The working day in medicine: lessons from the air

Ana Castelló, Fernando Verdú

This article discusses whether it would be wrong to explain a mistake involving medical responsibility on the basis of an opinion that the professional was not in the optimum physical or mental state at the moment the mistake took place.

'As men were being tormented by cruel monsters and countless scourges, Zeus begat among them a powerful hero who could deliver them from evil. And indeed one day a strong and robust boy was born to Alkmene in the royal palace of Thebes. And they called him Hercules, and the father of the gods gave him both incredible strength and all of the virtues.'
The Twelve Labours of Hercules (Enrique de Villena, 1384–1434)

Following the initial publication of Directive 93/104 of the Council of Europe of 23 November 1993 referring to certain aspects related to the organization of working hours (http://europa.eu.int/eur-lex/en/index.html), concern was shown in some sectors, particularly within the medical profession. The reason for this was the discrimination that would be shown towards certain groups of professionals should the directive be implemented. The actual text causing concern was as follows:

'The present Directive shall be applied to all sectors of activity, both public and private, in the sense of article 2 of Directive 89/391/CEE, without prejudice to the dispositions of article 17 of the present Directive, with the exception of road, air, railway, sea, and inland navigational transport, maritime fishing and other maritime activities and the activities of doctors during their training period.'

In June 2000, the Council drew up Directive 2000/34/CE to modify Directive 93/104/CE which referred to certain aspects of the organization of working hours. The new Directive included certain sectors of activity that had been excluded in the former Directive (http://europa.eu.int/eur-lex/en/index.html). The valid text now reads:

'The present Directive shall be applied to all sectors of activity, both public and private, in the sense of article 2 of Directive 89/391/CEE, without prejudice to the dispositions of articles 14 and 17 of the present Directive'.

From this moment on, it was established that health-care professionals should have a maximum working week of 48 hours including overtime. Moreover another series of conditions was included, such as having a minimum resting period of eleven consecutive hours throughout the course of each 24-hour period, the establishment of weekly resting periods and mandatory holiday periods.

As in all EU directives, a transitional period was adopted, which in this case was allowed to extend up to 11 years, so that member states could adapt their legislation to a common standard.

This article questions whether the working schedule as established by the directive can be considered satisfactory for health-care professionals. There is no doubt that in general it is conducive to improvements, especially in certain areas, but it would appear that excessive demands are still being made on certain groups.

PRACTISING MEDICINE

The climate in which doctors work (Appleton et al, 1998) has changed in recent times. Formerly, doctors' attention was focused on two areas: good clinical practice (efforts to cure) and good human relationships (caring for the patient). Over the years the curative approach, which is the doctor's ultimate aim, has relegated human relationships to second or third place, resulting in the so-called dehumanization of medicine.

Dr Ana Castelló is Biochemist and **Professor Fernando Verdú** is Professor of Legal Medicine in the Department of Legal Medicine, College of Medicine and Odontology, University of Valencia EG, 46010 Valencia, Spain

Correspondence to: Professor F Verdú

Today, doctors are still required to make these efforts, but they are also asked to meet certain economic and administrative objectives at the same time (Weinstein, 2001). As a consequence of this, the sword of Damocles is permanently hanging over their heads (Fenn et al, 2000).

A doctor should efficiently perform a series of tasks that can be divided into five sections: health care, learning, teaching, research and management. For each of these to reach acceptable standards, it is essential that both in training and performance the doctor should be perfectly alert to a series of processes that can be summarized as: data input, data analysis, decision making and task execution.

The average doctor, in a state of perfect physical and mental health, has to perform such tasks for 48 working hours a week. Would it be exaggerated to say that to successfully remain alert and in control for 9.6 hours a day – during shifts from Monday to Friday – is possible for only a few privileged persons?

Should the professional in question be one of the majority of doctors who are affected by other factors (Reason, 1990) that significantly diminish the capacities mentioned above, it would appear that levels of professional excellence can only be lower than ideally expected.

A further factor determining the efficiency of professionals when performing their tasks is physical and mental fatigue and consequent lowered alertness.

Two observational studies (Stewart et al, 1998; Heller et al, 2000) have shown that there is an relationship between the time a child is born and the probability of precocious death. Both studies showed that if a birth occurred between 21.00 and 06.59 hours, the probability of a precocious death was almost double that of a birth occurring between 07.00 and 20.59 hours. The first study even concluded that the probability of death by asphyxia for nocturnal births was almost four times that of daytime births.

The explanation for this in both studies and others to which they referred was twofold. First, health-care staff are tired at these times, especially if they have been working the day before. Some people, moreover, are not in the best condition to make important decisions until they reach a full state of waking consciousness. The second reason given by the authors, albeit of secondary importance to the aim of this study, is that childbirth care is relegated to less experienced staff. There is perceived to be no need to call in senior staff except under very special circumstances.

When it comes to avoidable or inevitable mistakes (Weingart et al, 2000), reference is made to each particular case on a kind of overall balance, based on the circumstances that gave rise to the problem. This is the key for a court which must decide whether a mistake could conceivably have been prevented or not.

