Reduced Work Hours: Who Benefits?

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Many countries in the Western hemisphere now impose limitations on hours of work on medical staff. In the United States, a change resulted from the investigations that followed the death of Libby Zion in 1984, an 18-year-old daughter of an attorney and journalist in a New York hospital.[3] Although an investigating committee found no doctor directly liable, they thought that resident's deprivation of sleep was a contributing factor. In response, the New York State Department of Health introduced a mandate in 1989 limiting on-duty time to 80 hours per week, with no more than 24 hours worked consecutively and with one 24-hour period off work per week.[25] In 2003, this limitation was enforced nationwide when the Accreditation Committee for Graduate Medical Education (ACGME), perhaps in an effort to preempt government legislation, introduced a compulsory restriction to 80 hours per week for all residency training programs.[1,2] Again, duration of on-call duty was restricted to 24 hours, resident on-call to no more than every 3rd night, and 1 day in 7 days free from patient care responsibility. All work hours were to be averaged during a 4-week period.

The introduction of such requirements was based on the assumption that sleep deprivation impaired performance. But, what evidence supports this? Friedman et al.[13] recently reviewed studies that examined the relationship between a doctor's performance and deprivation of sleep. Of 13 studies reporting the effect on manual tasks, such as surgical performance, suture placement, and performance on a surgical stimulator, only 7 found a significant relationship. Similarly, of 27 studies reporting the effect of sleep deprivation on cognitive tasks including chest x-ray and ECG interpretation, 17 found a positive link. Therefore, the evidence is conflicting, but the fact that the majority of studies did find an effect is sufficient to ensure that these work hour restrictions will continue.

How have neurosurgical residents and program directors responded? Cohen-Gadol et al.[7] conducted a survey of 93 program directors and 617 residents; 45 and 20%, respectively, replied. A minority of residents and even fewer program directors thought that the reduction in hours carried positive aspects, such as potential improvement in examination scores, improved attendance at educational meetings, and a potential increase in research publications, whereas 60% of residents and 78% of program directors thought that reduced hours would have negative effect on various aspects of training.

In 1990, in the United Kingdom, a committee of junior hospital doctors negotiated a "New Deal" with the government on hours of work, whereby on-call rotas would be limited to 83 hours per week and would carry minimal periods of compensatory rest; from 1994 this would fall to 72 hours per week.[24] Only 56 of these hours could constitute actual work. If valid educational reasons existed, the hours could be increased to 83 hours per week (the English Clause).[10] Any difficulties and concerns regarding the enforced reduction to these hours pales into insignificance with the introduction in August 2004 of the European Working Time Directive, legislation applying to all countries within the European Union.[8,9] This directive restricts work to 58 hours per week from August 2004, falling to 56 hours per week from August 2007, then to 48 hours per week from August 2009. Requirements for compensatory rest include 11 hours of continuous rest within any 24 hours and a minimum of 20 minutes of break every 6 hours. The European Court of Justice further ruled that time spent as a resident on-call (i.e., resident within the hospital) must be regarded in its entirety as working time, even if the doctor remained asleep, undisturbed for many hours (the SiMAP ruling),[11] and that compensatory rest must be taken as soon as possible after the working shift, thus, preventing the accumulation of rest periods (the Jaeger Ruling).[12] At present, staff have the right to sign a waiver to "opt out" of the requirements, provided that this is entirely voluntary. The European Commission plans to discontinue this option, a move currently resisted by the UK government.

Current working time regulations recently imposed in the United States are approximately equivalent to the United Kingdom restrictions from 1990 to 2004. Has it been possible to train neurosurgical registrars (residents) within these restricted hours of work? If so, is the training equivalent to that in the United States?

TRAINING IN THE UNITED KINGDOM AND IRELAND

In the United Kingdom and Ireland, standards of neurosurgical training are controlled by the Specialist Advisory

0148-703/06/5301-0252

Committee (SAC) in Neurosurgery under the auspice of the four Surgical Royal Colleges (Edinburgh, Glasgow, England, and Ireland). Thirty-five neurosurgical units make up 18 training programs, most of which involve rotations between two or more units to ensure a broad experience incorporating at least 6 months of pediatric neurosurgery and exposure to more than four consultant neurosurgeons. The SAC visits every unit/program at 4-year intervals to assess workload and to ensure that this will support training for the specified number of residents, to assess the educational program, and to interview residents to obtain their views of the training program. Visits are carried out more frequently if concerns exist regarding any one unit. During the last 15 years, training recognition was removed from six units, and this was reinstated only when the concerns had been addressed.

