主席女士：

公共醫生超時工作報告

一、 醫管局對於公共醫生長時期超時工作之改善仍然非常有限，而其中有一些指標更是十分苛刻（例如一位醫生只要當值次數不多於每三天一次便已算符合標準，即每三天最少要工作四十小時）容易引致醫療事故。

二、 報告祇集中於情況最差的部門，對於大部份其他不符法例的部門則隻字不提，有以片概全之嫌。（我們相信在九十八個接受調查的部門中絕大部份均未符合法例要求。而報告祇提及其中十一個部門有進步，其他部門非但可能沒有改善，甚而有惡化的可能。）

三、 醫管局對如何改善醫生超時工作之對策祇是重複其決心很大，但並無具體的計劃，客觀合理的工時及執行的時間表。而其所招聘之新醫生數目，並未說明是淨增加人數或是部份會用作補回因約滿、退休或自然流失的同事。而增聘醫生後，會否又再增加服務工作量或範圍，形成惡性循環。

四、 茲符上醫生超時工作之害處及英國醫生協會對制定醫生工時之文件以供參考。

香港公立醫院、衛生署及大學醫生協會

Implications for health and safety of junior doctors' working arrangements

Disruption of circadian rhythms

Working patterns

Workload intensity undertaken by junior doctors is a key feature in determining the working pattern: on-call rota, partial shift system or full shift system.

On-call rotas are a suitable working arrangement where junior doctors work a normal day, Monday to Friday, and are "on-call" in rotation for the remainder of the 24 hour period and for weekends. Such rotas are appropriate for those posts where the workload is of such a nature that, when working the standard working week, junior doctors on-call, whether in hospital or at home, are not required to work for a substantial portion of their additional duty hours.

Partial shifts are appropriate where the workload is such that a junior doctor is unable to take eight hours' rest during the on-call period, but the work is not of full shift intensity. Four hours rest during the overnight period, 5pm to 9am, is required. Partial shifts are thus suitable for many hard-pressed posts. They involve a variety of work patterns, particularly for night cover, but there is usually a significant workload during the day.

Full shifts are based on those used in other services, industry and other health professions, for example nursing. This type of shift pattern is appropriate for providing medical cover where the work is intensive and potentially continuous throughout the 24 hour period. In such situations, the doctors on duty can be expected to spend virtually all of the duty period, except for natural breaks, working or being immediately available for work.

Doctors working full or partial shifts, because of their higher work intensity, will regularly be working out of hours. The great majority of junior doctors still work on-call rotas. In such cases, juniors work at full intensity during the normal working day (9am to 5pm, for example) and, in theory, at 50% intensity out of hours and then at full intensity again until the end of the next normal working day when they come off duty. However, even though the out of hours period is supposed to be at 50% intensity, which is rarely the case in acute specialties, juniors must still be available for work throughout the period.

With all three types of working patterns, juniors are subject to disrupted circadian rhythms. Circadian rhythms are the daily variations in bodily functions. The sleep/wake cycle, core body temperature, hormonal release and cognitive ability all exhibit a circadian rhythm. While the disruptions of circadian rhythms is usually associated with shiftworkers, it applies to any arrangements that require the individual to work when they would normally be sleeping, or to sleep when they would normally be awake.

Effects on sleep

Sleep taken during the day is of a shorter duration and of a poorer quality than sleep taken at night. [Akerstedt T, Knuttsson A, Alfredsson L, Theorell T. Shift work and cardiovascular disease. Scandinavian Journal of Work, Environment and Health 1984;10:409-14.]. This is due to a combination of disrupted circadian rhythms, a poorer sleep environment and domestic commitments:

Circadian effects on sleep

During the day, it is more difficult to fall asleep and the sleep length is shorter because the body temperature is rising. Sleep taken during the day is also altered in its stage sequencing and contains less Slow Wave Sleep and REM sleep, all of which reduces its restorative properties. [Akerstedt T. Adjustments of physiological circadian rhythms and the sleep-wake cycle to shiftwork. In Folklard S, Monk T (eds). Hours of work: temporal factors in work scheduling. Chichester: Wiley, 1985.] [Kogi K. Sleep problems in night and shift work. Journal of Human Ergology 1982;11,(Suppl.):217-231.]

