Sleep, performance and the European Working Time Directive

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A generation ago doctors worked long hours that were not good for their own or their patients' health. Surgeons who had missed a night of sleep made 20% more errors and took 14% longer on a simulated operation than those at the start of a shift.[1] In the face of such evidence, the move to shorter working hours through the New Deal and the European Working Time Directive (EWTD) was welcomed. However, these changes are not without their own problems in terms of disruption to sleep patterns, performance and enjoyment – as well as the inevitable decrease in clinical experience for trainees.

Reduction in the working week to 56 hours per week, with a further reduction to 48 hours per week by 2009, the European Court of Justice rulings that a doctor sleeping on call in hospital is considered to be working and the shortage of doctors in the UK have inevitably resulted in the widespread adoption of full-shift systems. These changes to working practice are not popular with trainees – the 2005 Federation of Royal Colleges of Physicians survey found that 84% felt it decreased continuity of care and 69% felt it made training in their specialty worse.[2] Perhaps more worryingly, 81% of those on night shift reported suffering excessive fatigue and 74% had fallen asleep at work.

In a detailed survey of 39 specialist registrars working seven consecutive 13-hour nights at the Royal Free Hospital in London, most reported considerable difficulty in sleeping during the daytime, with a median daytime sleep duration during that week of 4 hours/day.[3] However, this was offset by the specialist registrars sleeping during 70% of night shifts, bringing their mean sleep duration above six hours. Such naps result from excessive tiredness and are a concern in terms of performance. In some hospitals, doctors sleeping on night shifts are being threatened with disciplinary action.

A North American study reported significantly impaired cognitive function in doctors at the end of a five-night run of nights in the emergency room.[4] Although this investigation could not distinguish whether the defect was in cognition or in motivation, the findings are nevertheless concerning. Equally worrying is another American study[5] which found that doctors working at night reported falling asleep at the wheel significantly more often than those working by day (49% *vs* 13%; $p < 0.001$). Similarly, nurses working night shifts report road accidents or near accidents when driving to and from work, most of which were believed to be related to tiredness.[6]

Thus, although the profession has moved on from a situation of impaired performance caused by sleep deprivation under earlier rota systems,[1] many have failed to recognise the potentially deleterious effects of night-shift work on delivery of care and on doctors' well-being. Shift workers report short and interrupted sleep, chronic sleepiness and fatigue and have a high rate of inaccuracy at work.[7] Workers on intermittent night shifts will not be able to establish a normal circadian body rhythm as they have an irregular sleep time, and the circadian information obtained from their exposure to daylight conflicts with that from the timing of their sleep periods. It is not surprising that many have difficulty initiating and maintaining sleep during such cycles. Some seem to cope with these shifts much better than others, with genuine inter-individual variations in tolerance, the less tolerant developing 'shift work disorder'.[8] Older people have greater difficulty adjusting to shifts,[9,10] particularly those over 45 years old. This is especially an issue when consultants are delivering overnight care either in their own specialty or as part of the hospital-at-night team.

The effects of shift work are not limited to performance but may also extend to general health. Shift workers are reported to have higher rates of ischaemic heart disease, peptic ulcer and gastrointestinal symptoms than day workers.[11,12] It is not clear, however, whether this relates on to the reportedly higher rates of smoking in shift workers or to other confounders, or whether it is a genuine shift-work effect.

How then do we balance the deleterious effects of the body's innate desire to sleep during the hours of darkness with the conflicting need to provide health care at night, a time when the frequency of myocardial infarctions, left heart failure and asthmatic attacks peak?[8] The first help may come from a proposed revision of the EWTD. Several countries have recognised the unhelpful aspects of the SiMAP and Jaeger judgments, and there is a proposal that time spent on-call in hospital but sleeping should not be considered as part of the working week. This, plus the

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suggestion that the reference period for calculating the working week may be increased up to 12 months, may allow more imaginative rotas to be introduced to avoid the sleep-disrupting block of nights becoming the norm. In addition, steps should be taken in hospitals to minimise the effects of shift changes. In the longer term, the increase in the number of doctors in the UK will have a beneficial effect. In the meantime, doctors on short runs of nights must be allowed to nap when not required to work. There is more evidence that this is beneficial than for the current vogue of 'power napping' in day workers.

