

Increased caseloads may explain why reducing resident physicians' work hours doesn't always improve patient safety

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In 2013, researchers at Boston Children's Hospital and Brigham and Women's Hospital launched a multi-center study comparing a work schedule that included traditional, extended work shifts for resident

physicians (24 hours or more) with a schedule that eliminated extended shifts and cycled resident physicians through day and night shifts (maximum, 16 hours). They expected the new schedule with shorter shifts would reduce serious medical errors by allowing residents to get more sleep. But as they report today in *The New England Journal of Medicine*, they found something different: patient safety worsened at some of the sites. On further analysis, a key factor that appeared to drive medical errors was how many patients each resident cared for.

"Our first finding was that the new scheduling didn't work—it actually appeared to make outcomes worse overall," says Christopher Landrigan, MD, MPH, chief of General Pediatrics at Boston Children's Hospital and the study's first author. "When we tried to understand why, it became clear that [workload](#) was a major component of medical errors. We didn't set out to look at workload, so this was an unexpected finding."

Comparing work schedules

The randomized study, called ROSTERS, was conducted in six pediatric intensive care units in different parts of the U.S. In a "crossover" design, the hospitals followed each work schedule for eight months, in random order. Total work hours for the traditional schedule and the new schedule were the same. The researchers collected data on adverse events, work rosters, work hours, sleep hours, residents' reports of sleepiness, and residents' performance on vigilance tasks.

To the researchers' surprise, serious medical errors increased by about 50 percent overall when ICUs followed the new schedule. But there were differences among the hospitals: One logged many fewer serious medical errors, three reported more errors, and two saw no change.

"The Data Safety Monitoring Board charged us with investigating why one center had a 75 percent reduction in serious errors, while another

had a tripled [error](#) rate," says senior author Charles Czeisler, MD, Ph.D., Chief of the Division of Sleep and Circadian Disorders at Brigham and Women's Hospital. "We spent a year going through the data trying to understand what was happening. We thought there was a problem with the intervention."

The additional analyses showed that residents got more sleep with the new schedule, and did better on performance tests, as expected. Though the number of patient "handoffs" between shifts increased by about 25 percent, this was consistent across sites, and didn't appear to account for why some sites did better and others did worse. So the team began looking at workload.

Variable workloads

Looking at staffing ratios, they found that resident physicians' workload increased by about 25 percent across the six sites when the new schedule was implemented—from an average of 6.7 to 8.8 ICU patients per resident. ICUs with the highest resident workloads before the study fared worst with the new schedule, the investigators found.

"There was remarkable variability between the sites in the baseline number of ICU patients each resident cared for every day," says Czeisler. "At one site, there were four to five ICU patients per resident physician; at another, there were 10 ICU patients per resident even before the intervention. If you increase that by 25 percent, it suddenly it gets to a breaking point, and you see a lot of medical errors."

The results contrast with a study Czeisler and Landrigan conducted more than a decade ago, which found that residents made 36 percent fewer medical errors when following a new schedule that eliminated 24-hour shifts. However, that study held resident workload constant and involved just one center, Brigham and Women's Hospital.

The new study spanned a broad range of children's hospitals with varying resources and unit organizational structures, and each [hospital](#) was allowed to develop its own staffing plan to accommodate the new [schedule](#).

"Once we adjusted for workload, the intervention was associated with a 50 percent reduction in medical errors," says Czeisler. "That tells us we need good standards as to what staffing is safe. Moreover, we recently found that work hour limits are better for physician safety and health."

A call for more attention to resident staffing

The study is one of the first to document a connection between resident physician caseloads and medical errors. More attention has been focused on nursing; for example, Massachusetts passed a law requiring a 1:1 or 1:2 nurse to patient ratio in the ICU.

In the U.S., as many as 250,000 patients per year die as a result of [medical errors](#), many of which occur in settings where [resident](#) physicians care for them.

"There is a lot of literature on nursing workload and patient safety, but the literature is surprisingly sparse when it comes to physicians' workloads," says Landrigan. "Future research should directly address this issue. Our findings suggest that we need to fundamentally redesign our care systems to ensure [patient safety](#) and invest funds and personnel to keep workload from rising. The status quo just isn't working."

Provided by Children's Hospital Boston

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