental strain may be identified as such in a collective or workforce agreement, or by a risk assessment made by the employer under the Management of Health and Safety at Work Regulations 1992 [see below]

Working Time Regulations Full details: www.dti.gov.uk/er/work_time_regs/index.htm

Horizontal Amending Directive [HAD]

A number of sectors were excluded from Working Time Directive when it came into force in October 1998. Five measures to extend Working Time to these sectors have now been formally adopted. The Horizontal Amending Directive is the main proposal. It came into effect on 1 August 2003. Full details of the amendments for the other previously excluded sectors (rail, air, sea, inland waterway and lake transport, sea-fishing, offshore work and junior doctors) are available at:

www.dti.gov.uk/er/work_time_regs/exsectors.htm

Road Transport Workers:

People carriers, couriers, taxis, white vans and all drivers not covered by EC drivers hours regulation 3820/85 (tachograph rules).

Non-mobile road transport workers (e.g. clerical/administrative personnel) - the existing Working Time Regulations were extended in full to this group. These mobile workers not subject to the Road Transport Directive [RTD] will be entitled to an average 48-hour working week, four weeks paid annual leave, health assessments if working nights and adequate rest but the HAD does not extend the Working Time Regulations on breaks and rest periods to mobile workers in this sector.

The Road Transport Directive [RTD]

This relates to HGV drivers and is due to be implemented in March 2005. It details breaks, rest periods and working time of HGV drivers. From March 2005 Mobile workers (drivers) subject to the RTD, will be entitled to the paid annual leave and health assessment provisions of the HAD. The self-employed have been excluded from the Directive for the time being.

Night Workers Entitlement to Free Health Assessment

Night worker: To be classed as a night worker you have to work more than three hours between 11pm and 6am as a regular part of your job, though this definition can be varied by agreement between the employer and the workforce collectively. [Work Smart TUC 2003]

“Under the regulations the night worker is entitled to the opportunity of a free health assessment at regular intervals. The appropriate frequency of repeat assessments will vary between individuals, according to factors such as the type of night work, its duration and the age and health of the individual worker. Where appropriate, the employer should be guided by the judgement of a health care professional. As a rule of thumb, it would be prudent for repeat screening questionnaires to be completed annually.” ACAS 2003 http://www.acas.org.uk/q_a/q_a6.html#3

The Management of Health and Safety at Work Regulations 1992

HSE guidance on fatigue:

“Regulation 3 of the Management of Health and Safety at Work (MHSW) Regulations requires all employers and self employed persons to assess the risks to the health and safety of their employees and any others who will be affected by their operations. The hazards of fatigue should be well known and it follows therefore that the consequential risks of fatigue should be assessed.”

<http://www.hse.gov.uk/pubns/dis4.htm>

7. shift planning considerations

Nurses at a London hospital initially opted for 12-hour shifts when new shift arrangements were made. (Three 12-hour shifts on consecutive days and nights, rather than working 36 hours over a five-day period). They thought it would give them more free time for a social life, fewer working days with more days off. In fact, they found that working so intensely left them exhausted. On the extra days off they were so tired they didn't feel like going out at all.

patterns of shift-work

There are many possible patterns of shift-work: 12hr (extended shifts); 3x 8hr; split shifts; forward rotation shift system; semi-continuous work (eg: not working at weekends). There is also much discussion around the relative qualities of, for example: 8 hour vs. 12 hour shift schedules or fixed vs. rotational shifts.

A physiologically sound shift schedule, chosen by the employees - whether fixed or rotating, works better than a shift schedule imposed on the employees.

planning considerations

Aims:

- minimise the impact of shift-work on the workforce
- improve the adaptation of workers to shift-work
- maximise productivity through the above aims.

Considerations:

- allow a 6-12 month trial period for new shift-work systems
- rotating shifts may work well for employees who don't like to always work nights
- fixed shifts may help employees schedule child-care and other family commitments with greater ease
- choose a shift system to suit the work required
- shorter shifts and work rotation schedules that go in the direction of the sun (morning, afternoon, night) have been found to reduce the negative effects
- short cycle schedule (changing the design of schedules so that the number of consecutive night shifts is small) produces fewer health risks, it also has a positive effect on leisure time
- concentration: where a job needs high levels of concentration is it possible to rotate the jobs within the team? Thus maintaining the necessary level of concentration for the most demanding job throughout the shift.
- set shift rosters ahead of time to allow employees to plan leisure time

- allow enough time between shifts for travel, washing, eating and sleeping and for employees to attend to their personal life
- allow flexibility for employees to change shifts where practicable
- avoid overtime for extended shifts

resources for planning shifts

The possible combinations of shift patterns and shift considerations are wide. The following documents, which can be downloaded free from the internet, offer more detailed information and planning advice:

Planning a shift rota. ACAS, 2004 (web version)

Appendix 2 to ACAS Advisory Booklet, Changing Patterns of Work

<http://www.acas.org.uk/publications/pdf/changingpatterns.pdf>

Wedderburn, A. (1998) Continuous shift systems

<http://www.eurofound.eu.int/publications/files/EF9802EN.pdf>

HSE [Validation and development of a method for assessing the risks arising from mental fatigue](#) CRR 254/1999, contains a summary of the main do's and don'ts of shift rotas, hours etc and a method (the 'fatigue index') for assessing planned shift pattern/hours changes

8. developing a productive and safer workplace for shift-working

HR and management issues

- access to HR, finance and other facilities etc: shift and night-workers need the access during their work hours, to discuss personal issues.
- training: shift and night-workers must be included in all company training initiatives
- educate managers and shift workers about the need for sleep and the dangers of fatigue
- family friendly policies need to include the difficulties faced by shift-workers, variable shift times affect families as well as the individual worker
- ensure there is communication and possibilities for 'shoptalk' between shifts
- consider making counselling or an Employee Assistance Service (EAP) available
- diversity issues: shift workers may come from more diverse ethnic backgrounds than day workers. Consider diversity training to assist many cultures and abilities to work together and the question of whether there is a need for training and communication in other languages.

