Application of airline pilots' hours to junior doctors

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Abstract

Objective—To determine the staff required if the rules for airline pilots' hours of work are applied to junior doctors.

Design—Junior anaesthetists recorded their workload from 1 March 1988 to 31 May 1988.

Setting—District general hospital.

Subjects—Two groups of three junior anaesthetists sharing a one in three rota to provide continuous emergency cover.

Interventions—By using the guidelines published by the Civil Aviation Authority in *The Avoidance of Excessive Fatigue in Aircrews* schedules were drawn up to cover the hours that junior doctors had been on duty.

Results—Each anaesthetist provided emergency and routine cover for 48-112 (mean 75) hours each week. To cover the work of six junior anaesthetists on an annual basis would require 26 doctors if they were working within the Civil Aviation Authority's guidelines.

Conclusions—Junior anaesthetists' hours are much longer than those of airline pilots. Both professions entail considerable periods of monitoring interspersed with episodes of high demands on physical and cognitive skills. Errors induced by fatigue made by anaesthetists and pilots could result in death. The medical profession should define rules similar to those of the aviation authority to prevent junior doctors having to work unsafe numbers of hours.

Introduction

Concern is expressed repeatedly about the long, possibly excessive hours that junior doctors work. This concern derives from comparisons with other workers and the risk of errors in treatment that have been induced by fatigue. Orton and Gruzeliar showed a loss of cognitive skills in junior doctors deprived of sleep.¹ This was not a new observation: in 1981 Newbower *et al* wrote: "Despite anecdotal evidence which suggests that fatigue lowers the quality of care and that extended periods of overwork undermine the morale of personnel, debilitating schedules still persist in many operating rooms,"² and Craig and Wilson found that seven out of 81 mishaps during operations were associated with fatigue.³

Existing guidelines limit doctors' time on call to one in three rotas but do not stipulate what work can be performed when they are not on call. There are no regulations defining a reasonable time of duty or workload despite proposals to restrict the number of hours worked.⁴ Recently, regulations were enforced in New York State that limited the number of consecutive hours worked by doctors in emergency departments to a maximum of 12.⁵

The periods of duty of transport drivers and aircrew are controlled strictly, and it seemed sensible to examine the effects of applying the same limitations

to medical practice. Comparisons have been made between aviation and anaesthetics in that each requires technical skills and an error can result in death. Airline pilots and anaesthetists are both scheduled to work on a sessional basis.

Air transport is governed by the Air Navigation Order, which devolves management to the Civil Aviation Authority. The authority's regulations and requirements are published as Civil Aviation Publications (CAP).⁶ *The Avoidance of Excessive Fatigue in Aircrews* (CAP 371) lays down rigid guidelines on hours of duty and rest that effectively are law. The medical press has often referred to these restrictions, but to our knowledge the effect of applying the rules to a sample of doctors has not been explored.

Methods

In 1988 as part of the audit programme of the division of anaesthesia, we conducted a survey of the emergency workload of anaesthetists on duty in a large district general hospital by asking them to record their workload from 1 March to 31 May. Resident anaesthetists worked one of two rotas (A and B). Three junior anaesthetists shared each rota. As the workload during the survey was consistent the middle week of each rota was selected as a fair representation.

The rules of CAP 371 were used retrospectively to allocate anaesthetists to cover the work that they had performed, as though scheduling aircrew.

We applied the rules for hours of duty as though each anaesthetist were the only pilot of an aircraft transiting up to four sectors in each period of duty (each sector comprised take off, flight, and landing). The four-sector period (table) was chosen because it allows the greatest number of working hours.

Maximum time of flying duty (hours) for airline pilots

Local time of start	No of sectors*				
	≤Four	Five	Six	Seven	≥Eight
0600 - 0759	10-00	9-25	8-50	8-00	8-00
0800 - 1459	11-00	10-25	9-50	8-75	8-00
1500 - 2159	10-00	9-25	8-50	8-00	8-00
2200 - 0559	9-00	8-25	8-00	8-00	8-00

*Each sector comprised take off, flight, and landing.

