Reviewer’s report

**Title:** The relationship between access to primary care and hospitalisations: Evidence from linked clinic and hospital data for remote Indigenous Australians

**Version:** 1  **Date:** 24 July 2013

**Reviewer:** Renate Zilkens

**Reviewer’s report:**

I find this study to be quite interesting. It describes an analysis of the association between Primary Health Care Services and hospitalisation rates in a large population cohort of indigenous Australian living in 54 remote Northern Territory communities in Australia. I would like to acknowledge that I have no research experience using primary health care data.

I would like to suggest the following Major Compulsory Revisions.

Specific Comments

1) **Background:** It would be helpful if the authors could define what they mean by remote area of NT (bottom paragraph page4). For people not familiar with the NT it might be helpful to put it into context of the entire indigenous population. That is to say, of the 64,000 Indigenous residents living in NT, 51,000 live in these remote areas.

2) **Background:** Could the authors clarify the total number of PHC providers? It is not clear whether the 40 medical practitioners are all qualified physicians (general practitioners) or include nurses and Aboriginal health workers discussed in the following sentence. It would be clearer if the authors stated the overall total of PHCs and then broke down the categories (i.e. Of the X PHCs in remote NT, X% were general practitioners , X% were nurses and X% were Aboriginal health workers).

3) **Method:** Could the authors give some examples of “other types PHC providers” working in remote NT? Are physiotherapists, psychologists, occupational therapists, dietitians working in these remote areas? Could they have examined rate of hospitalisations by type of PHC professional?

4) **Method:** Please clarify if the truncation of “individuals with clinic visits greater than 200 times” is 200 times per year or 200 times in the four year study period. What percentage of patients had more than 200 clinic visits? What type of PHCs were they accessing so frequently? Are they dialysis patients?

5) **Method:** Could the authors please clarify in the methods section what they mean by “Sensitivity analysis was undertaken to test the alternative assumptions”.

6) **Results:** I think table 2 could benefit by having a column percentage of people (rather than just having the frequency counts) and state the total number of
people in the study population.

7) Results: The Figure legends are inconsistent. While the Figure 2 legend states how they were estimated (ie, …using quadratic modelling…) the Figure 1 legend does not.

8) Results: The lines in the figures are difficult to follow. I think if they were in colour it would be much clearer.

9) Results: There were 52,739 patients using hospital services, slightly more than the estimated indigenous population referenced in the background. Would the authors care to comment on the 100+% capture rate? Did they anticipate every indigenous person would have at least one contact with the linked health services used in this study?

10) Results: I do not understand how inspecting Figure 2 panel a can be interpreted as showing me that the proportion of PAH decreased from 59% for those with no PHC visits to 28% when 15 PHC visits were provided. There is no reference to any percentage in Figure 2. Could the authors please clarify how they estimate that 75% of PAHs could be avoided by providing adequate level of PHC? By definition, shouldn’t all PAHs be avoidable?

11) Results: Correction, page 9 . First sentence “ Panel a in Figure 2 also compares the PHC-hospital relations by key demographics and major disease groups” . Please note that the major disease groups are in panel b.

12) Discussion: I think the use of the word vertex in the second sentence of the discussion “ This study demonstrates that people receiving the vertex level of PHC use the lowest amount of hospital care” is not particularly informative. While the term vertex is “sort of” defined in the methods section on page 6, “The spline quadratic model glues two simple quadratic models together through a free knot at the vertex” the meaning of the term will be lost on readers who skipped the statistical methods section. The third sentence again refers to the vertex level of PHC and is not interpreting the data for the reader.

13) Discussion: The authors refer to the Figure 1 and Table 3 in the first paragraph of the discussion and then again later in the discussion. This is quite unorthodox. I think it best that reference to particular figures and table be removed from the discussion.

14) Discussion: The sentence “The U-shaped distribution provides an explanation to why PHC activity is not a consistent linear predictor of hospitalisation” is incorrect. This is a poorly phrased sentence. To my mind the u-shaped distribution provided evidence for an association rather than an explanation for an association.

15) Discussion: Can the authors re-write the sentence “Residents living close to or further away from hospital both had higher hospitalisation rates.” so that it means something.
16) Discussion: The authors have acknowledged that distance from hospitals affect hospitalisation rates yet have not linked this fact to their study. I realise that remote communities are, by definition, far away (> 50kms) from hospital but I believe it would be helpful to give a few details as to how far the remote communities are from the closest hospital. Did the authors examine distance as a confounder? Were some communities 3000kms from hospital and others only 400kms? Did this affect hospitalisation rates? Or rates of PHC use?

17) Discussion: Can the authors please reference the sentence “Absence of PHC leads to increased false negative and delayed diagnoses, acute evacuation and hospitalisation”

18) Discussion: The authors quite correctly point out that “This study is neither longitudinal nor experimental, which limits the extent to which a causal relation can be drawn and generalized” yet the authors appear to infer a causal relationship which is a little strong.

19) Discussion: Perhaps this has already been done, but I would have been interested to see the relationship between type of PHC service provides and hospitalisation rates.

20) Did the authors consider statistical methods to adjust for confounders?

21) The discussion is generally difficult for me to follow and in my opinion requires a bit more work so that it can contribute better to our understanding of this area of health service need

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

Quality of written English: Needs some language corrections before being published

Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.

Declaration of competing interests:

I declare that I have no competing interests