Some may think that it would be wrong to explain a mistake involving medical responsibility on the basis of the opinion that the professional in question was not in the optimum physical or mental state at the moment the mistake took place. From the juridical viewpoint, it may seem inappropriate to blame a medical mistake on the mere planning of work schedules, even if such schedules do not take into account what may be considered the attention span limitations of the normal human being.

It is true that health-care resources are generally limited, and that careful studies must be made of medical necessities in each country (Weinstein, 2001). But such questions must also include the actual capacity of health-care professionals for efficient work.

CIVIL AVIATION AS AN EXAMPLE

With regard to investigating medical errors Helmreich (2000) points out that certain lessons can be learned from the aeronautical industry. The rigorous accident investigation systems used in this field enable the majority of cases to be clarified, whether they happen to be large-scale catastrophes or simple incidents claiming no victims. But there are also other aspects of relevance in the field of civil aviation.

With respect to the European Directives establishing time scheduling, as mentioned earlier, a transitional period is allowed that in some cases extends to up to 11 years – 5 years as of 2004, plus a special 2-year period of grace.

This is not the case with all types of workers. The aeronautical industry presented Directive 2000/79/CE of the Council (http://europa.eu.int/eur-lex/en/index.html), of 27 November 2000, referring to the application of the European agreement on the ordering of work time for flight personnel in civil aviation as put forward by the Association of European Airlines, the European Transport Workers' Federation, the European Cockpit Association, the European Regions Airline Association and the International Air Carrier Association.

Of particular relevance in this agreement is a section on working times and resting times. Regarding the first, it was established that 'The maximum working time per year, including waiting time and stays determined by the relevant legislation, should be 2000 hours, of which total flying time should not exceed 900 hours' (flying

time is measured from the moment an aircraft begins to taxi from the place it was parked for takeoff until the time it lands, parks again and shuts off all its engines).

With regard to resting periods, the agreement states that all flight personnel shall have free time, apart from their annual 4-week holiday, for at least 7 local days for every civil month, including, if relevant, the resting periods as required by law and at least 96 local days per civil year, including, if relevant, the resting periods as required by law.

KEY POINTS

- Formerly a doctor's attention was focused purely on efforts to cure and care for patients. It is now taken up with economic and administrative objectives as well as medical issues.
- Only a few people can maintain an exemplary physical and mental state for 10 hours a day.
- Some studies have linked undesirable results in health care with the tiredness of staff.
- These data and the increasing levels of 'burn-out' raise questions about whether doctors' working conditions are appropriate for optimum patient care.

Perhaps the most striking aspect of this agreement is that the directive should be applied at the latest by 1 December 2003. Note that a substantial reduction in the original transitional period has been achieved.

CONCLUSIONS

It is not the aim of this article to make a direct comparison between the demands of one profession with another. Every profession has its individual characteristics, both in terms of employment and economics. Yet it can be said, as a practical exercise, that a doctor working a 7-hour day in an intensive care unit would log up 900 'flying hours' in only 129 days of work, without even counting his or her hours on call, which would substantially increase flying time and reduce the final working day count.

If there are no doubts about requirement for a pilot's perfect physical and mental state when in charge of flight instrumentation enabling an aircraft to take off, fly and land automatically or semi-automatically, why should the same not apply to the physical and mental state required of health-care professionals on duty in intensive care units, emergency units, operating theatres and others, who are responsible for making decisions that affect patients' health, wellbeing and even lives? The only difference is that health-care workers, although fewer demands may be made of them at times, do not yet do their jobs automatically. They must always use their personal attention and awareness, and strive to remain in exceptional physical and mental shape.

At Delphi, the oracle of the Temple of Apollo did not give Hercules a thirteenth labour. It would appear that the gods were keeping it for health-care professionals. HM

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Beware of easy answers

To a lawyer called upon to defend those who commit clinical errors Castelló and Verdú's article makes beguiling reading, as does the thinking associated with the Reason (1990) analysis which directs attention to the multifactorial circumstances surrounding the mistake and away from the personal culpability of the responsible clinician. Unfortunately I think that both can be taken too far.

The first specific point made by Castelló and Verdú is that 48 hours is too long a working week. The figure is one which calls for a degree of interpretation. As a result of a series of recent decisions [BNA v Inland Revenue 2002; Wright v Scottbridge Construction Ltd 2003], the working time for the purpose of the Directive includes all time when the employee is at the employer's disposal. This will include time when the doctor is asleep on call in the hospital. Time spent in this fashion is unlikely to be so tiring as to increase the propensity for error.

Second, there are grounds for suspecting tiredness is not the leading cause of the diurnal variation in the rate of errors. After all, the doctor who is tired at midnight as a result of overwork is also likely to be tired at noon if his/her 48 hours constitutes such a punishing schedule as the authors suggest. The articles the authors cite do not demonstrate that tiredness is the dominant cause of error although they speculate that it may be a factor. They note the increased likelihood of junior doctors operating at the limits of their experience and without supervision at these times (Stewart et al, 1998). This is supported by an increase in the death rate associated with births in July and August, the holiday months, as well as in February when new doctors take up their posts.