Sleep environment

Sleep taken during the day is also reduced and more often disrupted due to environmental factors such as noise and light. Poor, noisy living conditions, which can be common amongst juniors living in hospital accommodation, exacerbate this problem. [Costa G. The problem: Shiftwork. Chronobiology International
1997;14(2):89-98.]

Domestic responsibilities

Domestic responsibilities, such as childcare and family mealtimes, will also reduce and disrupt daytime sleep. [Kogi K. Sleep problems in night and shift work. Journal of Human Ergology 1982;11,(Suppl.):217-231.]. This is a particular problem for women with small children. [Gadbois C. Women on the night shift: interdependence of sleep and off-the-job activities. In Reinberg A, Vieux N, Lauer P. (eds) Night and Shift Work: Biological and Social Aspects. Oxford: Pergamon Press, 1980.]. A study of Japanese nurses by Kuramatani et al [Kuramatani N, Koda S, Nakagiri S, et al The affects of frequently rotating shiftwork on sleep and family life of hospital nurses. Ergonomics 1994;37(6):995-1007.] found that nurses with infants spent significantly less time sleeping between shifts. The study also reported that these nurses were unable to make up for lost sleep by sleeping late prior to an evening shift or on days off, due to family responsibilities.

According to Akerstedt [Akerstedt T. Psychological and psychophysiological effects of shiftwork. Scandinavian Journal of Work, Environment and Health 1990;16(Suppl. 1):67-73.] the duration of

sleep for individuals working on night or morning shifts is reduced by 1 to 4 hours. The afternoon shift generally presents few problems.

The length of the interval between two shifts is also an important factor in the total amount of sleep time achieved. [Kuramatani N, Koda S, Nakagiri S, et al The affects of frequently rotating shiftwork on sleep and family life of hospital nurses. Ergonomics 1994;37(6):995-1007.] [Knauth P, Rutenfranz J. Development of criteria for the design of shiftwork systems. Journal of Human Ergology 1982; 11(Suppl.):337-367.]. According to Kuramatani et al [Kuramatani N, Koda S, Nakagiri S, et al The affects of frequently rotating shiftwork on sleep and family life of hospital nurses. Ergonomics 1994;37(6):995-1007.], an interval of more than 16 hours between shifts is needed to gain more than seven hours total sleep time. The amount of time spent commuting will also affect the total amount of time spent sleeping. Such factors are particularly relevant to junior doctors as the time between shifts can be as low as seven or eight hours and many commute considerable distances when in a training rotation between a number of hospitals in a region.

Effects on performance and safety

According to Folkard and Monk [Folkard S, Monk T. Hours of work: temporal factors in work scheduling. Chichester: Wiley, 1985.] performance tends to mirror the circadian sleep/wake cycle, although it can peak earlier or later depending on the type of task, time spent awake and motivation. Desynchronisation of circadian rhythms, together with sleep loss, significantly decreases work efficiency during the night and makes workers more susceptible to errors.

Although sleepiness is most widespread on the night shift it can also occur on the morning shift. It is rarer on the afternoon shift. Sometimes sleepiness is severe enough for a worker to actually fall asleep. [Akerstedt T. Sleepiness as a consequence of shiftwork. Sleep 1988;11:17-34.] This has obvious implications for safety. Moreover, as described by Akerstedt [Akerstedt T. Sleepiness as a consequence of shiftwork. Sleep 1988;11:17-34.] "although a certain sleepiness is clearly perceived by the individual, there seems to be no 'final warning' before dozing off".

Sleepiness for the night worker peaks in the early hours of the morning. It is often noted that some of the worst industrial accidents (for example, Chernobyl and Exxon Valdez) have occurred during this time with human error playing a key role. The research into accidents, however, is contradictory. While some studies
show a marked increase in errors and accidents on the night shift, other studies show peaks occurring during the day. This, according to Costa Costa G. [The problem: Shiftwork. Chronobiology International 1997;14(2):89-98.], reflects the fact that errors and accidents are a result of numerous environmental and organisational factors, for example, lighting, time pressure, duty length and supervision, in addition to circadian effects. Again, this does not just mean that

junior doctors might be less safe by working nights, but more importantly by working, mostly unsupervised, 32 hours from one day, through most of the night and to the end of the next day.