For those on longer runs of nights, lighting at work should be increased where possible, as high-intensity lighting induces a more rapid phase shift, better subjective sleep and improved mood,[13,14] and this works even if the bright lighting is only available during breaks.[14,15] Recent data indicate that successful phase shifting with bright lights is associated with improved cognitive performance, alertness and mood during night-time work.[16,17] The NHS must endeavour to establish whether these findings can be replicated in the healthcare environment.

Night-time work has always been, and will always be, associated with sleep and performance problems. The medical profession must work with employers to produce rotas and working practices which minimise these risks and at the same time provide safe care for patients and optimise quality of life for doctors and other healthcare workers.

References

1 Taffinder NJ, McManus IC, Gul Y, Russell RC, Darzi A. Effect of sleep deprivation on surgeons' dexterity on laparoscopy simulator. *Lancet* 1998;**352**:1191.

2 Coward R. Fourth specialty registrars survey. London: Federation of Royal Colleges of Physicians, 2005 (in press).

3 Horrocks N, Pounder R. *Working the night shift*. London: Royal College of Physicians, 2005. www.rcplondon.ac.uk/news/ ewtd.asp

4 Dula DJ, Dula NL, Hamrick C, Wood GC. The effect of working serial night shifts on the cognitive functioning of emergency physicians. *Ann Emerg Med* 2001;**38**:152–5.

5 Marcus CL, Loughlin GM. Effect of sleep deprivation on driving safety in housestaff. *Sleep* 1996;**19**:763–6.

6 Novak RD, Auvil-Novak SE. Focus group evaluation of night nurse shiftwork difficulties and coping strategies. *Chronobiol Int* 1996;**13**: 457–63.

7 Bjerner B, Holm A, Swensson A. Diurnal variation of mental performance. A study of three-shift workers. *Br J Ind Med* 1955;**12**:103–10.

8 Douglas N.J. *Clinicians' guide to sleep medicine*. London: Arnold, 2002.

9 Harma MI, Hakola T, Akerstedt T, Laitinen JT. Age and adjustment to night work. *Occup Environ Med* 1994;**51**:568–73.

10 Reid K, Dawson D. Comparing performance on a simulated 12-hour shift rotation in young and older subjects. *Occup Environ Med* 2001;**58**: 58–62.

11 Alfredsson L, Karasek R, Theorell T. Myocardial infarction risk and psychosocial work environment: an analysis of the male Swedish working force. *Soc Sci Med* 1982;**16**:463–7.

12 Koller M. Health risks related to shift work. An example of time-contingent effects of long-term stress. *Int Arch Occup Environ Health* 1983; **53**:59–75.

13 Stewart KT, Hayes BC, Eastman CI. Light treatment for NASA shiftworkers. *Chronobiol Int* 1995;**12**:141–51.

14 Eastman CI, Liu L, Fogg LF. Circadian rhythm adaptation to simulated night shift work: effect of nocturnal bright-light duration. *Sleep* 1995; **18**:399–407.

15 Lowden A, Akerstedt T, Wibom R. Suppression of sleepiness and melatonin by bright light exposure during breaks in night work. *J Sleep Res* 2004;**13**:37–43.

16 Crowley SJ, Lee C, Tseng CY, Fogg LF, Eastman CI. Complete or partial circadian re-entrainment improves performance, alertness, and mood during night-shift work. *Sleep* 2004;**27**:1077–87.

17 Crowley SJ, Lee C, Tseng CY, Fogg LF, Eastman CI. Combinations of bright light, scheduled dark, sunglasses, and melatonin to facilitate circadian entrainment to night shift work. *J Biol Rhythms* 2003;**18**: 513–23.