Stewart et al also suggested that nocturnal errors might be associated with circadian rhythms and it is now supposed that these have causes and effects which are profoundly complex (Edery, 2000).

The analogy between the doctor and the airline pilot has been cited extensively. While the insight is useful, like Reason's drawing of the holes in a piece of Swiss cheese, any analogy which is quoted too often tends to dull thought as a cliche. It also serves to mislead since the obvious weaknesses in the analogy become overlooked. There are many reasons for supposing that the demands on aircraft pilots are quite different than those on clinicians. The pilot's work is a repetitive uneventful interaction with a machine by someone seated in the same chair looking at the same objects over many hours. A doctor's work includes a series of lively varied interactions with patients and colleagues. A pilot may be at constant risk of falling asleep or inattention, the doctor, even where exhausted by a 48-hour working week, is not. An analogy may help. The lawyer knows that when driving a car on a hot afternoon, he must guard against inattention or even falling asleep as a result of tiredness. This is not likely to happen during a case in court, although one sometimes wishes it would.

In looking for the causes of error in the future it may be useful to go in the opposite direction and look at the deficiencies that we are building into the professional equipment of doctors in training today. Before Calman a trainee would serve 11–14 years as a junior on a rota which varied between 1:2 and 1:4. Commonly such a doctor would work for 50 000 hours before being appointed as a consultant. In the future a doctor who works for 48 hours a week over 7 years is likely to accumulate less than 15 000 hours of clinical experience.

Furthermore, the quality of that diminished experience is different. There may be more hours of training as opposed to clinical experience, but there is far less responsibility and direct experience of pathology. I recently had to defend a consultant obstetrician at the General Medical Council (GMC) where the underlying charge was that in a minor emergency (the absence of a colleague meant that he was on call for the labour ward as well as his own surgical list) he allowed a year 4 specialist registrar to perform an elective hysterectomy when he was doing a labour ward round 2 minutes away. Evidence was called by the GMC to the effect that doctors in training are there to learn and to be taught, not to deliver a service. When the consultant had been a junior at the same status he would have performed such procedures unsupervised 5 or 10 times a week. Eighteen months after that event the consultant had retired and the junior had been appointed a consultant in a teaching hospital. This exchange is repeated a thousand times a month as consultants who were the products of a monastic tradition of training as juniors are replaced by those who will never acquire their range of experience or their expectations of their juniors. It is true that the GMC dismissed the case, but it illustrates, as I fear do Castelló and Verdú, how a plausible argument with a weak evidential basis can be taken too far.

It may be that the doctors of tomorrow will be more highly trained than their predecessors in a task-specific sense. However, they will never get the broad experience of the natural history of disease in man or the unexpected catastrophe to which they have to respond in an emergency. They will never acquire the flexibility which is occasionally necessary to compensate for the patient's failure to identify the correct doctor to whom they should present their disease, or the occasional failure of those diseases to respond as predicted to the therapeutic intervention.

From the point of view of the NHS the consequence is a catastrophic decline in medical productivity. This

is quite sufficient to explain why the increase in government funding has not been matched with the quantity of service which the government desires. This is a process which continues. So far the working week has fallen to 56 hours. Over the next 10 years we will see that made worse by the fall to 48 hours and the impact of the judgment whereby sleeping time counts as working time. In 2009 we will see the same limitation extended to the consultant grade. Over the same period we will also see a generation of consultants trained under the old system replaced by a generation trained under the new. It may be that the profession and the government will find a way of mitigating this by having a junior consultant grade in which doctors are subject to some of the limitations of the old senior registrar grade, but it is by no means clear how hands-on training of the old sort can be transmitted during these years even if there is some effective restriction on the activities of the consultant.

All of these problems mean that the system will be more stressed which must mean either that waiting times are increased or bedside interaction between doctor and patient is abbreviated. These may prove to be fruitful causes of error: an alert and fit doctor who fails to spend enough time listening to the patient may be more likely to get it wrong than a tired colleague who lacks the energy to rush away before the patient can utter the inconsequential aside which reveals the diagnosis.

In some respects I accept that the consequence for the NHS may be greater than the consequence for the individual. If the juniors are less experienced they are likely to be more intensively taught. There is no doubt that the price of the 1:2 rota was heavy, often for the patient as well as the junior who was over-exposed as well as exhausted. I accept that 20 years ago we saw more catastrophic errors than we do today. The newspaper headlines which such mistakes attract reflects their rarity today as well as the public's greater comprehension of the subject. Twenty years ago one did sometimes suspect that exhaustion was partly to blame for the moment's inadvertence which had led to the intrathecal injection of a mega unit of penicillin. I can remember several tragedies perpetrated by doctors who were aware of the theoretical danger.

For these reasons I would not advocate a return to the old days. Nor do I need to do so to suggest that the doctor and the patient both have more to lose from a further reduction in working hours. A return to a 56- or 60-hour week, calculated as the courts now say it must be with on-call time counted as work, would be more likely to benefit both doctor and patient than any further reduction in the working week.

Bertie Leigh
Senior Partner, Hempsons Solicitors, London WC2N 6NJ

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