Also, we scheduled the "pilots" to work the longest permissible period depending on the time of starting or until the work that they had recorded was completed. As a result some periods of duty were less than the maximum permitted number of hours. This seems inefficient but was necessary to cover the work. We did not schedule the "pilots" again until an adequate rest period had been allowed.

Results

Each anaesthetist on rota A worked a 24 hour spell of duty during weekdays and a 48 hour spell at the

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weekend. Clinical duties occupied 71.3 (42%) of the 168 hours on call and occurred at any time of day or night. The three anaesthetists also undertook 14 operating lists, eight of which they did without being accompanied by another anaesthetist.

The duty period of the anaesthetists on rota B was from 5 pm until 9 am weekdays. Duty at the weekend was 48 hours from 9 am on Saturday. Clinical duties occupied 79.9 (62%) hours of the 128 hours on call. As duty started at 5 pm the three anaesthetists were able to undertake 22 daytime sessions; these included one operating list unaccompanied, 13 lists performed with another anaesthetist, and five sessions of intensive care or obstetrics as the sole anaesthetist. The remaining three sessions were spent on a lecture course during a study period.

The figure shows the results of scheduling anaesthetists according to the rules of CAP 371 to cover the work of the two hospital rotas. The top three rows show periods worked by the three anaesthetists on rota A, continuous emergency cover being provided by one of them. There were 15 daytime sessions as one of the sessions was the course for the fellowship of the College of Anaesthetists. CAP 371 requires all types of duty to be counted towards maximum hours of duty. The subsequent five rows give the results of scheduling "pilots" to cover this work. Each "pilot" was always given the appropriate rest period (at least as long as the preceding period of duty and not less than 12 hours) before being available for duty. Pilots, unlike anaesthetists, cannot be rostered for 24 hour spells, so each period on call was covered by a succession of "pilots." These short periods resulted in many of them starting and finishing during unsocial hours. The figure shows that to provide the same cover for an airline as provided by the anaesthetists on both rotas would require five people rather than three.

The scheduling was remarkably economical. The anaesthetists worked 72, 64, and 92 hours each, totalling 228 hours in a week. Scheduling resulted in five people working 44, 44, 49, 46, and 45 hours, totalling 228 hours. The same method was applied to anaesthetists on rota B. They worked 220 hours while

the "pilots" needed 227 hours. The difference is explained by the necessity of using split duties, which are allowed in CAP 371, to extend some periods of duty. Again five "pilots" were required.

CAP 371 allows a maximum week's work of 50 hours; thus our allocation was within the rules. It also limits the total number of hours of work in any consecutive 28 days to 100. The "pilots" whom we scheduled in this way could repeat the pattern for another week but would then have to be free from duty for two weeks before returning to work. Within the rules they could work only two weeks out of every four at this level of activity; thus 10 "pilots" would be needed for each rota. Even at this rate, however, the maximum permitted annual work time of 900 hours would be achieved in 280 days, and another three pilots for each rota would be required to cover the remainder of the year. Therefore, to cover the two rotas according to the rules applicable to airline pilots would require 26 anaesthetists.

Discussion

The number of people required to cover junior anaesthetists' rotas when the rules of CAP 371 were applied was surprisingly high and shows the enormous difference between the hours of work of pilots and junior hospital doctors. This pattern of work may not remain the purview of only junior doctors as the number of registrars is reduced and consultants participate more directly in the care of patients.

CAP 371 may be too extreme, but recent reports of pilots falling asleep and complaints of fatigue during the holiday season indicate otherwise.^{7,8} The Civil Aviation Authority is considering changing the rules to permit some of a cockpit crew to sleep while flying.⁹ Anaesthetists on duty do not have a second person into whose care they can hand a patient while they snatch some rest. Anyway, this type of rest merely mitigates fatigue and does not compensate for an extended period of duty. Pilots have further limitations when not acclimatised to local time; this does not apply to anaesthetists.

