

Patient Safety Tip of the Week

July 25, 2017

Can We Influence the “Weekend Effect”?

In our many columns on the “weekend effect” or the “after hours effect” we have stressed that there is probably a combination of patient-related and system-related factors contributing (see, for example, our What's New in the Patient Safety World columns for November 2013 “[The Weekend Effect: Not One Simple Answer](#)” and June 2016 “[Weekend Effect Challenged](#)”). It’s a complex interaction and it’s difficult to determine the relative contribution of each of those two factors.

A new study adds an interesting twist to that complex interaction: the method of patient arrival may play a role! Most previous studies on the weekend effect have used administrative data to perform risk adjustments and estimate patient severity of illness. These may not adequately measure severity of illness. Now, Anselmi and colleagues ([Anselmi 2017](#)) used arrival at the emergency department by ambulance as a proxy for greater severity of illness to analyze mortality and its variation by day and time of the week.

In their analysis, when using conventional risk-adjustment methods, there appeared to be a higher risk of mortality following emergency admission to hospital at nights and on weekends. However, after accounting for mode of arrival at hospital, this pattern changed substantially, with no increased risk of mortality following admission at night or for any period of the weekend apart from Sunday daytime.

The authors conclude that risk-adjustment based on inpatient administrative data probably does not adequately account for illness severity and that the elevated mortality at weekends and at night probably reflects a higher proportion of more severely ill patients arriving by ambulance at these times.

Another recent study ([Walker 2017](#)) used laboratory data to improve risk adjustment and severity of illness. After adjusting for multiple confounders including demographics, comorbidities, and admission characteristics, incorporating non-linearity and interactions, they then considered the effect of adjusting for 15 common hematology and biochemistry test results or proxies for hospital workload. Adjustment for test results explained 33% of the excess mortality associated with emergency admission on Saturdays compared with Wednesdays, 52% on Sundays, and 87% on public holidays after adjustment for standard patient characteristics. Excess mortality was predominantly restricted to admissions between 1100 h and 1500 h on weekend days. They also found that no hospital workload

measure was independently associated with mortality. But the latter measures (total admissions, total net hospital occupancy [admissions minus discharges], and percentage of bed occupancy based on inpatient duration) did not include actual staffing information. Those authors concluded that the weekend effect arises from patient-level differences at admission rather than reduced hospital staffing or services.

That said, we probably cannot do much about the patient-related factors contributing to the “weekend effect” or “after hours effect”. But we can certainly do more to mitigate some of the system-related factors contributing to them.

In our February 23, 2016 Patient Safety Tip of the Week “[Weekend Effect Solutions?](#)” we cited a study which suggested that specific hospital resources might be used to overcome the “weekend effect” seen in urgent general surgical procedures ([Kothari 2015](#)). Researchers identified emergent/urgent surgeries (appendectomies, cholecystectomies, and hernia repairs) in the HCUP database for Florida from 2007 to 2011 and used as a surrogate for the weekend effect an extended median length of stay on the weekend compared to weekdays. They identified 17 out of 166 hospitals that did not exhibit the “weekend effect” and looked to see how these hospitals differed from the others. Patient level factors like socioeconomic status did affect the occurrence of the weekend effect but hospital characteristics had more important associations with the weekend effect. They found that **hospitals not having the weekend effect were more likely to have higher nurse-to-patient ratios, full adoption of electronic medical records, home health programs, pain management programs, and inpatient physical rehabilitation**. The authors hypothesize that the improvement in the weekend effect at some hospitals is a result of “the ability of the identified components of perioperative infrastructure to assist patients with increased discharge needs, improve transitional care, and ensure care continuity from the week to the weekend”.

The study, of course, was limited by its use of administrative data and use of a proxy for the weekend effect. Also, the nurse staffing ratios were averages and did not specify whether such differed on weekends. Also questioned is why 3 procedures that typically have very low mortalities were chosen. Also, these are associations and may not play a causal role. But are they plausible contributory factors? They certainly could be. Previous work shows that the weekend effect is complex and involves both patient-related factors and quality of care factors (see our November 2013 What's New in the Patient Safety World column “[The Weekend Effect: Not One Simple Answer](#)”).