Entry to neurosurgical training follows 3 years of basic training, rotating around surgical specialities. Neurosurgical training lasts for a minimum of 6 years and incorporates 5 years of clinical neurosurgery and one optional year of research, sub-specialization, or overseas training. The research period may be extended for a higher degree. In training assessments are completed every 6 months to determine suitability of progression, and residents sit a multiple choice clinical and oral examination in their fifth year of training. On completing 6 years of training, the resident applies to the SAC, who ensure that the examination has been passed, that the trainers have provided satisfactory reports and that the resident's operative totals are "satisfactory." During the past 15 years, the SAC built up a database detailing the number of procedures achieved personally by the trainees (residents) at the end of their training.[18] From this, the median and range of procedures are derived both for the whole period and for each individual year. The SAC expects that, before gaining accreditation, the resident should approach the median value for the majority of procedures. The database also allows monitoring of operative totals on a yearly basis during the last 15 years, the period that bridges the reduction in hours of work from 83 to 72 per week. Aneurysm totals fell in recent years from a median of 34 per year to less than 10 per year because of the advent of coil embolization. Otherwise, operative totals have remained relatively constant (*Fig. 27.1*). If anything, numbers have increased compared with the mid 1980s, when no restriction on work hours existed.

A further factor that we must consider is the end product. In other words, for what are we training residents? In the United Kingdom and Ireland, appointment to a Consultant post on gaining accreditation brings independent practice. This contrasts with most other countries in Europe, in which hierarchical systems still exist. This does not mean that the newly qualified neurosurgeon is capable of performing *all* procedures; but the newly accredited neurosurgeon has autonomy of patient care and must know his/her limitations and

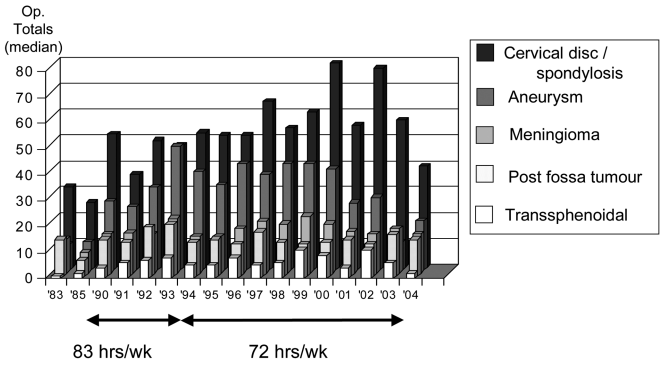

FIGURE 27.1 Graphs showing the median operative totals performed personally by United Kingdom neurosurgical residents on completion of training for each year from 1990 to 2004. Op, operations.

when to seek sub-specialty help. In conclusion, despite the restriction in working hours to approximately 80 hours per week or less, training in the United Kingdom maintains a high standard and is probably similar in quality to that achieved in the United States.[22]

PROVISION OF SERVICES

Major concerns now exist in the United Kingdom regarding the recent current reduction to 58 hours per week, falling to 48 hours per week during the next 4 years. This will affect both the provision of service and training. What measures are required to counteract the problems that will ensue?

Except in the very large units with 10 or more residents, the pressure to reduce hours of work and to permit the required compensatory rest periods, tends to push the organization of cover from a resident *on-call rota* system to either a *partial shift* system, i.e., in which week days are worked as normal days but out-of-hours period are covered by shifts of from 16 to 24 hours work, or to a *full shift* system, in which the week is divided into definitive blocks of time with doctors rotating around the shift pattern. No matter how efficient hand-over systems become, the loss of continuity of care must have a detrimental effect on patient safety.[14,26]

Some smaller units with low levels of emergency work may try to cope by permitting the resident to become "non-resident on-call", in which only doctors at preregistration level (intern) directly cover ward patients. Any such move, in a specialty in which potentially reversible conditions, such as acute hydrocephalus, can rapidly cause devastating effects, would inevitably increase patient risk.

Expanding Staff Base

In an effort to maintain an on-call system, training programs can *appoint more residents*. In the United Kingdom and Ireland, training numbers continue to expand, but the number of residents for any one program has a finite limit that

depends on the available workload. Beyond this, further appointments, although perhaps permitting an on-call rota, will dilute the elective operative experience.

