

There is Nothing Relaxing About *Medicine!*

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You meet up with a colleague from your hospital at a doctors' conference. With tears in her eyes, she tells you that she just finished working in Emergency last night and it has not gone well. She failed to detect an aortic aneurysm, and then had a run-in with a nurse, which is not like her at all. You noticed that she has appeared more tired and irritable this past little while. However, after just over 20 years, she says she still loves her work in Emergency, except she's finding it harder and harder to handle the irregular hours. Should she think about changing careers?

FOR MOST DOCTORS, fatigue is an all-too-familiar reality. We work long hours, evenings, weekends, even nights. These demands limit our time with our loved ones and hobbies, as well as cut into our valuable rest time.

Fatigue from sleep deprivation is formally recognized in the nuclear power and aeronautics industries, as well as in all transportation-related sectors. It has been a factor in the catastrophes at Bhopal, Three Mile Island and Chernobyl^{1,2}. According to the National Highway Traffic Safety Administration, falling asleep at the wheel leads to 100,000 car accidents every year, and causes more deaths than drunk driving¹.

In the field of healthcare, this subject first came to attention in the mid-eighties in the United States after the publicized death of a young woman, Libby Zion, shortly after she was admitted to a reputable university hospital^{1,3,5}. An inquiry was conducted, revealing that fatigue linked with overwork and sleep deprivation of on-call residents that night may have led to medical error, which resulted in this fatality. This sad turn of events sparked the reassessment of schedules imposed on interns, and, nearly 20 years later, finally led to the framework that currently regulates work and on-call hours for residents everywhere in the United States. Here in Quebec, a similar system exists, but, as throughout North America, its application still meets with resistance in certain areas.

Furthermore, no measures apply to doctors once they are practicing medicine. With work weeks of 50 to 60 hours, not including time on call, the problem remains unresolved, especially in these times of scarce resources. Although the industry recognizes the problem of fatigue, this reality seems all too often to be ignored by doctors. Could we be physiologically different from other workers?

Are We Getting Enough Sleep?

The Physiology of Sleep

Sleep is an active biological process that is required by the body to carry out a number of essential restorative functions. Normal sleep involves four to six cycles of 90 to 120 minutes, subdivided into the four stages of non-rapid-eye-movement (NREM) sleep, followed by a period of rapid-eye-movement (REM) sleep. During stages 1 and 2, sleep is lighter, and we can still easily be woken up. Stages 3 and 4 involve slow or deep sleep waves, during which brain activity slows down and the body physically recovers. During REM sleep, muscle tone is almost fully absent, whereas cortical activity is highly active. This is when most dreams occur. This stage is associated with the restoration of our cognitive processes. There is more NREM sleep at the beginning of the night and more REM sleep early in the morning.

As shown in the *figure*, we can see that when sleep is shortened or fragmented by the pager, telephone, a baby crying, etc., we do not experience optimal recovery of our physical and cognitive processes⁶.

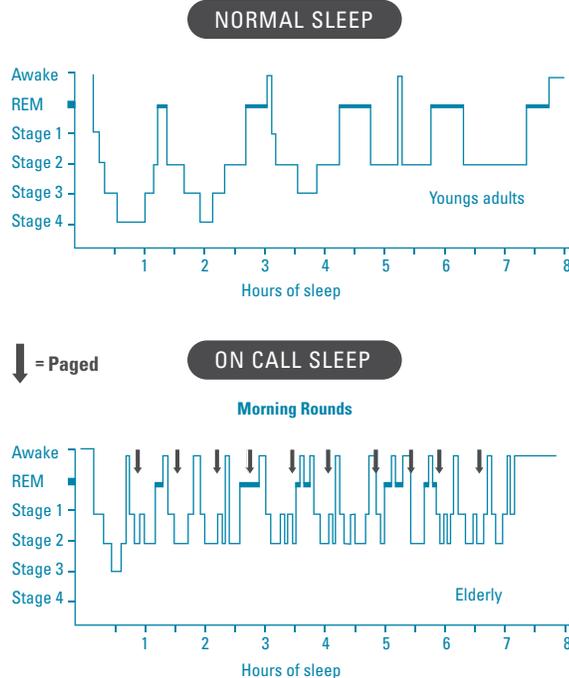
Sleep medical specialists claim that adults need six to ten hours of sleep every 24 hours, so just slightly more than eight hours on average^{6,8}. They all agree that, despite individual differences, sleeping less than five hours is not enough. Unlike what we often believe, sleep requirements are genetic, and training, habit or motivation cannot change any of that.

