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## The tiring anaesthetist

Working time regulations based on the European Working Time Directive (EWTD) were introduced to address the problem of fatigue as a contributory factor in poor clinical outcomes and doctors' ill health. Today, all medical grades from trainees to consultants work time-based contracts that incorporate the stipulations of the working time regulations. However, the regulations cannot be regarded as a complete set of rules for designing work schedules that avoid hazardous levels of fatigue. Their incomplete nature probably owes much to a desire among clinicians and managers to maintain some flexibility, as well as to political expediency. The failure of the regulations to take into account several key parameters known to affect fatigue, such as the sequencing of successive shifts, led to initial reports of doctors' being required to work up to 91 hours of nights per week [1]. (Not that rules and regulations should be regarded as the only bulwark against excessive fatigue; individuals have a personal responsibility to remove themselves or alert their colleagues if they are too tired to work safely).

Even when doctors' work schedules are designed using evidence-based ergonomic criteria, it still leaves the problem that each doctor works fewer hours, inevitably increasing costs and the intensity of work. Another concern is the deleterious effect the restrictions have on training. There is an increasing recognition that expertise is inextricably linked to time spent in the clinical environment [3]. That said, the chronic fatigue that is associated with excessive work hours will inevitably impair learning and teaching [4].

Thus, while doctors' excessive working hours in the pre-EWTD era clearly needed addressing, the situation remains imperfect almost ten years after the introduction of the regulations. Nevertheless, it is becoming clear that with imaginative work-scheduling solutions, real improvements in standards of patient care and doctors' own wellbeing are possible. According to a systematic review of studies conducted in the USA, the reduction of shifts over 16 hours was associated with improvements in patient safety, as well as doctors' quality of life, in most studies [5]. An intervention study in the UK that involved redesigning doctors' work schedules with shorter shifts, fewer consecutive night shifts, and a sequence of shifts designed to facilitate circadian adaption to night work, brought about a 33% reduction in medical errors [6].

The Association of Anaesthetists of Great Britain & Ireland (AAGBI) is publishing an updated edition of its guidelines, *Fatigue and Anaesthetists*, in 2013 [7]. It includes updated and new recommendations relating to rest facilities, the management of on-call work (with particular emphasis on the older anaesthetist) and education on fatigue.

The updated recommendation that “*rest facilities and on call rooms should be available for staff to nap during shifts or sleep post call*” [need to check against final wording – can you leave this note in as a reminder?] [7] is consistent with evidence that the introduction of a night-time nap increases doctors’ sleep efficiency and decreases their fatigue [8]. However, it is notable that the doctors in that study took limited advantage of the opportunity to nap because of concerns about how it would affect continuity of care. Another potential problem is that night-time naps are associated with sleep inertia, i.e. the temporary degradation of performance in the period following waking, under certain circumstances [9]. There is also evidence that taking a night-time nap may disrupt the subsequent day’s sleep between shifts [10, 11]. However, studies on napping within medical settings are relatively scarce. Further research is needed to understand fully the effects of naps on patient care, and also the factors underlying doctors’ ability (and inclination) to take rest breaks and naps, e.g. the availability of appropriate accommodation.

These issues aside, it is evident from research conducted within and outside medical settings that napping during nightshifts is an important aspect of fatigue management. Guidelines proposed by the Royal College of Physicians [12] recommend taking 20-45 minutes’ nap during the night shift if possible. In order to facilitate the taking of naps, it is recommended that rest areas should be provided that are quiet and dimly lit, with sufficient capacity for the number of people working on shift. It was also noted that napping is easier when lying down or sitting in a reclined position with the legs supported, and that a short period (30 minutes) free from non-emergency bleeps will further enhance the opportunity for effective napping during the nightshift. The AAGBI guidelines also allude to the importance of being able to sleep at work post-call. Highly fatigued doctors are at increased risk of being involved in traffic accidents on their way home from work [13, 14].

