

Patient Safety Tip of the Week

October 4, 2016 More on After-Hours Surgery

The “weekend effect” (sometimes also known as the “after hours effect” since many of the same results apply to patients admitted at night as well as on weekends) in which increases in mortality, complications or adverse events are seen for patients admitted on weekends has been demonstrated for a wide range of both surgical and medical conditions. Our numerous columns on the “weekend effect” have stressed that there are likely both patient-related and system-related factors underlying the phenomenon (see, for example, our November 2013 What's New in the Patient Safety World column “[The Weekend Effect: Not One Simple Answer](#)”).

Our June 2016 What's New in the Patient Safety World column “[Weekend Effect Challenged](#)” noted several recent articles have challenged the concept of the “weekend effect” and pointed out deficiencies in case identification methodologies that may give rise to inaccurate conclusions. But a couple new studies demonstrate both a “weekend effect” and an “after hours” effect for surgery, though the weekend effect may have been reduced somewhat in recent years.

A study from the UK showed that the “weekend effect” for emergency general surgery has improved over the past 15 years ([McCallum 2016](#)). The researchers showed that the 30-day mortality rate is indeed higher for patients having surgery on Saturdays and Sundays, compared to weekdays. But there was no difference in 30-day mortality by day of the week admitted. Moreover, for those surgeries done on the weekend the 30-day mortality rates have decreased from 5.4% in 2000-2004 to 2.9% in 2010-2014.

On the other hand, Canadian researchers showed that surgical mortality does vary by time of day ([WFSA 2016](#)). They evaluated all surgical procedures for the past 5 years, including all elective and emergent surgical cases except ophthalmic and local anesthesia cases. After adjustment for age and ASA scores, patients operated at night (11:30 PM-7:29 AM) were **2.17 times more likely to die** within 30 days than those operating on during regular daytime working hours (7:30 AM-3:29 PM). Those operated on in the late day (3:30 PM-11:29 PM) were 1.43 times more likely to die than those operated on during regular daytime working hours.

Of course, it is logical that patients operated on after-hours are likely to be sicker and thus have a higher mortality. The Canadian authors tried to adjust for that using age and ASA scores but those likely are imperfect adjusters. Other potential factors contributing to the higher after-hours mortality as noted by the authors include provider fatigue during anesthesia and surgery, overnight hospital staffing issues, delays in treatment, or the patient being too sick to be postponed prior to treatment.

We've done several prior columns pointing out some of the downsides of after-hours surgery. In our What's New in the Patient Safety World columns for September 2009 "[After-Hours Surgery – Is There a Downside?](#)" and October 2014 "[What Time of Day Do You Want Your Surgery?](#)" we discussed studies that showed for certain types of orthopedic surgery after hours there was an increased need for reoperations for removal of painful fracture hardware ([Ricci 2009](#)) and laparoscopic cholecystectomies done at night compared to daytime were associated with a higher conversion rate to open cholecystectomy (11% vs 6%) ([Wu 2014](#)). We also noted previous studies by Kelz and colleagues that showed increased morbidity in non-emergent surgical cases done "after hours", one in the VA system ([Kelz 2008](#)) and another in a private hospital setting ([Kelz 2009](#)). And our January 2015 What's New in the Patient Safety World column "[Emergency Surgery Also Very Costly](#)" suggested, in addition to the human costs of after-hours surgery there may also be financial costs.

Why should "after hours" surgery be more prone to adverse outcomes than regularly scheduled elective surgery? There are many reasons aside from the fact that patients needing emergency and after hours surgery are generally sicker. For surgery, in particular, the impact of time of day on teamwork is important. You are often operating with a team that is likely different from your daytime team. All members of that team (physicians, nurses, anesthesiologists, techs, etc.) may not have the same level of expertise or experience as your regular daytime team (because many hospitals have "seniority" policies, you may have less experienced personnel on your OR "on-call" teams) and the team dynamics between members is likely to be different. The post-surgery recovery unit is likely to be staffed much differently after-hours as well. The staff may be more likely to be unfamiliar with things like location of equipment. And some of the other hospital support services (eg. radiology, laboratory, sterile processing, etc.) may have lesser staffing after-hours. Just as importantly, many or all of the "on-call" staff that make up the after-hours surgical team have likely worked a full daytime shift that day so fatigue enters as a potential contributory factor. And there are always time pressures after hours as well. In addition, one of the most compelling reasons surgery is done at night rather than deferred to the next morning is the schedule of the surgeon or other physician for that next morning (either in surgery or the cath lab or his/her office). Because the surgeon does not want to disrupt that next day schedule, he/she often prefers to go ahead with the current case at night. Similarly, many hospitals run very tight OR schedules and adding a case from the previous night can disrupt the schedule of many other cases.

We highly recommend hospitals take a hard look at surgical cases done "after hours". You need to look at the morbidity and mortality statistics of such cases. In particular, you need to determine which cases truly needed to be done after hours and, perhaps more importantly, which ones could have and should have been done during "regular hours". If the latter are significant, you need to consider system changes such as reserving some "regular hours" for such cases to be done the following morning. You may have to alter the scheduling of cases for individual surgeons as well. For example, perhaps the surgeon on-call tonight should not have elective cases scheduled tomorrow morning. That way, if a case comes in tonight that should be done tomorrow morning you will have both a

“free” OR room and a “free” surgeon. And you would need to develop a list of criteria to help you triage cases into “regular” or “after-hours” time slots.

Some of our previous columns on the “after-hours” surgery:

- September 2009 “[After-Hours Surgery – Is There a Downside?](#)”
- October 2014 “[What Time of Day Do You Want Your Surgery?](#)”
- January 2015 “[Emergency Surgery Also Very Costly](#)”
- September 2015 “[Surgery Previous Night Does Not Impact Attending Surgeon Next Day](#)”

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](#)”

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