health and safety Issues

- workstation and DSE assessments also need to be arranged for shift and night workers
- risk assessments should include the possibility of the effects of fatigue on the work undertaken or caused by the work undertaken. This can be an important element in errors of judgment and accidents. The HSE is currently validating a method of assessing the risks arising from fatigue. ¹¹
- workplace exposure standards are based on 8-hour shifts and not on extended shifts, daily exposure to noise, chemicals and physical hazards may be increased. Professional advice should be sought for adjustment of exposure standards.
- be concerned about employee safety going to and from work, encourage the use of carpools, public transportation, rested drivers and even taxis.

workplace and environment

- provide good meals facilities or vending machines with healthy food choices and a microwave oven
- ensure good ventilation
- dim lighting, limited visual acuity (eg due to weather), high temperatures and high noise all tend to enhance fatigue
- install bright lights in the work areas. A well-lit workplace signals the body that it is time to be awake and alert
- if people have to work in dim lighting because of the nature of their work (eg nursing) provide areas with full spectrum lighting where some aspects of their work can be done
- car parks and external entrances should be well lit for safety of workers starting and finishing their shifts at night
- offer alternatives where practicable to employees who may have difficulties adjusting to shift-work

9. avoiding fatigue: adjustment strategies and advice

Shift-workers adjust better if they sleep well, have family support, reduce stress, exercise, and have a healthy diet.

starting your shift 'day'

- exercise can help sort out body rhythms. Before your shift start your new 'day' with some exercise. Take the dog for a walk or go for a brisk walk or jog in the evening before your shift, or exercise with a DVD/video
- taking a nap of 1-4 hours before the first night shift can help the body to adjust
- consider having your largest meal after your day-time sleep ie: before your shift
- for some people sitting beside a full spectrum light for 20-30mins when they wake up can help them adapt better, particularly in winter¹²

healthy sleep strategies

- let family and friends know your work schedule and sleep times
- after the last night shift, have a short sleep first, and go to bed early that night
- keep to a regular sleep routine
- sleep in a cool, quiet, darkened room. Heavy curtains or blackout blinds can be helpful
- environmental noise: try soft earplugs; heavy curtains can help to dampen exterior sounds; secondary double-glazing in the bedroom may be helpful
- avoid heavy physical exercise before sleeping as this wakes you up, thus delaying sleep
- sleeping tablets are not the answer. Most people find they give poor quality sleep and can leave you feeling groggy for hours. Try lifestyle strategies before you consult your doctor.
- for additional sleep strategies see: www.sleepnet.com

maintaining social ties

Some people find that shift work makes it difficult to maintain social ties if they are working when others are socialising or they are awake when others are asleep.

- phone home: make time to call home and talk with your kids and spouse, whether it's just before bedtime or just after the sun rises
- publicise your hours: make sure your family and friends know your work schedule
- get creative: make a breakfast date — it'll be a nice end-of-the-day treat for you and a nice start-of-the-day treat for someone else

[© 1998-2004 Mayo Foundation for Medical Education and Research]

timing and choosing food

- eat regular meals with a balanced diet
- have a light meal in the middle of night shift
- toward the end of your shift, especially if you go to bed soon after finishing work, choose small portions — and avoid fatty foods entirely
- after your shift choose a low-fat meal such as fish and vegetables which can be digested in about an hour. A meal heavy in fats such as roast beef, french fries and cheesecake or a breakfast fry-up will keep your stomach busy digesting for up to 8 hours and you won't sleep well.
- have caffeinated drinks before your shift or early during your shift. Caffeine stays in your body for 5 hours so have your last caffeinated drink 5 hours before you plan to sleep.
- avoid alcohol and smoking just before going to bed they both disrupt sleeping patterns.

strategies for promoting alertness at work

- don't leave the most tedious or boring tasks to the end of your shift when you are apt to feel the drowsiest. Night shift workers hit their lowest period around 4 a.m.
- if it is possible take short breaks throughout the shift
- try to exercise during breaks. Use the employee lounge, take a walk, climb stairs

10. shift-work as a positive experience

Shift and Night work can become positive experiences for both the employer and the employee:

- if it is organised and managed well
- rotating shifts may work well for employees who don't like to always work nights
- fixed shifts may help employees schedule child-care and other family
- if the hours worked are flexible to suit individuals, not the other way around
- when there are salary incentives
- if the strategies for improving sleep and eating habits are used, particularly on night shift, these help to minimize the risks to health and safety and improve the general feeling of well being
- shift-workers adjust better if they sleep well, have family support, reduce stress, exercise, and have a healthy diet
- healthy food options are easily available with proper breaks and a pleasant place to eat
- if there is proper workplace support – training, access to HR, finance, and managers who can help sort out problems during the shift
- when creativity about maintaining social ties is encouraged to make it fun for employees and their friends and family then they won't be cutting short on sleep to fit with others' social routines
- remember some people enjoy working in the quiet of night

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- ¹¹ HSE [Validation and development of a method for assessing the risks arising from mental fatigue](#) CRR 254/1999, Summary of the main do's and don'ts of shift rotas, hours etc and a method (the 'fatigue index') for assessing planned shift pattern/hours changes. For up to date information regarding about the research on validating this method contact the Human Factors Team: Tel 0151 951 3041 or 3955
- ¹² For information on full spectrum lights contact: the occupational health helpline for a resource sheet or the Seasonal Affective Disorder Association PO Box 989, Steyning, BN44 3HG (send sae) www.sada.org.uk/