

Inaccurate coding of patient data may explain 'weekend effect'

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Studies that use UK hospital coding data to examine "weekend effects" for acute conditions, such as stroke, may be undermined by inaccurate coding, suggests research published by *The BMJ* today.

The research, by Dr Linxin Li and Professor Peter Rothwell at Oxford University, was the subject of media reporting last week, before the full findings had been published.

There is conflicting evidence as to whether patients admitted to hospital at weekends are more likely to die than those admitted during the week (the so-called "weekend effect").

The issue became headline news last September when *The BMJ* published a paper by Professor Nick Freemantle and colleagues that identified an increase in deaths among patients admitted at weekends.

Most studies of the weekend effect have used hospital administrative data (diagnostic information extracted from medical records at a later date by non-clinical clerical staff), but the possibility that the accuracy of coding data might differ between weekend and weekday admissions has not previously been assessed.

So Professor Rothwell and colleagues set out to compare the accuracy of coding for all acute stroke admissions on weekdays and weekends from a population of over 90,000 Oxfordshire residents from 2002-2014 and to assess any impact on apparent outcome.

They also assessed patient behaviour and other potential biases that might lead to an apparent weekend effect and reviewed previous studies of weekend effects in stroke.

They found that the accuracy of the administrative data differed substantially between weekend and weekday admissions.

For example, low risk, pre-planned admissions were often miscoded as acute stroke, which carries a much higher risk of death - and so would be wrongly included in analyses of administrative data. These low risk admissions were most likely to occur during the week, resulting in an apparent weekend effect for stroke if based on coding data alone.

In contrast, previous studies of weekend effects in stroke that were limited to patients with actual new strokes found no weekend effect.

"Given the limitations of coding of acute medical admissions, at least in the UK, any conclusion based on administrative data alone should be interpreted with caution," write the authors.

They warn that similar biases are likely to occur in studies of the weekend effect in acute admissions for other conditions for which administrative diagnostic coding is prone to inaccuracy. And they say future studies examining the weekend effect "should ideally be based on prospective studies of clinically confirmed cases or at least include some validation of coding data against a clinical ideal standard."

In a linked editorial, Professor Martin McKee at the London School of Hygiene & Tropical Medicine, says this, and other recent studies, show that at least part of the weekend effect is data artefact (an unintentional pattern in data) and that any remaining association between weekend admission and mortality does not seem to be due to medical staffing.

This new evidence also reinforces concerns about the government's use of evidence, says McKee, and he asks how, in the face of what we now know, can the Department of Health still insist that doctors in training must accept a new contract to address any weekend effect?

Also today, *The BMJ's* research editors explain why the journal recently rejected a paper by Rachel Meacock and colleagues that found patients attending A&E at weekends were no more likely to die than those arriving during the week.

The paper was reviewed by Professor Freemantle and some assumed that it was rejected solely because of his review, which was not the case, say the editors. In fact, he was largely in favour of publication of the paper.

Some also felt that Freemantle's *BMJ* paper on the same topic, which reached a different conclusion, constituted a conflict of interest that should have been reported or disqualified him as a reviewer.

But in a blog, the editors say the decision to reject the paper was made by them and not by the four external peer reviewers - and with permission from the authors and reviewers they have posted their signed comments online.

They acknowledge that Professor Freemantle might have included in his competing interests declaration a statement that he had published a paper on the topic in question that reached a different conclusion, but say "this made no material difference to the review process; indeed, he was selected precisely for this expertise because we seek opinions from people who are active in the relevant field."

The *BMJ's* Editor in Chief, Dr Fiona Godlee, adds: "Any real excess mortality in patients admitted to hospital at weekends is likely to be due to a complex mix of factors. But one thing seems clear from these latest

publications: there is no good evidence of an association between excess deaths and medical staffing. Moves towards more seven day services may still be justified on other grounds but will come at a cost and will need to be properly resourced."

More information: Biases in detection of apparent "weekend effect" on outcome with administrative coding data: population based study of stroke, www.bmj.com/cgi/doi/10.1136/bmj.i2648

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