Reviewer's report

Title: Variations and inter-relationship in outcome from emergency admissions in England. A retrospective analysis of Hospital Episode Statistics from 2005-2010

Version: 3  Date: 11 March 2014

Reviewer: Ian Blunt

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This is an interesting and extensive piece of work, with a generally robust design. While it replicates work done by the CQC and Dr Foster (and possibly others), these organisations do not (to my knowledge) publish their assessments of variations in mortality. The challenge for the authors will be to frame the implications on their results in terms of the potential and mechanisms for quality improvement.

Major Compulsory Revisions

1. The authors need to justify their choice to analyse trusts in quintiles of aggregate mortality rate, instead of reporting on the direct association between aggregate and procedure-specific mortality (possibly censoring for extreme outliers). It would be possible to analyse non-stratified data while retaining quintiles for presentational convenience.

2. Whatever method is used to compare condition-specific to aggregate, the aggregate used in each test should not include the contribution from the procedure being tested (e.g. hernia mortality should be tested against an aggregate of all mortality rates except those from hernia). While I doubt it will make a difference to the results, it is the formally correct way to approach the analysis.

3. The authors should be much more circumspect on reasons for variation, rather than assuming anything not removed by standardisation must be a quality issue. I agree quality of services will have a lot to do with the observed variations, but what other factors might also explain it?

4. It may have been dropped for reasons of length, but I felt that the lack of comment on any association between in-hospital mortality rates and 1 year mortality rates was a major omission. Please try to squeeze something in, even if it is just a sentence.

5. Likewise, it feels important to consider if there is any association between mortality and readmission rates. Other studies have suggested that hospitals with low mortality rates have higher readmissions (as a consequence of keeping the patients alive when they are sicker).

6. Lastly (as mentioned above) the authors should frame the discussion in terms of not just the fact that variation exists, but the potential reasons for the variation and the actions that may be taken to reduce variation (standardised procedures,
monitoring, CQC mortality outliers programme etc).

Minor Essential Revisions
7. You should report the total number of first emergency admissions in HES for the period (ie. the pool from which your 2.5 million were drawn)
8. Please add a little more detail on the method of aggregating mortality rates rather than just a reference.
9. Top of page 10, missing “in” in sentence “also seen surgical procedures”
10. Page 13 “until complete and accurate disease staged data…” – what about the national audits and registries?

Discretionary Revisions
11. I was curious about whether strengthening the standardisation for co-morbidities (based on data available in HES) would reduce the observed variation. The Charlson score is doing an awful lot of work – would more detailed morbidity measures perform better?
12. There are additional factors that might be worth standardising for in your readmission measure. Both distance from home to hospital and a hospital’s underlying admission rate are known to influence the likelihood of readmission.
13. Some of the paragraphs on pages 9 and 10 present numbers from the tables without adding much. It would be useful to add further detail about why you chose to highlight those particular results. What are they telling you? Why are they more interesting than the other results?
14. I was also left wondering the extent to which there might be associations between the mortality rates for pairs of conditions. For example might the conditions treated under cardiology specialties show similar patterns? Alternatively, might it reveal inconsistencies in coding between trusts?

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

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

Declaration of competing interests:
I declare that I have no competing interests