Reviewer's report

Title: Admission to hospital on a weekend has an increased risk of death: a retrospective database study of National Health Service hospitals in England

Version: 1 Date: 5 February 2012

Reviewer: Peter Cram

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GENERAL COMMENTS (DISCRETIONARY REVISIONS)

1. I like this paper. It is well written and fairly easy to understand. My major comment is that this analysis seems to have the same limitation of many prior studies. I would like to see greater thought given to the issues below (in both the Introduction and Discussion Sections). Specifically, weekday admissions to a hospital typically represent a combination of emergency cases and elective cases. Weekend admissions are almost exclusively emergency cases. The simplest way to address this potential source of confounding is to limit the analysis to emergency cases (for both weekends and weekdays); the authors did not do this, but rather chose to adjust for whether a specific admission was an emergency (or not). This may be ok.

The more complex problem is that even when limiting the analysis to emergency cases, there are likely to be significant differences between emergency cases admitted on the weekday and those admitted on the weekend. I will explain. Patients who develop emergencies on the weekday can: a) call their GP (primary care provider); b) go directly to the emergency department. Both “a” and “b” can result in admission (or no admission). Patients who develop emergencies on the weekend do not have option “a.” Moreover, patients who are admitted on a weekend may be patients who had initially become “ill” on a weekday (Thursday or Friday) but delayed visiting the ED until their symptoms worsened, resulting in a weekend admission. In short, there are likely to be important and unmeasured differences in severity (confounding) when comparing patients admitted on weekends and weekdays.

I typically think of the weekend effect actually having two different and important questions: 1) are patients admitted on weekends more likely to die when compared to patients admitted on weekdays; and 2) do patients who are “exposed” to weekend levels of care provided by hospitals more likely to die. These are two fundamentally different questions and have different methodological challenges. “1” fundamentally focuses on patients admitted on weekends and weekdays (this seems to be the focus of the current analysis). “2” could be measured in any patient hospitalized on the weekend or weekday and focuses on the care delivered by a hospital. Thus, “weekend care”- if it were a bad thing because of inadequate staffing or delayed staff response time- could harm any patients irrespective of the day that he or she was admitted. I have yet
to see a paper that attempted to answer “2” and would imagine that this approach would need to treat exposure to “weekend care” as a time-varying co-variate in some sort of time-to-event model.

SPECIFIC COMMENTS (DISCRETIONARY REVISIONS)

2. Introduction: It would be good to make it clear that this analysis focuses on “1” as described above.

3. Methods: The authors should provide more detail on how the variable “emergency admission” is coded and whether this has been validated with chart review. This is an important issue as discussed above.

4. Methods: I remain concerned about unmeasured differences in severity among the weekend and weekday admissions. Let me point out that either the emergency department variable is not coded appropriately or the U.K. or alternatively there are simply fewer emergency admissions on weekends than would be expected. To elaborate, in Table 2 we would expect that 1-7ths of emergency admissions would occur each day meaning 5-7ths would occur on weekdays and 2-7ths on weekends. Instead, per my calculations, only 23% of emergency admissions occurred on weekends while 77% occurred on weekdays. This suggests a problem. Either there are fewer emergencies on weekdays than expected or more emergencies on weekdays than expected; in actuality, my concern is that the excess emergency admissions on weekdays are the result of some elective admissions (on weekdays) being coded as emergency admissions. This hints at the challenge of this type of analysis and the potential for confounding.

5. Methods: I wonder whether some sort of propensity score matching might be useful.

6. Results: I was a bit surprised that the Figures and Tables were mixed in with the Methods and Results section of the manuscript. Typically, most journals request that all Tables and Figures be at the end of the manuscript.

7. Discussion: I would like to see the Discussion section reflect some of the methodological issues I have mentioned earlier in the review.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I have no competing interests.