What is more, sleep requirements do not decrease with age. Instead, the amount and type of sleep changes considerably. Starting from the age of 45 or 50, stage 3 and 4 sleep becomes shorter, and sleep becomes less continuous. This phenomenon explains why, over time, it is more difficult to catch up on sleep from being on call or to be able to tolerate night work.

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Sleep Fragmentation Affects Sleep Quality



Sleep Alertness and Fatigue Education in Residency © 2006 American Academy of Sleep Medicine

Circadian Rhythms

In addition to lack of or poor quality of sleep, disruptions in the circadian rhythm from irregular schedules can also cause fatigue. Humans have an internal clock, located in the hypothalamus, which regulates several physiological functions, such as basal temperature, hormone secretion and sleep-wake cycles.

Over a 24-hour period, just like with body temperature, cognitive performance also fluctuates. We are most alert between 9:00 a.m. and 1:00 p.m., whereas between 3:00 a.m. and 7:00 a.m., when circadian rhythm is at its lowest point, we are programmed to sleep. During this period, we are not as alert and become more likely to making mistakes. Moreover, studies have indicated more technical accidents, accidental prickings, and errors in administering medication occur at night. Another drop in performance, although not as great, happens at the end of the afternoon, which explains the sudden feeling of fatigue that we sometimes experience at that time.

Circadian rhythms are synchronized by our environment and are highly resistant to change, which is why night shifts often feel more demanding. Experts estimate that even people who regularly work nights never completely adjust. Daytime sleeping is generally shorter and involves less NREM sleep in stages 3 and 4, and REM sleep¹⁰.

What Are the Effects of Not Getting Enough Sleep?

Sleep deprivation gradually affects mood, which often comes out as irritability, a lack of initiative and lowered motivation. It may become more difficult to control one's emotions, which can result in mood swings, or conflicts with loved ones, colleagues or even patients.

Cognitively, we first see an increased number of errors of omission, memory lapses, overlooking things, errors in transcription and other mistakes from not paying attention, which we can generally and fortunately catch.

However, the more tired we become, the more our reason and judgement could be affected. We also know that sleep deprivation produces fluctuations in our cognitive abilities. According to David Dinges, a researcher on sleep and chronobiology, a person suffering from sleep deprivation will start off well in a task, but will see his performance decline when the pace is stepped up. His thought processes become more rigid and he stubbornly persists in using ineffective strategies instead of considering other solutions. Stress can temporarily mask these effects. For example, a doctor may respond very well to an emergency, but then forget to write crucial information in the patient's file^{11,12}!

TABLE

Ten Signs of Fatigue to Look out for⁶

- Irritability
- Less empathy
- Sleepiness at the end of the afternoon
- Drowsiness as soon as your head touches the pillow*
- Sleepiness during meetings, at the movies, etc.
- Memory lapses, errors due to inattention
- The need to check one's work
- Problems concentrating, cognitive slowness
- Distracted at the wheel
- Poor coordination, increased accidents

* It generally takes 10 to 20 minutes to fall asleep. If it takes less than five minutes, it may be due to a type of sleep disorder or to sleep deprivation!

A study even showed that the decreased psychomotor performance after a 24-hour period without any sleep is comparable to that found in people with a blood alcohol level of 0.1%!^{6,13} We should point out that cognitive abilities are just as affected in cases of chronic insomnia. In a study focused on measuring the repercussions of chronic insomnia, researchers found that sleeping only six hours a night for 14 consecutive nights produces a similar effect on certain cognitive functions as losing a full night's sleep¹⁴! The same study,

like others, also showed a progressive dissociation between the subjective evaluation of deficits and actual performance. In other words, the more we are deprived of sleep, the more we overestimate our actual abilities¹²! The table lists the ten signs of fatigue to look out for.

There is no magic bullet to cure fatigue in doctors. The best remedy for not getting enough sleep is "to sleep"!

What Can We Do About It?

