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Sleep deprivation among physicians

Evidence clearly indicates that the loss of sleep caused by long work hours can have an effect on the health of physicians and the safety of patients.

ABSTRACT: Sleep deprivation is a recognized hazard in aviation, aerospace, trucking, the military, and other industries. Given this awareness, it is difficult to explain why physicians in North America continue to work hours that far exceed guidelines first proposed for employees in the 1930s. Because sleep deprivation in physicians may be dangerous for patients and unhealthy for physicians, the health profession needs to consider current accepted principles of human sleep requirements, the consequences of sleep loss, the regulations presently in force, the situation today for physicians in BC, and some possible solutions.

Impairment caused by lack of sleep has long been recognized as a major factor in many transportation and industrial accidents. Based on recent scientific findings[1] regulated work and duty hours first proposed in the 1930s may become even more stringent.

Human sleep requirements

In the considerable literature on sleep, several concepts have relevance to the circumstances of physicians in BC today:

- Healthy adults typically require 6 to 10 hours of sleep in a 24-hour day. The average need is just over 8 hours.[2]
- Adults who get fewer than 5 hours of sleep will show a decline in peak alertness.[3]
- After one night of missed sleep, a significant cognitive decline may occur. One study showed that 24 hours of wakefulness produces impairment equivalent to having a blood alcohol level of 0.1%—well above the current BC legal driving limit of 0.08%.[4] Recent evidence suggests that the effects of fatigue exceed the combined effects of alcohol and drugs in causing motor vehicle accidents.[5]
- Chronic loss of sleep, defined as 2 to 3 hours per night less than the ideal for an individual, produces a sleep debt. Humans do not adapt to a sleep debt.[6]
- Cognitive decline, altered mood, poorer motor skills, decreased motivation, and lack of initiative can all be observed after 5 to 10 days of chronic sleep loss.[7] Those who are chronically sleep deprived tend to underestimate their impairment.
- Sleep debts are not repaid hour for hour but only by extended periods of deep sleep.[2]
- Sleep requirements in adults do not lessen with age. In addition, sleep disorders increase with age.[8] Males older than 45 may awaken more often with nocturia while females in this age group may have sleep disturbance related to menopausal symptoms.
- After age 45, decreased quality of sleep, with shorter deep stage 3 and 4 levels, makes it much more difficult to repay a sleep debt. Thus, older physicians are less able to return to normal function after a sleepless

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night on call than their younger colleagues.[9]
- In addition to the cognitive and motor impairment seen in physicians with sleep deprivation, the emotional effects are considerable. A partial list includes family and marital discord, depression, cynicism, lack of empathy for patients, and suicide.[10-12]
- The long-term health effects of chronic sleep deprivation are more difficult to quantify, but there is some evidence of poorer gastrointestinal and cardiovascular health as well as increased rates of breast cancer and early death.[13-16]
- Among some physicians, the desire to avoid on-call duty is cited as the most common reason for early retirement.[17]

Given all this evidence, it is not surprising that industries such as transportation have brought in strict regulations regarding work and rest time to help address safety issues. These regulations have been accepted as common sense by members of the public, who are well aware that sleep deprivation was identified as a major factor in disasters such as the *Exxon Valdez,* Bhopal, Three Mile Island, and Chernobyl.[18] Some requirements of the US Code of Federal Regulations requirements[19] include:
- Pilots: When flying domestic air carriers, no more than 30 hours' flying per week or 100 hours per month or 1000 hours per year.
- Truck drivers: Maximum of 10 hours of driving per day and 60 hours per week. After a 10-hour day drivers must have at least 8 consecutive hours off.
- Marine operators: Varies with vessel, but if operators are in charge of navigation they must have 10 hours of rest in 24.

Twenty-four hours of wakefulness produces impairment equivalent to having a blood alcohol level of 0.1%.

Consequences of sleep loss

Some reports in the medical literature suggest that physicians are different from all other humans and somehow not significantly affected by sleep deprivation. Reviews of these studies show serious methodological flaws, including lack of standardized tests and controls.[20,21] Most importantly, some of these studies compared residents in the same program and claimed little difference in performance between those who had just finished a night on call and those who were not on call the previous night. Considering that *all* the residents were chronically sleep-deprived, this comparison could only capture the effects of a single night of acute sleep loss against a background of inadequate sleep over long periods of time.[22,23] Some well-designed studies of physicians have shown that sleep deprivation has a number of effects:
- Impairs language and math skills.[24]
- Impairs ECG interpretation.[25]
- Results in poorer quality intubations.[26]
- Increases time taken to perform laparoscopy and error rates in performance.[27,28]
- Increases error rates in an intensive care unit.[29]
- Increases motor vehicle accidents.[30]
- Can produce less empathy for patients and poor communication.[31,32]
- Causes significant family and marital stress.[33,34]