Number of hours worked each week by three junior anaesthetists on rota A and three on rota B and schedules drawn up by using guidelines of Civil Aviation Authority's publication CAP 371 to cover same number of hours. Vertical lines between days indicate midnight

Comparison between aircrew and anaesthetists may not be valid as aircrew are working for the whole of their time on duty whereas anaesthetists are only on call and have long periods of inactivity when they could take rest. Nevertheless, both professions entail considerable periods of monitoring interspersed with episodes of high demands on physical and cognitive skills. Aircrew are considered to be on duty whenever they carry out a duty at their employer's request. This includes training and standby duty. Anaesthetists in hospital are on duty and may be called at any time. In our survey work occupied 42% and 62% of the time on call of anaesthetists on rotas A and B respectively and its timing was unpredictable. A resident anaesthetist may reasonably be considered to be working for the whole of the time.

In anaesthetic practice cover for unexpected absence, sickness, examination vivas, etc, is arranged at short notice, resulting in an increased workload for some anaesthetists. Such arrangements are not permitted by CAP 371 if they would cause excessive hours to be worked or if there is insufficient time to plan rest and periods off duty.

CAP 371 implies a two way relationship. The employer undertakes to schedule duties within the rules sensibly and realistically. In return employees are expected to use any rest period properly and to report all flying that they have been paid for, whether professional or private. The Air Navigation Order requires that employers should have a scheme for regulating their crews' work. A crew member should not fly, and his employer should not require him to fly, if either has reason to believe that he is suffering, or is likely to suffer, from such fatigue as might endanger the safety of the aircraft. The analogy with medical practice is clear. Doctors could be expected to control their activities when they were off-duty so as to attend for

work in the best possible condition. Any reduction in hours worked for an employer would not permit more time in private practice as limits on the total numbers of hours worked must not be exceeded.

Lord Rea's bill, which seeks to reduce the hours of junior doctors to 72 each week, may be of benefit, but this limit is still considerably higher than that for airline pilots, for whom short hours of work, though expensive, are presumably justified by the risks of tired aircrew. If junior doctors' hours are reduced the requirement to cover emergencies and work unsocial hours will become the task of more senior and older anaesthetists. Fatigue is but one of the factors that threaten a person's concentration, but it can be anticipated. There is no excuse for demanding that junior anaesthetists continue working their present unsafe number of hours or for subjecting patients to a new generation of tired doctors. The responsibility for errors resulting from fatigue will belong to those who fail to plan appropriately.

We thank the Civil Aviation Authority for permission to quote from CAP 371.

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Letter from Brasilia

Brasilia: modern day Stonehenge

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When you are travelling on a bus west to Brasilia you pass through hundreds of kilometres of savannah country or cerrado, a type of terrain common to the Brazilian uplands. Here rolling hills are populated by millions of small trees and coarse grass struggling on top of a leached laterite red soil. It resembles parts of East Africa, though the vegetation is totally different. To the unpractised eye it seems monotonous apart from the forested valleys, but actually it is a rich ecosystem. Over 500 types of trees are present, and many flowering plants and innumerable insects. At night deer, anteaters, pumas, armadillos, wolves, giant lizards, and capybara and many other rodents are active, while by day the air is full of bird song. Here the termite and ant are king; indeed, it is one of the best places in the world to study such social insects. The bus, usually overloaded, grinds on inexorably until, passing the satellite city of Sobradinho, it climbs a hill and, turning a corner, gives you a startling view of Brasilia: white buildings in the geometric pattern of an aeroplane with swept back wings. From your vantage point in the bus you can see only the nose of the fuselage with the parliament and ministerial buildings and part of the north wing. It is a modern day Stonehenge but more dramatic in its setting. The effect

on my companions in the bus is electric. Many rise to their feet, and watching their faces I feel their sense of pride that their country built this city. Justifiable pride, for few countries could have done it. For me, however, this reaction by the people of the Brazilian interior is tinged with sadness for there is no place for them there. It is a city for the wealthy, very expensive, full of millionaires, a city of administrators, and they will sleep in one of the 12 satellite conurbations, some of which are larger than Brasilia itself.

Electoral promise

Brasilia is the result of the administration of president Juscelino Kubitschek de Oliveira. In his election campaign he was asked if he would build the new capital for it had been planned by the Brazilian government for decades: a way of developing the vast interior of a country that is half of South America. A site had been chosen near where the city stands today. Apart from its central position a possible factor influencing that decision was the excellent climate, temperatures rarely rising above 80°F, long hours of sunlight, and sufficiently fresh in the evenings to drink red wine. This because, though it is near the Equator,

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