The updated AAGBI guidelines also recommend that “*on call responsibilities should be reviewed regularly and in particular in the older anaesthetist, taking into consideration subjective assessment of fatigue (in conjunction with advice from an accredited specialist in occupational medicine)*” [7] [ditto to check against final wording]. On-call work involves working ‘unsocial’ hours and often long weekly hours. As noted above, there is good evidence that long hours at work have deleterious effects not just on patient care but also on doctors’ own wellbeing. High levels of on-call work have been linked to impaired psychological wellbeing among doctors and greater intention to quit [14-17]. It is not just the number of hours worked per week that impacts on doctors’ fatigue and well-being, but also the way in which their work hours are arranged. Hence studies of doctors have highlighted a range of important factors such as the prevalence of night work, the number of consecutive night shifts worked in a row, the number of

rest days scheduled after night work, the length of the interval between successive shifts, the regularity of the work schedule and being able to sleep during duty hours [14, 17-20].

The majority of studies in this area have focussed on junior doctors and so there is a paucity of evidence regarding the impact of demanding work hours as doctors get older. In their study of Australian doctors, Ferguson et al. [19] noted that in some facilities senior doctors (who are usually older) were essentially always on-call. They pointed out that being on-call can be highly disruptive of sleep, even without actual work occurring. Thus senior doctors' rest and sleep were likely to be affected even on days without work, when they might otherwise have expected to catch up on sleep lost during workdays.

The impact of demanding work schedules on fatigue generally increases with age. In the general population, sleep quality worsens with increasing age and sleeps become shorter, with such changes associated with degraded performance and mood. Older shift workers report greater sleep loss and more disturbed sleep, compared with younger people working similar duty patterns [21]. There is some evidence that the cognitive performance of older shift workers may be more impaired during night work, but that they may be less aware of their degree of impairment, compared with younger shift workers [22]. It has also been suggested that older shift workers may be less able to sustain their performance across the night shift, and that they are more affected by longer spans of successive nights [23]. Regular assessments of fitness for work are one way of addressing the risks associated with aging (c.f. aviation). Fatigue and sleep related issues should be a standard part of such assessments [21].

The 2013 edition of the AAGBI guidelines includes the new recommendation that *“education on fatigue, its causes and mitigating factors and its impact in healthcare should be a priority for departments of anaesthesia”* [7] *[ditto check against final wording]*. The guidelines themselves are an excellent resource in this regard. They provide explanations of sleep mechanisms, how working conditions impact on fatigue, the consequences for performance and wellbeing, and ways of mitigating these effects through work schedule design, individual fatigue-management strategies and organisational fatigue management systems.

One issue not mentioned in the guidelines is that of worktime control, i.e. the degree of influence that doctors have over how and when their work hours are scheduled. Control over work hours and schedule flexibility are important predictors of doctors' work-life balance, burnout [24] and career satisfaction [25]; outcomes that have, in turn, been linked to quality of care [26, 27]. Our own research has found that doctors who have a degree of control over their work hours report less fatigue [28]. Matching doctors' work hours to their individual needs and preferences will be challenging in the complex work environment where effective cover needs to be maintained at all times. Nevertheless, solutions that optimise the balance between flexibility

and patient needs have the potential to enhance doctors' own wellbeing, reduce their levels of fatigue and its associated consequences for patient care, and bolster recruitment and retention of medical staff.

In our survey of doctors in Sweden [28], we found that of all the medical specialties, anaesthetists were among the most likely to lack influence over, and to have no flexibility in, their work hours. They were also the most likely to work long shifts (>12 hours) and they reported some of the highest levels of on-call work (e.g. at nights and at weekends). The findings echo those of an earlier study in Finland [29]. A survey in New Zealand reported that a substantial proportion of anaesthetists believed their weekly work hours jeopardised both patient safety and their own wellbeing [30].

