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Sleep and neurology training

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WHAT ISSUE DID THIS ARTICLE ADDRESS?

The article on sleepiness in neurology training in this issue of *Neurology*[®] adds to what is known about lack of sleep in medical trainees.¹ Lack of sleep has mostly been studied in areas of medical training other than neurology. The study by Reimann and colleagues tries to fill this gap. They looked at a group of neurology doctors-in-training, called residents. They wanted to see whether the residents showed signs of sleepiness and whether sleepiness made their thinking slower and less accurate. The study found that neurology residents were sleepy but not slow in their thinking after working for a complete day and night (on call) or after working one of a series of night shifts.

Sleepiness has long been a part of teaching people to become doctors, but now people inside and outside medicine are beginning to worry about the effects that sleepiness may have on patient and trainee safety. Sleepiness may make residents more likely to make medical mistakes.² Sleepiness may also make residents poor drivers when they leave work to go home.³ One study found that sleepy residents were about as sharp in their thinking as people with blood alcohol levels of 0.04–0.05%.⁴

HOW DID THE AUTHORS STUDY SLEEPINESS AND WHAT DID THEY FIND?

In this study, sleepiness was measured in residents after a day and night shift, a night shift, or a day shift using a test that looked at the size of residents' pupils. The study found that those residents who worked overnight (either an all day and night shift or a night shift only) were sleepier than those who had worked only during the day. This was not a surprise. How well residents were able to think after each of these work shifts was measured using a repeated math test (called paced auditory serial addition). A little surprisingly, the authors found that all groups did just about the same on this thinking test, whether they were sleepy or not (see table).

WHAT DO THE FINDINGS MEAN FOR PATIENTS AND TRAINEES?

This study is an important first step in looking at the effect of lack of sleep on neurologists in training. The findings confirm that long and overnight work schedules make neurology residents feel and act sleepy. The study did not show that sleepy residents think more slowly. This is different from other studies of sleepy residents.⁴ Why is this? The authors

Table Thinking test results from Reimann et al.⁴

Work type	Tests of sleepiness		
	Feel sleepy?	Show sleepy pupils?	Score normal on math test?
All day and night	Yes	Yes	Yes
Night shift only	Yes	Yes	Yes
Day shift	No	No	Yes

wonder whether their thinking test was too short to show the effects of being tired or whether residents tried extra hard to do well on this test despite being tired. Either of these may be true. It may also be that the test they chose does not get at a more important question: Do sleepy residents make poor *medical* decisions?

WHAT MORE DO WE NEED TO KNOW?

Few doubt that long hours and overnight shifts cause sleepiness or slow thinking. But does sleepiness lead to poor medical decisions? Some people think that residents can train themselves to think clearly despite feeling sleepy when important medical decisions need to be made. When an important decision comes up, residents will be able to shake off sleepiness and make a good choice, such as how to treat someone who comes to the hospital with a stroke or a rapidly progressing paralysis. The study by Reimann and colleagues does not help answer whether residents are able to do this. A study that looks at whether neurology residents make poor *neurology* decisions when they are sleepy is a necessary next step.

Patients put their lives into the hands of sleepy neurology residents every day. More needs to be known about how long hours or overnight work affects the ability of residents to think clearly and make good decisions. This information needs to be balanced with the risk of errors that result from the many “hand-offs” of patient care that occur when long shifts are broken into shorter segments shared by several residents. The training hours of neurology and other residents are already restricted and carefully monitored. The training of neurology residents might need to be changed further to reduce sleepiness or to minimize its effects. More good studies that focus on medical decision-making could help guide these policies. The goal should be to make medical training safer for patients and for trainees.