Effects on health and wellbeing

The health effects of broken and reduced sleep are discussed in the above section on sleep deprivation.

Nevertheless, in addition, shiftworkers are more susceptible to gastric disturbances, for example irregular bowel movements, constipation, dyspepsia, heartburn and abdominal pains. Epidemiological studies show an increased prevalence of gastrointestinal disorders, such as chronic gastritis, gastrodudentitis, peptic ulcer and colitis Costa G. [The impact of shift and nightwork on health. Applied Ergonomics 1996;27(1):9-16.]. Gastrointestinal functions also follow a circadian cycle (for example, gastric secretion, enzyme activity, and intestinal motility). One explanation forwarded for the digestive problems experienced by shiftworkers is the desynchronisation of meal times and gastrointestinal phases. [Venner K, Szabo S, Moore J. The effect of shiftwork on gastrointestinal (GI) function: A review. Chronobiologia 1989;16:421-39.]. Possible contributory factors include the types of food consumed by shiftworkers and the time available for meals. This is a very pertinent consideration for juniors' where the availability of decent quality hot food out of hours is often severely limited as is the time to eat these meals.

Women are thought to have particular vulnerabilities to shiftworking, due to more complex circadian and infradian hormonal rhythms, and to extra demands related to family life. [Costa G. The problem: Shiftwork. Chronobiology International 1997;14(2):89-98.]. Some studies of women shiftworkers have reported disruption of the menstrual cycle, higher frequency of menstrual pain, higher ratios of miscarriages to pregnancies and higher prevalence of pre-term delivery and low birth weight. [Colquhoun WP, Costa G, Folkard S, Knauth P. Shiftwork: problems and solutions. Frankfurt: Peter Lang, 1996.] [Scott A, LaDou J. Shiftwork: Effects on sleep and health with recommendations for medical surveillance and screening. Occupational Medicine 1990;5(2):273-299.]

Effects on family and social life

Just as biological functions follow a daily rhythm, domestic and social events also follow a cycle. Meals are at certain times of the day, as are social activities, and sporting and cultural events.

Most family and social activities are organised according to the diurnal rhythms of the general population. Therefore, the shiftworker is often out of synchronisation with the activities of their family and with society; especially for junior doctors when working a week of nights is common. This may cause social problems such as marriage strain and isolation, which may lead to, or

exacerbate existing, health problems. According to Costa:

"Such family and social difficulties are often complained of more by shiftworkers than are those related to biological difficulties and frequently represent the main cause of intolerance to shiftwork".

This is supported by findings from a study of stress among junior doctors in the United Kingdom [Health Policy and Economic Research Unit. Work related stress among junior doctors. London: British Medical Association, 1998.] that found the most common source of stress for the doctors was the demands that work made on social and family life.

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junior doctors BMA

Implications for health and safety of junior doctors' working arrangements

Junior Doctors Committee
August 2000

Introduction

The BMA's Health Policy and Economic Research Unit (HPERU) has undertaken a review of the scientific literature on the implications for health and safety of junior doctors' working arrangements. The review was designed to identify principles that could be applied to the organisation of junior doctors' working patterns that would ensure protection both for the doctors themselves and patients. Educational issues relating to juniors' working arrangements, however, were not within the remit of the review.

The HPERU literature review gives a detailed account of the effects of long working hours, sleep deprivation and disruption of circadian rhythms on performance and safety; health and wellbeing; and family and social life. Although for convenience these factors are addressed individually in this report, it is clear that in reality they interact. (Spurgeon A, Harrington J. Work performance and health of junior hospital doctors - a review of the literature. Work and Stress 1989;3(2):117-128)

The health and safety problems associated with juniors' working patterns result from a combination of long periods of time spent working, insufficient sleep and working at times when the biological clock is programmed for resting and sleeping. Although it is difficult to separate the influence of these factors on health and safety, each one can be clearly identified with aspects of juniors' working arrangements: number of hours worked each week, intensity of work and the type of pattern being worked.