In a recent followup study Kothari and colleagues ([Kothari 2017](#)) identified components of electronic health record systems that were associated with less pronounced weekend effect in patients undergoing urgent general surgical procedures. Weekend effect was 33% less likely in those hospitals with electronic operating room scheduling compared with hospitals using paper-based scheduling. In addition, weekend effect was 35% less likely in those hospitals having electronic bed-management systems.

In our many previous columns on the weekend effect or after-hours effect we have pointed out how hospitals differ during these more vulnerable times. Staffing patterns

(both in terms of volume and experience) are the most obvious difference but there are many others as well. Many diagnostic tests are not as readily available during these times. Physician and consultant availability may be different and cross-coverage by physicians who lack detailed knowledge about individual patients is common. You also see more verbal orders, which of course are error-prone, at night and on weekends.

We've often said the use of the simple nurse:patient staffing ratio on weekends may be misleading. That is because there is often a significant difference in nurse workload on weekends. We've described the tremendous increase in nurse responsibilities on weekends due to lack of other staff (no clerical staff, delayed imaging, physicians not on site) that add additional responsibilities to their jobs. Our December 15, 2009 Patient Safety Tip of the Week "[The Weekend Effect](#)" discussed how adding non-clinical administrative tasks to already overburdened nursing staff on weekends may be detrimental to patient care. Just do rounds on one of your med/surg floors or ICU's on a weekend. You'll see nurses answering phones all day long, causing interruptions in some attention-critical nursing activities. Calls from radiology and the lab that might go directly to physicians now often go first to the nurse on the floor, who then has to try to track down the physician. They end up filing lab and radiology reports or faxing medication orders down to pharmacy, activities often done by clerical staff during daytime hours. Even in those facilities that have CPOE, nurses off-hours often end up entering those orders into the computer because the physicians are off-site and are phoning in verbal orders. You'll also see nurses giving directions to the increased numbers of visitors typically seen on weekends. They may even end up doing some housekeeping chores and delivering food trays. All of these interruptions and distractions obviously interfere with nurses' ability to attend to their clinically important tasks (see our Patient Safety Tips of the Week for August 25, 2009 "[Interruptions, Distractions, Inattention...Oops!](#)" and May 4, 2010 "[More on the Impact of Interruptions](#)"). We thus think that simply addressing nurse:patient staffing ratios without addressing nurse workload issues may be short-sighted.

It is clear we have not yet achieved the desired state in which our systems of hospital care are equivalent 24 hours a day, 7 days a week. Add to this the increase in acuity or severity for patient requiring weekend or after-hours admission and it is not surprising that we see less desirable outcomes in those situations.

Some of our previous columns on the "weekend effect":

- February 26, 2008 "[Nightmares....The Hospital at Night](#)"
- December 15, 2009 "[The Weekend Effect](#)"
- July 20, 2010 "[More on the Weekend Effect/After-Hours Effect](#)"
- October 2008 "[Hospital at Night Project](#)"
- September 2009 "[After-Hours Surgery – Is There a Downside?](#)"
- December 21, 2010 "[More Bad News About Off-Hours Care](#)"
- June 2011 "[Another Study on Dangers of Weekend Admissions](#)"
- September 2011 "[Add COPD to Perilous Weekends](#)"

- August 2012 “[More on the Weekend Effect](#)”
- June 2013 “[Oh No! Not Fridays Too!](#)”
- November 2013 “[The Weekend Effect: Not One Simple Answer](#)”
- August 2014 “[The Weekend Effect in Pediatric Surgery](#)”
- October 2014 “[What Time of Day Do You Want Your Surgery?](#)”
- December 2014 “[Another Procedure to Avoid Late in the Day or on Weekends](#)”
- January 2015 “[Emergency Surgery Also Very Costly](#)”
- May 2015 “[HAC’s and the Weekend Effect](#)”
- August 2015 “[More Stats on the Weekend Effect](#)”
- September 2015 “[Surgery Previous Night Does Not Impact Attending Surgeon Next Day](#)”
- February 23, 2016 “[Weekend Effect Solutions?](#)”
- June 2016 “[Weekend Effect Challenged](#)”

References:

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<http://qualitysafety.bmj.com/content/26/8/613>

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