

## Weekend versus Weekday Hospital Admission: Is There a Difference in Mortality?

Cram P, Hillis SL, Barnett M, Rosenthal GE. Effects of weekend admission and hospital teaching status on in-hospital mortality. *Am J Med* 2004;117:151-7.

### Study Overview

**Objective.** To compare mortality rates of patients admitted to hospitals on weekends with patients admitted on weekdays and to determine if differences in mortality (if any) varied between teaching versus nonteaching hospitals.

**Design.** Retrospective analysis of administrative data of patients discharged from California hospitals.

**Settings and participants.** 641,860 patients who were admitted from the emergency department for any of 50 common conditions were eligible for analysis.

**Main outcome measure.** In-hospital death.

**Main results.** The mean age of patients was 67 years and just over 50% of the study population were women. While 72% of patients were admitted on weekdays, 28% were admitted on the weekend. Mortality rate of patients admitted on weekdays was 6.4%, and the mortality rate of those admitted on weekends was 6.7% (odds ratio, 1.03 [95% confidence interval, 1.01-1.06];  $P = 0.005$ ). However, increased mortality rates among weekend admissions were only present for 3 of the 50 conditions studied. In contrast, the weekend admissions mortality rate was lower for 15 clinical conditions. Major teaching hospitals had a larger gap in mortality between weekend and weekday admissions as compared with minor teaching hospitals or nonteaching hospitals.

**Conclusion.** Being admitted to the hospital on a weekend was associated with slightly higher mortality risk than being admitted to the hospital on a weekday. This gap seemed to be more pronounced in academic hospitals. Decreased staffing during weekends may be a factor to explain these gaps.

### Commentary

Clinicians know that when patients are admitted to the hospital on weekends, they often receive fewer tests and therapeutic procedures in the early part of their admission. While

many clinicians believe that the reduced availability of services leads to worse outcomes, there are few data to confirm or refute this hypothesis. Two previous studies suggest that patients admitted on weekends seem to have worse outcomes [1,2], but the studies were limited in scope or took place outside of the United States.

Cram and colleagues found only minor differences in mortality between patients admitted on weekdays and weekends, but even small differences in mortality, if real, can have important public health implications. Therefore, understanding whether this small difference is valid and whether increasing staffing on weekends can reduce mortality is critical. However, several major limitations of this study affect the interpretation of the findings.

First, patients who are admitted to the hospital on weekends are likely sicker than patients admitted on weekdays. The threshold for going to the clinic or the hospital is typically higher on weekends, because there are fewer providers and longer wait times. Therefore, one would expect that patients admitted on weekends would have higher mortality based on their severity alone. The authors tried to address this limitation by adjusting for severity of illness. However, due to the limitations of administrative data, the authors were limited in their ability to do so. Inability to adequately address differences in severity could easily explain the difference in mortality found in this study.

Another source of concern in this study is that the "weekend effect" was greater in teaching hospitals. This finding is puzzling and suggests a mechanism for their results other than decreased staffing. While nonteaching hospitals often have large fluctuations in staffing rates, academic hospitals typically have a steadier staffing due to their use of house-staff. Therefore, a bigger effect in teaching hospitals, where patients are typically sicker, suggests that the findings are more likely due to inadequate risk adjustment.

### Applications for Clinical Practice

While Cram and colleagues appear to have found a "weekend effect" in mortality in California hospitals, the effect is small and likely represents inadequate risk adjustment. New

studies, especially those that address the weekend effect in academic hospitals, are urgently needed.

—Review by Ashish K. Jha, MD

### References

1. Bell CM, Redelmeier DA. Mortality among patients admitted to hospitals on weekends as compared with weekdays [published erratum in N Engl J Med 2001;345:1580]. N Engl J Med 2001;345:663–8.
2. Barnett MJ, Kaboli PJ, Sirio CA, Rosenthal GE. Day of the week of intensive care admission and patient outcomes: a multisite regional evaluation. Med Care 2002;40:530–9.

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