Legislation

After the death of an 18-year-old admitted to hospital in New York State (the Libby Zion case) was attributed to poor supervision and heavy patient loads for sleep-deprived house staff, the state enacted legislation to restrict physician work hours in 1989. Residents who had been working 100 to 120 hours per week were limited to no more than 80 hours a week, with no shift longer than 24 consecutive hours.[35] These limits far exceed the regulations of any other industry with the potential to adversely affect the general public. Furthermore, a follow-up audit done 10 years later in 12 New York hospitals found that 60% of surgical residents were still working more than 95 hours per week.[36] Only the more recent threat to hospitals of loss of accreditation has had any impact on improving compliance with the legislation. A recent Canadian study showed that even when residents are compliant with new working-hour guidelines, they still work long hours with little sleep and significant

physiological stress.[37] Patients may also be put at risk according to a recent comparison study that showed residents working 24-hour shifts made significantly more serious medical errors than those restricted to 16-hour shifts.[29]

New York State is still the only jurisdiction in North America with legally binding limits for physician work time. In other states and provinces there are recommendations, but in most cases these guidelines can be ignored with impunity. However, a recent authoritative study that estimated between 50 000 and 100 000 patients die annually in US hospitals because of errors has focused medicolegal attention on these issues.[38] Given that some physicians believe fatigue is a factor in some of their most serious errors,[39] it is reasonable to expect that documented lack of sleep will be increasingly used as grounds for malpractice.[40] Concerns about possible similar error rates in Canada led to the 2003 federal budget allocation of $10 million annually for initiatives to promote patient safety, including the establishment of the Canadian Patient Safety Institute in Edmonton.

Doctors in Europe follow the European Working Time Directive that limits work to a maximum of 48 hours per week. This directive was introduced in England in 1998 for all consultants and is being applied in a graduated way to all residents.[41] Since August 2004 residents have been limited to 58 hours work per week—a limit that will be lowered to 48 hours per week by 2009. A decision in Spain clarified that "work" includes all the time doctors are available on call and not just the time they are actually seeing patients. As Pickersgill notes,[41] these regulations are not gentlemen's agreements, but enforceable laws of the land in Europe.

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The situation in BC

In BC, emergency room doctors and a few other groups have managed to schedule reasonable hours. However, many physicians long past their residency training days continue to work hours far longer than would be tolerated in any other profession where safety is an issue. Typical work weeks exceed 50 hours, while work weeks in excess of 80 hours are still common, particularly when on-call time is included. These on-call hours can be especially wearing for physicians because the minimal staffing in hospitals late at night and on weekends can create long delays in transferring patients and finding beds, and make it difficult to obtain consults, organize diagnostic tests, and arrange procedures that require technical and nursing staff.

The pressure of inadequate access to resources such as operating rooms during regular working hours means that some urgent cases are treated as emergencies and done late at night or on weekends. If these cases were not done out of regular hours, they might be dangerously delayed for weeks waiting for an opening in the daytime operating room schedule. This very serious lack of resources has led some to suggest that BC's health regions should be responsible for paying very large after-hours premiums to give hospitals a financial incentive to improve daytime access to operating rooms. Surgeons guaranteed daytime access to operating rooms for urgent cases might then select this option rather than operating late at night. This could be safer for patients.

Recommendations

What steps should be considered to deal with the problem of sleep deprivation among physicians? Whichever one of many possible approaches is taken, some basic principles should be followed.

- *Recognize the importance of the issue.* Physicians suffer from loss of sleep and patient safety can be affected.
- *Work to change attitudes about long hours of work.* Instead of bragging about 100-hour work weeks, we should condemn them as dangerous to patients as well as physically and emotionally unhealthy to ourselves as practitioners.

- *Accept that while the system cannot be corrected overnight, we should still set goals to lessen the problem.* Many would argue that long hours are necessary in resident training and that the costs of reducing clinician's hours of work and call would be prohibitively expensive. These concerns have been addressed in Europe and health care is functioning there at least as well as in North America, aided by the fact that physician shortages pose less of a problem in Europe than they do in North America. However, without some targets, little change will occur in work habits on this continent.
- *Encourage group practice with shared call schedules.* This is already well established in many specialties, but is admittedly a challenge in smaller communities and for certain subspecialties with few practitioners, such as vascular surgery.
- *Consider enforceable legislation.* Guidelines and recommendations will be largely ignored. The situation in New York State demonstrated that even legislation will be ignored until penalties are applied. Hospitals in New York flouted the laws on resident work time limits for 10 years until they were threatened with loss of accreditation. The European Working Time Directive is a good example of formal legislation with penalties for noncompliance.

Leading sleep experts have been pleading with physician colleagues to recognize the importance of sleep deprivation for more than a decade.[42] Physicians owe it to their patients and themselves to deal with this problem rather than waiting for externally imposed regulations. Ensuring adequate sleep may one day be as readily accepted for physicians as hand washing.

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Competing interests

None declared.

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