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Things to Do

- Adopt good sleeping habits. Go to bed, and wake up always at the same time if possible. Having a pre-sleep routine and a comfortable environment are also simple ways of promoting better sleep.
- Avoid losing sleep. Ideally, you should try to respect your own sleep requirements and take advantage of days off to recover, either by taking naps or by sleeping longer during these times.
- Sleep a bit longer when you know you are about to begin a period where you might not get enough sleep.
- Plan time to recover after being on call. Ask your loved ones to respect this valuable recovery time. According to experts, two or three nights of extra sleep will make up for one sleepless night.
- Exercise regularly. In addition to the well-known benefits, physical activities improve the quality of sleep.
- Take naps. Naps are the simplest, most effective way of preventing or making up for sleep deprivation (Text box 1).
- Use caffeine strategically. As the most commonly used stimulant in the world, caffeine may indeed temporarily improve alertness as long as it is taken strategically, especially during more vulnerable periods, such as the circadian dip (between 1:00 p.m. and 4:00 p.m., and especially between 3:00 a.m. and 7:00 a.m. if you are working the night shift).

The effects of caffeine will be felt after 15 to 30 minutes, and can last up to three to four hours. A cup containing 100 mg to 200 mg of caffeine is enough (approximately 7 ounces of filtered coffee). Important: Overconsumption of caffeine may entail adverse effects, such as trembling, palpitations, anxiety and problems sleeping at a given point.

TEXT BOX 1

Some Advice for Naps^{2,6,8}

When should you nap?

- Before a period during which you know you will be getting less sleep, **before being on call nights**, for example, in order to increase alertness and performance. You can take a nap around 3 p.m. when your circadian cycle dips in the afternoon⁸.
- **After an extended period of work**, to make up for sleep deprivation.

For how long?

- **A short nap:** If you know you could suddenly be awakened to respond to an emergency, the nap should not be longer than 30 to 40 minutes to avoid having sleep inertia (temporary cognitive deficit when you're woken up from a deep sleep).
- **A long nap:** A two-hour nap allows you to benefit from a complete sleep cycle.

Avoid the Following

- Vigorous exercise, heavy meals and coffee should be avoided two to three hours before bedtime.
- As well, answering e-mail or any other intellectual and stimulating activity should be avoided right before bed.
- Be careful with alcohol. Often wrongly used as a sedative, alcohol may make it easier to fall asleep, but disturbs sleep quality by waking you up frequently.

Although some studies have shown that melatonin can help travelers adapt quicker to the time difference; other studies have shown that it does not improve the quality of sleep of medical personnel or help them adjust to working nights^{7,15} (Text box 2).

CNS stimulants, such as amphetamines used to increase alertness and performance, are to be avoided. They can easily lead to overmedication and high dependency. They also are not meant to treat fatigue due to sleep deprivation.

TEXT BOX 2

About Working Nights^{10,13}

- Working late evenings or nights will always be a challenge in medicine. However, you can optimize the situation by applying better strategies based on the physiology of sleep.
 - **The best sequence:** Day → Evening → Night. This best reflects our circadian rhythm, which naturally tends to increase an hour every day.
 - **The worst sequence:** Day → Night → Evening. This sequence goes largely against our physiology. What is the ideal number of consecutive nights? One, or two at the very most, and then at least one day off to recover.
- Drink coffee only during the first half of the night to prevent insomnia once you are off call. Plan to take a short nap before driving.
- Upon returning home after a night shift, wear sunglasses to avoid exposure to daylight.
- To make it easier to sleep during the day, make sure the room is dark, use ear plugs if necessary, turn off your cell phone and pager.

You had suggested some reading material to your colleague. You meet up with her a few weeks later. She seems rested and tells you that she is doing much better.

She reorganized her schedule in Emergency in order to better recover from being on call evenings and nights, and now takes naps before working nights. She is no longer using the day after being on call to run around for appointments and errands, but to rest instead. She also started exercising again, improving her quality of sleep, which had been light over the past few years. You tell yourself that you should be doing the same!

EVEN IF SCIENTIFIC EVIDENCE clearly shows the effects of sleep deprivation, we rarely discuss it in terms of the medical field. Even though the industry has long had strict standards in place regarding schedules and rest periods, the medical world seems to often deny the problems, and even perpetuate certain myths fostering overwork to the detriment of basic physiological needs!

However, we must recognize the importance of sleep. We cannot completely eliminate fatigue from medical practice, but we can certainly manage it better.⁹

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Roman S, Cummings S. La médecine, c'est pas reposant ! *Le Médecin du Québec* 2009 ; 44 (9) : 31-35. © FMOQ. Translated and reproduced with permission.