The incorporation of trainees holding research posts or fellowships on to the on-call rota provides a satisfactory solution, but a busy night on-call could disrupt research output on the following day or interfere with experimental procedures, which may extend into an evening. Again, numbers of such posts in any one program would be limited because most would need to merge back into the clinical program on completion of their period of research.

The *appointment of more nonmedical staff*, e.g., nurse practitioners, physician's assistants, phlebotomists, etc., may ease the intensity of resident's work, but does not remove the need for medical cover without reducing the quality of patient care.[17] Operating department assistants may perform minor procedures, but this could reduce training opportunities of junior residents.

Expanding the number of consultants/attending staff members will only help to reduce junior doctor's hours of work if these consultants are prepared to work out with normal hours in the place of residents. More realistically, expansion in consultant numbers could allow more time for training and help improve the quality of training in the fewer hours available.[6]

Hospital at Night Program

The need to reduce doctors hours of work forced a rethinking of traditional methods of nighttime cover, where often the most junior doctors are first to deal with the nighttime emergencies. A survey of 10 hospital Trusts in the United Kingdom, auditing activity of all doctors from a wide range of specialities between the hours of 5 PM and 9 AM, found that the number of calls fell dramatically after midnight.[15] In addition, the calls seldom referred to life-threatening situations and were often nonurgent. This study reported the formation of a multidisciplinary team (equivalent to "hospital floaters" in the United States) composed of various grades of staff covering medical, surgical, and anaesthetic specialties with supporting nursing staff, all trained to handle core skills required for resuscitation and the management of the critically ill. Such a team may successfully manage the bulk of emergencies arising in a general hospital along with the medical problems, e.g., pulmonary embolus or hematemesis, which may develop in neurosurgical patients. The team would not, however, be capable of dealing with acute neurosurgical conditions, many of which require treatment after hours. The "hospital at night team" will not solve the need to reduce neurosurgical resident's hours of work.

Re-allocation of Staff

The survey of evening and nighttime hospital activity did not include a neurosurgical unit, but it is likely that activity levels follow a similar pattern. If so, then the number of staff in hospital in the evening could be increased. The reduction in activity after 11 PM may permit a downsizing of the on-call team, or at least a reduction in numbers of the resident (i.e., remaining in the hospital) on-call team after that time. However, any re-distribution of staffing levels requires caution. A sudden influx of emergency admissions could overburden remaining staff and endanger patient's safety.

Rationalization of Neurosurgical Services

In most countries or states, neurosurgical services are supplied by a combination of departments of varying size covering populations to match. By limiting emergency admission to a few selected sites either on a permanent on a rotational basis would require patients to travel greater distances but at the same time would allow a more efficient use of resident staff. However, neurosurgical units would still require resident cover for inpatients and such a move is unlikely to significantly impact on hours of work. Removing or reducing emergency admissions from units may lead to a de-skilling of staff and reduction in intensive care facilities for these units. Rationalization of neurosurgical units in the area—closing small units and expanding medium-sized units until each covered a population of from 3 to 5 million, would reduce access for both patients and relatives, but could provide sufficient staff to permit acceptable resident on-call rotas. Such long-term moves may not only aid a reduction in resident's hours of work, but would also address the volume-outcome issue. Analysis of large administrative databases in the United States for several different operative procedures (aneurysm repair, microvascular decompression, pediatric brain tumors, and ventriculoperitoneal shunts) suggest that outcome improves when more patients are treated for a particular condition within a hospital or by a particular surgeon.[4,16,27,28] Moves to close departments and rationalize the neurosurgical service require planning at a national level and may be blocked by local politics. This is no short-term solution!

MAINTAINING STANDARDS OF TRAINING

In a recent publication, Lowenstein[19] drew attention to the views expressed by Sir William Osler that although diseases can be learned from textbooks, the progress of the illness is learned from the continuity of patient care. As stated above, the need to reduce hours of work increases pressure on neurosurgical departments to move from an on-call system to a partial-shift or even a full-shift system. The further the move in this direction, the greater the reduction in continuity of care (*Fig. 27.2*). However, shift systems may not only harm training by their effect on continuity of care. An unpublished study from neurosurgical units in London has shown that the greater the move toward a shift system, the less the trainees exposure to elective cases during normal

