

## Clinical Outcomes of Limiting Resident Physician Shifts

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### Question

Does a sixteen-hour limit on the duration of resident physician shifts improve clinical outcomes?

### Evidence-Based Answer

Decreasing resident shifts from >24 hours to ≤16 hours resulted in 36% fewer serious medical errors in an intensive care unit training setting (SOR: B, randomized controlled trial). When resident shifts were shortened from 30 to 13 hours in a pediatric training program, patient length of stay was reduced by 18% and total hospitalization cost was reduced by 10% (SOR: B, retrospective cohort study).

### Summary of Data

In 2004 Boston researchers performed a prospective RCT to assess whether decreasing resident work hours affected serious medical errors in the ICU<sup>1</sup>. The control group worked the traditional schedule of 77-81 hours per week (which included shifts >24 hours) and the intervention group worked no more than 60-63 hours per week with ≤16 hour shifts. The total number of interns was not included in the paper but three interns at a time were on the traditional schedule while four interns at a time were on the intervention schedule. This was a crossover study where the two groups later switched to the opposite schedule. The study included 634 admissions and 2,203 patient-days.

### Summary Continued

Interns were continuously monitored by six physician observers and two nurse chart reviewers who were not blinded to interns' groupings. Any suspected medical error was then independently rated by two physicians blinded to the interns' group. A serious medical error was defined as "a medical error that causes harm or has substantial potential to cause harm". The primary outcome was that in the traditional schedule, interns made 36% more serious medical errors (136 vs 100 per 1000 patient-days,  $p < 0.001$ ) than interns on the intervention schedule. Interns made significantly more diagnostic and medication errors with the traditional schedule (19 vs 3.3 per 1000 patient-days,  $P < 0.001$  and 100 vs 83 per 1000 patient-days,  $P = 0.03$ ). Study limitations include: that only a single hospital was utilized, observers were not blinded, and study size was limited.

A 2013 cohort-study examined whether shortening resident shifts affected patient length of stay and hospitalization cost<sup>2</sup>. A total of 280 non-intensive care unit (ICU) inpatients aged newborn to 18 y were evaluated preintervention and 274 post-intervention. The control group consisted of 152 non-ICU pediatric surgery service patients preintervention and 120 postintervention. The intervention consisted of medical residents' call shifts being shortened from 30 to 13 hours. Surgical residents in the control group did not have changes to their shifts. To ensure that patient factors (severity of illness, age, diagnosis, time in ICU) did not affect outcomes, statistical models were employed.

### Summary Continued

There was no significant difference between the groups in regards to age, race/ethnicity, sex, primary language, insurance, admit source or whether they received ICU care. Data was gathered from electronic medical records as well as billing and administrative databases. Post-intervention, the length of stay for non-ICU medical service patients was reduced by 18% (4 to 3.5 days, 95% CI 0.73, 0.93) and total hospitalization cost was reduced by 10% (\$9,915 to 9,337, 95% CI 0.81, 0.99). The control group with no reduced physician shifts showed no difference in length of stay (5.4 to 5.3 days, 95% CI 0.95, 1.29) and total hospitalization cost increased (\$13,467 to 15,876, 95% CI 1.02, 1.37). Study limitations include: unmeasured changes to the hospital units involved may have partially accounted for the results, the effect of the new system on patient safety was not evaluated, it was an observational study showing associations only, and it was a single-site study and results may not be applicable to other settings.

### References

1. Landrigan CP, Rothschild JM, Cronin JW, et al. Effect of reducing interns' work hours on serious medical errors in intensive care units. *The New England Journal of Medicine*. 2004;351:1838-1848. [Step2]
2. Rosenbluth G, Fiore DM, Maselli JH, et al. Association between adaptations to ACGME duty hour requirements, length of stay, and costs. *Sleep*. 2013;36(2):245-248. [Step2]