

It's not you, it's me: time to narrow the gap in weekend care

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Numerous studies^{1–6} have now described the 'weekend effect' and its negative impact on timeliness of inpatient care and mortality. Patients presenting with numerous medical and surgical problems experience better outcomes if they happen to arrive in hospital on a workday versus a weekend day. Researchers have highlighted the problem as reflecting reduced staffing and decreased access to specialised services at the weekend. Remarkably, the weekend effect was recently found to extend even to elective admissions and surgeries, raising major questions about resource planning around elective care that occurs near the end of the week.^{7 8}

Perez Concha *et al*⁹ analysed administrative data from Australian hospitals between 2000 and 2007. They compared 7-day mortality after hospital admission in patients admitted during the weekend versus a weekday, stratifying their analysis by diagnostic group. They defined the weekend as occurring between midnight on Friday and midnight on Sunday. Their analysis included ORs for death after weekend versus weekday admission, as well as survival curves and HRs.

In all, 16 of 430 diagnostic groups showed evidence of a weekend effect for 7-day patient mortality. No conditions demonstrated an 'inverse weekend effect', or decreased mortality over the weekend relative to the work week. In addition to risk ratios, the authors present the absolute number of excess deaths for each condition. All together, these conditions account for 21 excess deaths per 1000 patient admissions. Adjustment for differences in case mix between weekend and weekday groups surprisingly increased the magnitude of the observed weekend effect. This finding suggests that patients admitted at the weekend had a lower baseline risk than those admitted during the rest of the week, a result that at first seems counterintuitive.

So why would this study report that weekend patients were in fact at lower risk? The authors note that patients admitted at the weekend were younger and had fewer comorbidities. At first blush, this would suggest that weekend patients are inherently at lower risk, and that any excess mortality must result from deficiencies in care. There is, however, another possible explanation. Younger, healthier patients could be more acutely ill. Younger patients with fewer comorbid conditions are more likely to be employed. Employed patients might delay seeking medical care during the work week only to present at the weekend in worse condition.

Severity of presenting illness is a major determinant of prognosis, yet it does not factor into risk adjustment based on administrative data. As in most other studies of the weekend effect, risk adjustment is limited to readily available information such as age and comorbidities. These adjustments account for neither severity of disease nor patient functional status. Weekend patients, while appearing to be at lower risk, may in fact be sicker in ways not captured using administrative data. Adjusting for comorbidities and age will only make this group's outcomes appear worse relative to their older, more chronically ill weekday counterparts.

If baseline risk adjustment is limited, teasing out whether care or characteristics are driving excess risk is challenging. Fortunately, the authors found an alternative way to distinguish patient and care effects. The main contribution of the study by Perez Concha *et al*⁹ is the novel use of excess risk over time curves to identify which conditions exhibit time trends most suggestive of a weekend effect. These were generated by subtracting the medical condition-specific mortality risk curves for weekday patients from those generated for weekend patients. For each admitting diagnosis, these



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profiles display the incremental risk incurred over time by patients admitted over the weekend.

The excess mortality risk curves generated for each condition afford a better understanding of where in time the excess risk lies and what may be driving it. Major arrhythmia, pulmonary embolism and pulmonary oedema showed an excess mortality risk that was front-loaded over the first few days of admission, normalising when the work week resumed. The authors postulate that such an acute risk pattern is consistent with a weekend care effect, with risk normalisation once the patient is re-exposed to weekday care. There are a few clinically plausible reasons for a weekend effect in these diagnostic groups. All three conditions can involve substantial acute risk of death (eg, haemodynamic instability at the time of presentation) and often require urgent testing and intervention. At the weekend, decreased staffing can reduce access to specialised services, medical imaging and urgent procedures.⁶ These 'high stakes' medical conditions thus carry a risk of increased mortality without timely care.

In contrast, three malignancy categories (connective tissue malignancy, lymphoma and leukaemia) showed a steadily increased risk profile, suggesting that their higher mortality was fixed from the time of admission onwards. Such a pattern would be expected if mortality was attributable to higher-risk patient characteristics rather than to quality of care. For patients with advanced cancer, or other palliative chronic conditions, the weekend (or just beforehand) may be a period of reduced access to home care or hospice services. Such patients are at an inherently higher risk of death, whether they are in or out of hospital; the fact that they become admitted may incidentally lead to an observed 'weekend effect'. In contrast, patients with lung, hepatobiliary, pancreatic and breast cancer exhibited a 'mixed' pattern of increased risk, characterised by an early peak of excess mortality followed by a slow decline upon re-exposure to weekday care. This pattern of risk may suggest an interaction between a high-risk patient profile and a high-risk environment. Thus, in higher-risk patients, sorting out whether care or characteristics are to blame may not be so straightforward.