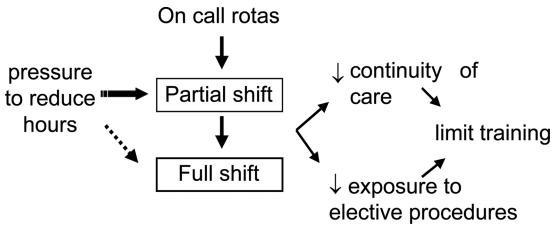

FIGURE 27.2 Diagram showing the effects of reducing hours of work on training.

working hours.[29] Although both of these effects may act to limit training, this does not mean that training is not possible, but training in those circumstances will take longer. There is also the danger that a move to a neurosurgical shift system would in the long-term create a "shift-worker" mentality in future neurosurgeons, which could act against patient's best interests.[13,20,23]

We are told that because, in the future, the residents would be in training for fewer hours, we must train more efficiently and improve the quality of training.[7] Within the working week, we should increase the training component and decrease the service component.[6] I have always been rather sceptical of the feasibility of such statements, however, I was encouraged to read the results of a survey carried out on trainees attending a European training course.[5] Of 218 participants, 65 trainees from 23 countries completed and returned the questionnaire. Hours of work between countries varied from 40 to 100 per week. The numbers of operative procedures per year performed either personally or with assistance from a trainer varied from less than 10 to almost 200. Most importantly, no correlation existed between the number of hours spent at work and the number of procedures performed per year (*Fig. 27.3*). In some countries, trainees performed fewer than 25 procedures per year, yet worked 100 hours per week. In contrast, in others, trainees performed approximately 140 procedures per year yet worked less than 45 hours per week. The low response rate of this survey requires cautious interpretation, but it does suggest that the quality of training in terms of the amount of operating can remain high despite very restricted hours of work. A more recent survey of surgical training programs in the United States across 2002 to 2003 similarly found no correlation between hours of work and volume of operated cases.[23]

In the United Kingdom, there is an intention to move toward a more *competence-based* rather than *time-based* training. In other words, training would not be restricted to 6 years, but would continue for as long as necessary until the required level of competence was achieved. Any difficulty in acquiring the necessary competence because of a reduction in hours would be compensated by an extension of the training period. Although excellent in theory, in practice this may be harder to achieve because of the difficulty is providing an

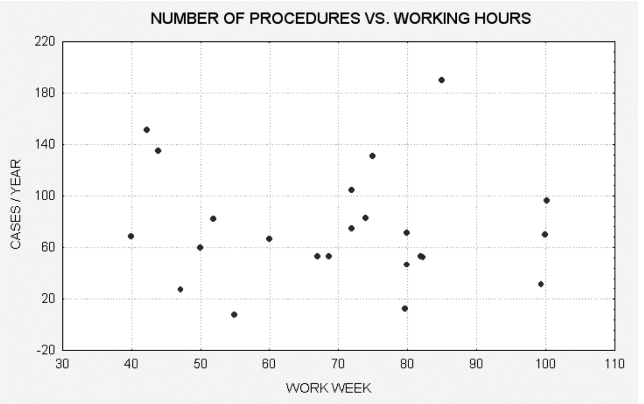

FIGURE 27.3 Graph showing absence of any correlation between hours of work of 65 trainees from 23 European countries and number of operative procedures performed per year (data reproduced with permission from Brennum J: European neurosurgical education: The next generation. **Acta Neurochir** 142:1081–1087, 2000[5]).

objective measure of competence. Although limitations exist when operative totals are used to assess competence, this at least provides a relatively objective measure.[18] Other methods, e.g., checklists for key operative procedures, have been developed for general surgical procedures and await neurosurgical evaluation.[21,30]

CONCLUSIONS

Reductions in the hours of work of hospital doctors are here to stay. Does the patient benefit? Although patient safety has been the driving force behind these changes, no evidence exists to suggest that reduced hours of work lead to an improvement in patient outcome. Any benefit to patients incurred by reducing sleep deprivation of surgical staff may well be offset by the inevitable reduction in continuity of care.

Does the resident benefit? More time becomes available for leisure and for private study, examination scores may improve and research publications may increase,[7] but such benefits may follow at the expense of neurosurgical training. From experience in the United Kingdom, I do not think that the enforced reduction in hours to 80 per week will affect the quality of neurosurgical training. I do however have concerns that training will suffer when hours fall to between 48 and 56 per week, as enforced by the European Working Time Directive. This may result in a 15 to 25% increase in the duration of training required to maintain present standards—to the detriment of the trainee. There is, however, no doubt that the families of trainee neurosurgeons will benefit from any reduction in their partners' hours of work, and recognition of their tolerance is long overdue.

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