Difficult working time arrangements are but one aspect of the particularly demanding work conditions that anaesthetists experience, with several studies having focussed on their fatigue, occupational stress and wellbeing [e.g. 29, 31-33]. Night work may be especially problematic for anaesthetists, as they have to deal with severe and immediately life-threatening conditions whenever they occur. Consequently they may experience higher mental workload during night duties, compared with other medical specialties. One of the very few fatigue-related field studies to compare anaesthetists with other medical specialties (in this case, paediatricians and ENT surgeons) found that the anaesthetists had more disrupted sleep [34, 35]. However, there were no differences between specialties with respect to sleep restitution or physiological recovery after night-call duties. Nevertheless it is clear that, given the criticality of the anaesthetists' role, their particularly demanding work schedules warrant special attention when it comes to fatigue management. The AAGBI's *Fatigue and Anaesthetists* guidelines are a vital educational tool for tackling these hazards. In the words of the German writer Lichtenberg (1742-1799), once we know our weaknesses they cease to do us any harm.

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## References

1. Murray A, Pounder R, Mather H, Black DC. Junior doctors' shifts and sleep deprivation – the European working time directive may put doctors' and patients' lives at risk. *British Medical Journal* 2005; **330**: 1404.
2. General Medical Council. *Good Medical Practice*. London: GMC, 2013.
3. Byrne A. Mental workload as a key factor in clinical decision making. *Advances in Health Sciences Education* March 2012: 1-9.
4. Papp KK, Stoller EP, Sage P, et al. The effects of sleep loss and fatigue on resident-physicians: a multi-institutional, mixed-method study. *Academic Medicine* 2004; **79**: 394-406.
5. Levine AC, Adusumilli J, Landrigan CP. Effects of reducing or eliminating resident work shifts over 16 hours: a systematic review. *Sleep* 2010; **33**: 1043-53.
6. Cappuccio FP, Bakewell A, Taggart FM, et al. Implementing a 48 h EWTD-compliant rota for junior doctors in the UK does not compromise patients safety: assessor-blind pilot comparison. *Quarterly Journal of Medicine* 2009; **102**: 271-82.
7. Association of Anaesthetists of Great Britain & Ireland. *Fatigue and Anaesthetists*, 2nd edn. London: AAGBI, 2013. [www.aagbi.org](http://www.aagbi.org) *[to be confirmed]*.
8. Arora V, Dunphy C, Chang VY, Ahmad F, Humphrey HJ, Meltzer D. The effects of on-duty napping on intern sleep time and fatigue. *Annals of Internal Medicine* 2006; **144**: 792-8.
9. Dinges DF. Adult napping and its effects on the ability to function. In: Stampi C, ed. *Why We Nap: Evolution, Chronobiology, and Functions of Polyphasic and Ultrashort Sleep*. Boston, MA: Birhauser, 1992: 118-34.
10. Bonnefond A, Muzet A, Winter-Dill A-S, Bailloeuil C, Bitouze F, Bonneau A. Innovative working schedule: introducing one short nap during the night shift. *Ergonomics* 2001; **44**: 937-45.