Examination of the findings of the literature review suggests that the existing arrangements for junior doctors have serious implications for their health and wellbeing and for their performance and safety as medical practitioners. From the evidence, certain principles for the design of working patterns can be highlighted which would maximise effective working practices and, therefore, minimise the risk to the doctors themselves and to patients. However, such arrangements are incompatible with the current system of patient care provided by junior doctors. If such arrangements were to be introduced, fundamental changes would be needed to junior doctors' current training requirements and service commitments.

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Appendix

Design principles for working patterns

1. Employees should be involved in the development of the schedule;
2. Where practicable, shift duration should not exceed 12 hours (total hours in one week not exceeding 48 hours);
3. Continuous shift systems, which run over the weekend, should include some free weekends with at least two consecutive full days off;
4. Shifts should rotate clockwise (morning, afternoon, night);
5. Consecutive night shifts should be kept to a minimum;
6. Morning shifts should not start too early;
7. The period of the shift that falls in the night sleep zone should be as short as possible;
8. Night shifts, where possible, should include short sleeps;
9. Good lighting, ventilation and facilities for meals should be provided;
10. Where the employee sleeps on the premises, the environment should be dark, quiet and free from interruption;
11. Intervals between two shifts should be long enough for the worker to have sufficient sleep, as well as to travel, wash and eat;
12. Overtime should be avoided, especially with long shifts, and employees should not be called in on their days off;
13. Schedules should be flexible enough to meet personal needs of the individual;
14. Rotas should be set in advance to allow employees to plan for leisure time.

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Implications for health and safety of junior doctors' working arrangements

Optimal working arrangements

There is great variability in how working arrangements affect the individual. This is because of personal physical differences, for example, some people do have more difficulty than others adapting to night shifts, and social differences, such as variation in domestic situation. When an employee chooses a certain work pattern, it often involves a trade-off of advantages and disadvantages. For example, a worker may balance increased money and leisure time against loss of sleep and fatigue. This situation, however, does not apply to junior doctors as their out of hours work is in addition to daytime work and compulsorily required by a monopoly employer. Nevertheless, the argument behind the evidence, that there is no one optimal working pattern for all workers, is valid.

Employee participation

As in the paragraph above concerning employee choice, several studies have shown how the way a shift system is implemented, and the satisfaction of the workers with the working pattern, influenced subjective reports of its effects. Smith et al [Smith L, Folkard S, Tucker T, Macdonald I. Work shift duration: a review comparing eight and twelve hour shift systems. Occupational and environmental medicine 1998;55:217-229.], for example, state:

"Flexibility and the opportunity to exert some control over working time seems to be an increasingly important factor in how a rota is accepted by a workforce and impacts on individual people"

Similarly, Conrad-Betshant [Conrad-Betschart H. Designing new shift schedules: participation is a critical factor for improvement. In Costa G, Cesana G, Kogi K et al (eds) Shiftwork: Health, sleep and performance. Frankfurt: Peter Lang, 1990.] argues that the participation of employees in the development and implementation of the shift pattern is critical to its acceptance and positive effects.

With regard to juniors, however, this is again a situation which does not apply. While the specific roster is often determined by junior doctors themselves, they have little opportunity to formulate the working pattern to suit their particular requirements. This is due to a number of reasons including service commitments, training requirements, poor medical staffing planning, the rapid turnover of juniors in post every six to twelve months and the fact that out of hours work is required of juniors by a monopoly employer, which is perpetuated by their cheap rate of pay for out of hours work. Consequently, employee participation, as an essential mitigating factor in making working arrangements with adverse effects on doctors' health and safety acceptable to employees, does not apply to junior doctors.

Shift duration

In a review of the literature on shift duration (8 versus 12 hour shifts) the authors found that, in terms of sleep, performance and health, the research was equivocal. [Smith L, Folkard S, Tucker T, Macdonald I. Work shift duration: a review comparing eight and twelve hour shift systems. Occupational and environmental medicine 1998;55:217-229.]. This, according to the authors, was due to the many variables that mediate how shiftwork is experienced. For example, often when 12 hour shifts were introduced they were accompanied by health and safety reviews, counteracting the potential negative effects of extending the shift.