Despite two decades' worth of papers on the topic, the weekend effect continues to be observed. Certain conditions seem more vulnerable than others to the effects of weekend care; urgent medical conditions such as pulmonary embolism, stroke and acute kidney injury have shown an increased mortality if the patient is admitted over the weekend.^{1 10 11} In contrast, several studies of weekend care in acute upper gastrointestinal bleed have shown differences in time to procedure, but failed to show a mortality effect.^{5 12 13} Prolonged waiting times are further evidence of decreased work capacity at the weekend and direct effects on patient care.^{6 14} A delay in an urgent procedure is a sentinel event. Like other near-misses, a

proportion of these may lead to an adverse outcome. Studies showing effects on time to procedure only may have been underpowered to detect small differences in downstream mortality.

Weekends hold a special status in our medical culture and in society as a whole. Whether reduced weekend capacity is the result of cost-saving strategies or hospital staffing preference, it is clearly problematic. Unfortunately, evidence of harm in an existing model is often the only way to force a culture change. At this point, the evidence seems sufficient to justify a change in how we deliver care at weekends. Economics provide a further argument to narrow the gap between weekend and weekday service levels. Patients waiting for procedures and tests at the weekend have a longer length of stay, and interventions aimed at improving weekend access have succeeded in reducing it.^{6 15-17} Length of stay is both a patient-important outcome and a cost driver that can be addressed by enhancing service levels at the weekend. The time is right to restructure the hospital work week, to both maximise efficiency and improve patient outcomes.

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REFERENCES

- 1 Bell CM, Redelmeier DA. Mortality among patients admitted to hospitals on weekends as compared with weekdays. *N Engl J Med* 2001;345:663-8.
- 2 Kostis WJ, Demissie K, Marcella SW, *et al.* Weekend versus weekday admission and mortality from myocardial infarction. *N Engl J Med* 2007;356:1099-109.
- 3 Magid DJ, Wang Y, Herrin J, *et al.* Relationship between time of day, day of week, timeliness of reperfusion, and in-hospital mortality for patients with acute ST-segment elevation myocardial infarction. *JAMA* 2005;294:803-12.
- 4 Nanchal R, Kumar G, Taneja A, *et al.* Pulmonary embolism: the weekend effect. *Chest* 2012;142:690-6.
- 5 Helgeson J, Stromdahl M, Kalaitzakis E. Is there a weekend effect on outcomes in patients with acute upper gastrointestinal bleeding? *Gastroenterology* 2013;144:S196-7.
- 6 Bell CM, Redelmeier DA. Waiting for urgent procedures on the weekend among emergently hospitalized patients. *Am J Med* 2004;117:175-81.
- 7 Mohammed MA, Sidhu KS, Rudge G, *et al.* Weekend admission to hospital has a higher risk of death in the elective setting than in the emergency setting: a retrospective database study of National Health Service hospitals in England. *BMC Health Serv Res* 2012;12:87.
- 8 Aylin P, Alexandrescu R, Jen MH, *et al.* Day of week of procedure and 30 day mortality for elective surgery: retrospective analysis of hospital episode statistics. *Bmj* 2013;346:f2424.
- 9 Perez Concha O, Gallego B, Hillman K, *et al.* Do variations in hospital mortality patterns after weekend admission reflect reduced quality of care or different patient cohorts? A population-based study. *BMJ Qual Saf* 2014;23:215-22.

- 10 Saposnik G, Baibergenova A, Bayer N, *et al.* Weekends: a dangerous time for having a stroke? *Stroke* 2007;38:1211–15.
- 11 James MT, Wald R, Bell CM, *et al.* Weekend hospital admission, acute kidney injury, and mortality. *J Am Soc Nephrol* 2010;21:845–51.
- 12 Jairath V, Kahan BC, Logan RFA, *et al.* Mortality from acute upper gastrointestinal bleeding in the United Kingdom: Does it display a weekend effect. *Am J Gastroenterol* 2011;106:1621–8.
- 13 Myers RP, Kaplan GG, Shaheen AM. The effect of weekend versus weekday admission on outcomes of esophageal variceal hemorrhage. *Can J Gastroenterol* 2009;23:495–501.
- 14 Bell CM, Redelmeier DA. Enhanced weekend service: an affordable means to increased hospital procedure volume. *CMAJ* 2005;172:503–4.
- 15 Krasuski RA, Hartley LH, Lee TH, *et al.* Weekend and holiday exercise testing in patients with chest pain. *J Gen Intern Med* 1999;14:10–14.
- 16 Issaka RB, Parikh ND, Komanduri S, *et al.* Performing a weekend ercp is associated with a reduction in hospital charges and length of stay. *Gastrointest Endosc* 2013;77:AB293–4.
- 17 Wei F, Mark D, Hartz A, *et al.* Are PRO discharge screens associated with postdischarge adverse outcomes? *Health Serv Res* 1995;30:489–506.