

# Longer shifts do not create chronic sleep loss in first-year doctors or reduce safety for patients

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When medical residents were permitted to work shifts longer than 16 hours, patient mortality was not affected and the doctors themselves did

not experience chronic sleep loss, according to a pair of papers published today in the *New England Journal of Medicine* by a team of researchers from the Perelman School of Medicine at the University of Pennsylvania, Children's Hospital of Philadelphia, Johns Hopkins University, and Brigham and Women's Hospital in Massachusetts. The study that resulted in the papers follows a 2011 change imposed by the Accreditation Council for Graduate Medical Education (ACGME) to limit the amount of hours first-year residents could work in a single shift—a cap of 16 hours per day and 80 hours per week—which came in response to concerns about the potential for mistakes to be made by young doctors working long shifts. The results from these studies suggest that those well-intentioned policies were not necessary to protect patients.

The work is part of an ongoing research effort—the individualized comparative effectiveness of models optimizing patient safety and resident education (iCOMPARE) study—funded by the National Institutes of Health (NIH) and ACGME. Both papers add to research published in the *New England Journal of Medicine* by the same team last year, which showed the shift restrictions had little effect on how the residents spent their time or scored on tests of medical knowledge.

"A lesson here is that although there was a lot of concern about shift limits, they really don't seem to have an effect on any important domains, such as patient safety, when applied in the current context," said David Asch, MD, MBA, a professor of medicine at Penn, and principal investigator for iCOMPARE. "Through iCOMPARE, we were able to use a single study to examine the impact of resident on-duty hours on their sleep and alertness, the safety of the patients they cared for, and the education the residents received, all at once. In the past, what research there has been only looked at one of these factors at a time."

Data for iCOMPARE came from observations made of 63 different residency programs across the United States between 2015 and 2016. About half of the programs were assigned to follow the mandated shift limits while the other half did not restrict individual shifts as long as they fell within the 80 overall hours per week. In 2017, after the observations were completed, ACGME relaxed shift limits to permit interns to work for 24-hour shifts, which actually aligned with the study's unrestricted "flex" groups. This provides a rough comparison between the stricter 2011 limits and the more relaxed 2017 guidelines.

"This highlights how well-structured studies can determine barriers to sleep health and if managing sleep can potentially improve performance and outcomes," said James Kiley, Ph.D., director of the Division of Lung Diseases at the National Heart, Lung, and Blood Institute, part of the NIH.

In the part of the study focused on patient safety, patients cared for by residents with less-restricted shift lengths had mortality rates no greater than those cared for by residents facing restricted shift lengths. They had seven-day readmission and complication rates (things like deep vein thrombosis, hip fractures and different kinds of infections) that were also no worse than the other group.

"The iCOMPARE trial had the benefit of a randomized design, the strength of using Medicare claims to study patient mortality so that deaths could be tracked both during patient hospitalization or after discharge from the hospital, the further ability to carefully adjust for individual patient sickness through patient history information, and the ability to account for program differences in quality of care by comparing the outcomes in each program from the previous year to the trial year. All this allowed us to more closely detect safety problems, if they had occurred," said Jeffrey Silber, MD, Ph.D., the lead author of the [patient safety](#) part of the project, and a professor of Pediatrics at

Penn and the director of the Children's Hospital of Philadelphia's Center for Outcomes Research. "The results of the iCOMPARE trial, taken as a whole, provide reassuring evidence that the more [flexible approach](#) to shift length does not pose significant risks to [patients](#), compared to the conventional duty hours approach that was in place at the time."

For the phase of the study examining intern sleep, several hundred interns continuously wore sleep monitors for approximately two weeks and performed daily tests to measure their alertness. Interns averaged around seven hours of sleep a day, and those facing longer shift lengths got no less sleep and did not experience more sleepiness than those with the more restricted shift lengths.

"Interns in flexible programs were able to compensate for the sleep lost during extended overnight shifts by using strategic sleep opportunities before and after shifts and on days off," said Mathias Basner, MD, Ph.D., an associate professor of Sleep and Chronobiology in Psychiatry and the lead author of the sleep-focused study.

Despite similarities in sleep averaged over several days, interns working flexible overnight shifts had the least amount of sleep per 24 hours (they averaged 5.12 hours), as well as lower alertness, and more subjective sleepiness. Basner believes that these symptoms of acute sleep loss related to night work must be mitigated.

"Some people may be surprised by these results because they think 'Of course shorter shifts must be better'," Asch says. "But those ideas are at least partly offset by other considerations, including the risks from transferring patient care across shifts, and biological imperatives that help us prevent chronic sleep loss."

Asch also said it can be misleading to examine any one issue in isolation, adding, "studies like iCOMPARE provide the scientific evidence to help

us balance these considerations in real world settings."

**More information:** *New England Journal of Medicine* (2019). [DOI: 10.1056/NEJMoa1810641](https://doi.org/10.1056/NEJMoa1810641)

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