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JAMA study: Long hours equal to alcohol in impairing young doctors

PROVIDENCE, R.I. -- Fatigued medical residents' performance on attention tests and on a driving simulator is comparable – or worse – than their performance after drinking three to four cocktails, according to research from Brown Medical School and University of Michigan.

The negative effects of fatigue on doctors-in-training are well documented and increasingly a matter of concern. In July 2003, the Accreditation Council for Graduate Medical Education instituted a landmark 80-hour-per-week limit on the nation's roughly 98,000 residents.

But the latest study, published in the current issue of JAMA, is the first to compare residents' sleep deprivation with alcohol ingestion – a standard of impairment long studied by researchers and easily recognized by the public.

"The take-home message here is that the repercussions of fatigue on residents are considerable," said Judith Owens, director of the Pediatric Sleep Disorders Clinic at Hasbro Children's Hospital and associate professor of pediatrics at Brown Medical School. "This is a national problem, and we shouldn't consider it solved by an 80-hour cap on hours."

Owens, a pediatrician who was involved in a serious car accident after an overnight shift as a resident, helped create the Sleep, Alertness, and Fatigue Education in Residency (SAFER) Program used in residency programs across the nation. She said regulators, hospitals and medical schools must keep pushing to protect residents – and the public – from work-related fatigue.

"We have to continue to educate doctors-in-training," Owens said, "and we should help them develop sleep risk-management strategies. This is particularly important since our study shows that many sleep-starved residents don't recognize that they're impaired."

Mary A. Carskadon, director of the Bradley Hospital Sleep and Chronobiology Research Lab and professor of psychiatry and human behavior at Brown Medical School, said further reducing residents' hours need not be the only solution to the problem.

"We could improve on-call sleeping quarters, provide rides to and from work, reinforce the importance of catching up on sleep after heavy call," Carskadon said. "Because there is a risk to residents and to other drivers – and that risk needs to be managed."

Led by former Brown Medical School researcher J. Todd Arnedt, now at the University of Michigan Health System, the team compared the post-call performance of 34 medical residents to examine the effects of extended work hours.

Each resident was tested under four conditions – light call, light call with alcohol, heavy call and heavy call with placebo.

Light call was defined as one month of daytime clinic rotations with little or no overnight duty, during which residents averaged 44 hours of work per week. Residents averaged six hours and 37 minutes of sleep the night before the tests.

Heavy call was defined as overnight duty every fourth or fifth night, during which residents worked an average of 90 hours per week (80 hours per week after July 1, 2003). Those residents had, on average, three hours and 26 minutes of sleep before the testing sessions.

Residents were tested a total of four times, twice each during two separate sessions conducted at the end of light and heavy call months. Before one of the test sessions, residents were given an amount of vodka found in three to four standard cocktails to achieve a 0.05 blood alcohol concentration – an amount just below the legal driving limit.

Each group performed computer tests to gauge their attention and judgment. They also spent 30 minutes on a driving simulator.

The results: Heavy call and light call with alcohol testing showed similar numbers of attention lapses and slowed reaction times on computerized tests. On the driving simulator, both groups also showed the same level of impairment in their ability to maintain lane position and avoid going off on the road. After heavy call, residents were actually 30 percent more likely to fail to maintain a steady speed on the simulator.

Owens said these results not only have safety implications for medical residents, but other workers who regularly pull down long shifts or go without sleep for extended periods, such as nurses, truck drivers, and police officers.

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Former Rhode Island Hospital research assistants Megan Crouch and Jessica Stahl contributed to the work. The American Academy of Sleep Medicine funded the study.

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Long residency hours linked with impaired performance similar to effects of drinking alcohol

During heavy call rotation and long hours, effects on residents' neurobehavioral performance are comparable to the impairment associated with a 0.04 to 0.05 grams percent blood alcohol concentration, according to an article in the September 7 issue of *JAMA*, a theme issue on medical education.

"Work-related sleep loss and fatigue in medical training has become a source of increasing concern," according to background information in the article. One study found that interns got 5.8 hours less sleep, had 50 percent more attentional mistakes, and made 22 percent more serious errors on critical care units while working a traditional schedule compared with a schedule with less hours. Also, self-reported lifetime rates of motor vehicle crashes and near-miss crashes among residents are 3 and 2.5 times those of nonresident drivers, respectively.

J. Todd Arnedt, Ph.D., from the University of Michigan, Ann Arbor, and colleagues compared post-call neurobehavioral performance of 34 medical residents (18 women, 16 men) after their rotations to examine the effect of extended work hours. The residents were tested after light call rotation (four-week rotations averaging 44 hours per week), light call with alcohol, heavy call (an average of 90 hours per week, every fourth or fifth night, 80 hours after July 2003), and heavy call with placebo. In the light call with alcohol condition, participants' blood alcohol concentrations were raised to 0.05 grams percent. Average age of residents was 28.7 years.

The researchers found that performance impairment during a heavy call rotation was comparable to impairment associated with a .04 to .05 grams percent blood alcohol concentration during a light call rotation. Compared with light call, heavy call reaction times were 7 percent slower and lane variability and speed variability during the simulated driving test were 27 percent and 71 percent greater, respectively. Speed

variability was 29 percent greater in heavy call with placebo than light call with alcohol, and there were similar errors and reaction times.

"These findings have important clinical implications. Residents must be aware of post-call performance impairment and the potential risk to personal and patient safety. There should be sleep loss, fatigue and countermeasure education in residency programs. Because sleepy residents may have limited ability to recognize the degree to which they are impaired, residency programs should consider these risks when designing work schedules and develop risk management strategies for residents, such as considering alternative call schedules or providing post-call napping quarters. Additional studies should examine the impact of these operational and educational interventions on resident driving safety and on patient care and safety," the authors conclude.

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Editorial: Work Hours and Reducing Fatigue-Related Risk - Good Research vs. Good Policy

In an accompanying editorial, Drew Dawson, Ph.D., from the University of South Australia, Adelaide, South Australia, and Phyllis Zee, M.D., Ph.D., from the Feinberg School of Medicine, Northwestern University, Chicago, write, "While there is little doubt that physicians-in-training work long hours and experience chronic sleep restriction over many years, the consequences remain unclear."

"Although the authors [Arnedt et al] acknowledge that these laboratory tests of performance have not been validated against medical tasks, the indirect implication is that residents working 80- to 90-hour weeks are at an equivalent or greater risk compared with an intoxicated physician. This is, without doubt, a notable finding and one that should concern those responsible for patient safety and medical training."

"Despite the appeal of restricting working hours, it is important to consider potential negative ramifications," the editorialists write. "In some scenarios, limiting working hours may increase risk to patients and physicians. For example, restricted working hours may lead to restricted access to health care practitioners through a reduction in the labor supply, insufficient clinical preparation for the 'real world,' increased sleep restriction in senior physicians, or increases in error rates due to work intensification."

They conclude by saying, "Failure to consider the broader issue carries the considerable hazard that well-intentioned policies to reduce fatigue-related risk may not lead to overall improvements in patient safety." (JAMA. 2005; 294: 1104‐1106. Available pre-embargo to media at www.jamamedia.org.)