About sleepiness and medical training

WHEN DID THIS ISSUE FIRST RECEIVE ATTENTION? Sleepiness in medical trainees has become an important issue. In 1984, a young woman named Libby Zion died in a New York teaching hospital after being given a wrong medication.⁵ The error was blamed, at least in part, on the lack of sleep of the doctor-in-training who gave her the medication. Since this time, doctors-in-training, called residents, are no longer allowed to work more than 30 hours in a row or 80 hours in a week. Within these work hour limits, however, residents are still expected to work long hours, often overnight. As a result, many residents take care of patients and make important medical decisions on very little sleep.

WHY DO RESIDENTS WORK SUCH LONG HOURS? There is a tradition in medicine of residents working long hours. The term “residency” arose because trainees worked so many hours that it made more sense to live (or “reside”) at the place they worked than to live somewhere else. There are many reasons why residents continue to work the number and kind of hours that they do:

1. Working these hours is difficult and has been a kind of rite of passage, like medical boot camp, for generations of doctors.
2. The cost of paying others to work the long and unpopular hours that residents currently work probably would be very large.
3. Long hours give residents the chance to gain experience in treating patients that might not be possible otherwise or might happen only by making training programs longer.
4. Residents who work long hours get to know their patients better. This limits the chance of mistakes that comes from passing on a patient’s care to someone else.

ARE LONG RESIDENT HOURS A PROBLEM? There are a number of concerns about the amount and quality of sleep that residents get. Some of these concerns are about resident well-being and safety. Residents who do not get enough sleep have increased stress and depression.⁶ Most residents drive home after working long hours or overnight shifts. Sleepy residents may make bad drivers and endanger themselves and others on the road.⁷ Though these concerns are important, medical error and patient safety have been responsible for much

of the recent interest in sleepy residents. Do sleepy residents think poorly and do they make poor medical decisions?

The first of these questions—do sleepy residents think poorly—has been easier to answer. Sleepy residents do worse on tests of memory, paying attention, doing math, and reacting to changes in their environment. But tests are not what people are really interested in. People want an answer to the second question—do sleepy residents make bad medical decisions? This has been more difficult to answer. Residents make many kinds of decisions, from what questions to ask of a patient, to which body part to examine, to which area of an x-ray to focus on, to what value to calculate, to where to make an incision. Studies show that sleepy residents do poorly on some but not all of these tasks. It is still unclear whether a resident who makes a particular poor choice does so because of sleepiness or because of some other reason.

The effect of sleepiness on neurology residents has not been carefully studied. Sleepy neurology residents make important decisions about patient care. Most of these decisions are supervised, but errors are not always caught. It is not known if the kinds of decisions that neurology residents make are more or less prone to the effects of sleepiness. Patients and residents will both benefit from research that tries to answer this question.

REFERENCES

1. Reimann M, Manz R, Prieur S, Reichmann H, Ziemssen T. Cognitive performance is preserved in sleep-deprived neurology residents. *Neurology* 2009;73:e99–e103.
2. Barger LK, Ayas NT, Cade BE, et al. Impact of extended-duration shifts on medical errors, adverse events, and attentional failures. *PLoS Med* 2006;3:e487.
3. Barger LK, Cade BE, Ayas NT, et al. Extended work shifts and the risk of motor vehicle crashes among interns. *N Engl J Med* 2005;352:125–134.
4. Arnedt JT, Owens J, Crouch M, Stahl J, Carskadon MA. Neurobehavioral performance of residents after heavy night call vs after alcohol ingestion. *JAMA* 2005;294:1025–1033.
5. Asch DA, Parker RM. The Libby Zion case: one step forward or two steps backward? *N Engl J Med* 1988;318:771–775.
6. Rosen IM, Gimotty PA, Shea JA, Bellini LM. Evolution of sleep quantity, sleep deprivation, mood disturbances, empathy, and burnout among interns. *Acad Med* 2006;81:82–85.
7. Barger LK, Cade BE, Ayas NT, et al. Extended work shifts and the risk of motor vehicle crashes among interns. *N Engl J Med* 2005;352:125–134.

Neurology[®]

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Neurology 2009;73:e104-e105

DOI 10.1212/WNL.0b013e3181c79062

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