In a study by Tucker et al [Tucker P, Barton J, Folkard S. Comparison of eight and 12 hour shifts: Impacts on health, wellbeing and alertness during the shift. Occupational and Environmental Medicine 1996;53:767-772.], comparing the impact of eight and twelve hour shifts in terms of health, wellbeing and alertness, the authors also found little difference between the two groups of workers. In discussing the findings the authors pointed out the importance of the fact that the 12 hour workers only ever worked two or three shifts in a row before a break of two or three days rest. The workers also only ever worked two nights in a row. The authors concluded that the sequencing

and timing of shifts was more important than the actual duration. For junior doctors, such factors are affected by their specialty, the pursuant service commitment and training requirements, and medical staffing limitations. This makes it very difficult to implement suitably flexible working patterns to minimise health and safety risks.

Direction and speed of rotation
The circadian sleep/wake cycle runs on a 25 hour day, as opposed to a 24 hour day; thus, subjects who are kept isolated from all time cues will predictably go to bed an hour later each day and sleep an hour longer the next day. [Thomas H. Circadian rhythms and shiftwork. American College of Emergency Physicians. http://www.acep.org/POLICY/PR004166.htm]. It is for this reason that it is easier to travel from east to west, where one adapts by staying up later and sleeping in. It is also the reason why a clockwise rotating shift system (morning, afternoon, night) is recommended.

The ideal schedule is to roster as few a number of nights as possible in a row (ideally one) so that normal diurnal circadian rhythms are maintained. [Wedderburn A. Guidelines for shiftworkers. Bulletin of European Shiftwork Topics No. 3 Dublin: European Foundation for the Improvement of Living and Working Conditions; 1991.]. A cumulative sleep deficit builds up after several nights in succession [Kiesswetter E, Knauth P, Schwarzenau P, Rutenfranz J. Daytime sleep adjustment of shiftworkers. In koella W, Ruther E, Schulz H (eds) Sleep '84. New York: G Fisher; 1985.] and quickly rotating shift systems also provide more opportunity for social contacts than a weekly rotating system. [Knauth P, Kiesswetter E. A change from weekly to quicker shift rotations: A field study of discontinuous three-shift workers. Ergonomics 1987;30:1311-1321. Wedderburn A. Social factors in satisfaction with swiftly rotating shifts. Occupational Psychology 1967;41:85-107.]

Where possible, permanent night work should be avoided. This is because most individuals' circadian rhythms never completely adapt. [Knauth P, Rutenfranz J, Hermann G, Peoppl S. Re-entrainment of body temperature in experimental shiftwork studies. Ergonomics 1978;21:775-783.] [Knauth P, Emde E, Rutenfranz J, Keisswetter E and Smith P. Re-entrainment of body temperature in field studies of shiftwork. International Archives of Occupational and Environmental Health.]. The worst possible shift schedule is to work between four and seven nights in a row as this disrupts circadian rhythms and then, just as the body starts to adapt to night work, switches back again. [Thomas H. Circadian rhythms and shiftwork. American College of Emergency Physicians. http://www.acep.org/POLICY/PR004166.htm]

For specialties in which juniors work full shifts, for example, accident and emergency, different employers set very different shift schedules. In addition, they are often inflexible to the needs of the juniors. As mentioned above (see section 4.5, page 15), it is very common for them to work a succession of up to seven nights.

Anchor sleeps
A short sleep during the night shift appears to be effective in reducing night-time fatigue. It is thought that, as it is sleep that is taken during the night zone (0000-0800), it replaces the need for recovery sleep. [Kogi K. Sleep problems in night and shift work. Journal of Human Ergology 1982;11,(Suppl.):217-231.]

Naps are also recommended for reducing the detrimental effects of sleep deprivation in situations that do not permit sleep. These are recommended to be of at least 20 to 40 minutes, although continuous sleep for as little as ten minutes may partially recover alertness and improve performance. [Giam G. Effects of sleep deprivation with reference to military operations. Annals of the Academy of Medicine Singapore 1997;26:88-93.]. The benefits of naps, however, must be balanced against the problem of "sleep inertia" (see section 3.3, page 8). While this might be possible when some sleep is guaranteed, any junior doctor on-call tends to find it very difficult to sleep with the suspicion that their bleep could go off at any point, or because they are considering management dilemma.

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