11. Horrocks N, Pounder R. Working the night shift: preparation, survival and recovery – a guide for junior doctors. *Clinical Medicine* 2006; **6**: 61-7.
12. Horrocks N, Pounder R. *Working the Night Shift: Preparation, Survival and Recovery*. London: Royal College of Physicians, 2006.
13. Barger LK, Cade BE, Ayas NT, et al. Extended work shifts and the risk of motor vehicle crashes among interns. *New England Journal of Medicine* 2005; **352**: 125-34.
14. Brown M, Tucker P, Rapport F, et al. The impact of shift patterns on junior doctors' perceptions of fatigue, training, work/life balance and the role of social support. *Quality and Safety in Health Care* 2010; **19**: e36.
15. Heponiemi T, Kouvonen A, Vanska J, et al. Effects of active on-call hours on physicians' turnover intentions and well-being. *Scandinavian Journal of Work, Environment and Health* 2008; **34**: 356-63.
16. Smith AM, Morris P, Rowell KO, Clarke S, Jones TH, Channer KS. Junior doctors and the full shift rota – psychological and hormonal changes: a comparative cross-sectional study. *Clinical Medicine* 2006; **6**: 174-7.
17. Tucker P, Brown M, Dahlgren A, et al. The impact of junior doctors' working time arrangements on their fatigue and well-being. *Scandinavian Journal of Work Environment and Health* 2010; **36**: 458-65.
18. Baldwin D, Daugherty SR. Sleep deprivation and fatigue in residency training: results of a national survey of first- and second-year residents. *Sleep* 2004; **27**: 217-23.
19. Ferguson SA, Thomas MJ, Dorrian J, Jay SM, Weissenfeld A, Dawson D. Work hours and sleep/wake behavior of Australian hospital doctors. *Chronobiology International* 2010; **27**: 997-1012.
20. Gander P, Purnell H, Garden A, Woodward A. Work patterns and fatigue-related risk among junior doctors. *Occupational and Environmental Medicine* 2007; **64**: 733-8.
21. Gander P, Signal L. Who is too old for shift work? Developing better criteria. *Chronobiology International* 2008; **25**: 199-213.
22. Bonnefond A, Harma M, Hakola T, Sallinen M, Kandolin I, Virkkala J. Interaction of age with shift-related sleep-wakefulness, sleepiness, performance, and social life. *Experimental Aging Research* 2006; **32**: 185-208.
23. Folkard S. Shift work, safety, and aging. *Chronobiology International* 2008; **25**: 183-98.
24. Keeton K, Fenner DE, Johnson TR, Hayward RA. Predictors of physician career satisfaction, work-life balance, and burnout. *Obstetrics and Gynecology* 2007; **109**: 949-55.
25. Clem KJ, Promes SB, Glickman SW, et al. Factors enhancing career satisfaction among female emergency physicians. *Annals of Emergency Medicine* 2008; **51**: 723-8 e8.

26. Gundersen L. Physician burnout. *Annals of Internal Medicine* 2001; **135**: 145-8.
27. Spickard A, Jr., Gabbe SG, Christensen JF. Mid-career burnout in generalist and specialist physicians. *Journal of the American Medical Association* 2002; **288**: 1447-50.
28. Tucker P, Bejerot E, Kecklund G, Aronsson G, Åkerstedt T. Doctors' work hours in Sweden: their impact on sleep, health, work-family balance, patient care and thoughts about work *Stress Research Report 325*. Stockholm: Stress Research Institute, 2013.  
<http://www.stressforskning.su.se/english/publications/reports> (accessed 25/05/2013).
29. Lindfors PM, Nurmi KE, Meretoja OA, et al. On-call stress among Finnish anaesthetists. *Anaesthesia* 2006; **61**: 856-66.
30. Gander PH, Merry A, Millar MM, Weller J. Hours of work and fatigue-related error: a survey of New Zealand anaesthetists. *Anaesthesia and Intensive Care* 2000; **28**: 178-83.
31. Gander P, Millar M, Webster C, Merry A. Sleep loss and performance of anaesthesia trainees and specialists. *Chronobiology International* 2008; **25**: 1077-91.
32. Cooper CL, Clarke S, Rowbottom AM. Occupational stress, job satisfaction and well-being in anaesthetists. *Stress Medicine* 1999; **15**: 115-26.
33. Bartell P, Offermeier, W., Smith, F., Becker, P. Attention and working memory in resident anaesthetists after night duty: group and individual effects. *Occupational and Environmental Medicine* 2004; **61**: 167-70.
34. Malmberg B, Kecklund G, Karlson B, Persson R, Flisberg P, Orbaek P. Sleep and recovery in physicians on night call: a longitudinal field study. *BMC Health Services Research* 2010; **10**: 239.
35. Malmberg B, Persson R, Flisberg P, Orbaek P. Heart rate variability changes in physicians working on night call. *International Archives of Occupational and Environmental Health* 2011; **84**: 293-301.