Reviewer’s report

Title: Malaria case-management in the era of artemisinin-based combination therapy across 15 northern states in the Sudan

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Reviewer: Carole Fogg

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General comments
This is a clearly described and detailed piece of work, highlighting some important issues in malaria case management ‘in practice’.

Major compulsory revisions
1. Please provide sample size calculation, or a rationale for the number of facilities surveyed. The data management and analysis section glosses over the power and precision considered to be required for the survey, and what the primary outcome that the survey was based on was, or if the number of facilities were in fact the number you could feasibly visit.

2. You state that ‘there were no significant differences in practices for patients below and above 5 years of age’ (last sentence, Results section of abstract). What is this based on? Although the sample in table 3 for test positive patients is small, there is a trend towards greater use of AS/SP for test positive patients under 5 vs greater use of artemether injection for patients >=5 (the latter is statistically significant). Test negative patients do not show anything, but the difference between the age groups in treatment with NO test is statistically significant both for AS+SP and artemether (watch your spelling...!) injection. I would suggest that you abandon the confidence intervals in this table, and insert a column with simple test of 2 proportions results. Then repeat the process for Table 4 (for which it looks like the pattern is similar, although smaller differences, as you say). Then, suggest you adjust this statement in the abstract, and consider discussing these significant findings in the results/discussion. Similar differences between age groups in terms of prescribing first line/alternative line according to knowledge of parasitological results were found in Ghana (Dodoo et al Mal Journal 2009) (?add as reference?) and this is something which warrants further, perhaps qualitative, research (you could mention this in the conclusions?)

3. I was not over fond of the confidence interval columns in any of the tables, especially in the absence of a sample size calculation – are they necessary?

Minor essential revisions
4. Title: - should reflect the fact that this survey was in public health facilities only. Also, title focuses on case-management, when in fact the focus of the paper is all aspects of adherence to the change in strategy – perhaps you can update this? Suggestion: ‘Adherence to / progress towards implementation of ACT malaria
case-management in public health facilities in northern Sudan: a cluster-sample survey (or audit...or ‘mid-term’ audit...)

5. In table 3 and 4, rather than the ‘Any AM prescribed’ row, for consistency it would be good to have the ‘no treatment’ row (then the reader can add up the numbers rather than having to subtract figures from the denominators). Or perhaps just add in a ‘no treatment’ row above the ‘Any AM’ row.

6. You refer to RDT roll-out in the discussion – can you please specify if the intention is that the health workers rather than lab personnel are intended to use these? Or are the health workers already performing microscopy? For example – you say that ‘only 23.5% of outpatient health workers were trained on RDT use’ – would you expect them all to be trained, or do lab personnel also have a role? Lab personnel were not mentioned in this manuscript, so I was not entirely sure where the diagnostic responsibilities lay.

7. Paragraph 2 of results ‘health facility and health worker readiness etc’ – it is not clear whether expired blisters were found at different facilities to non-expired (i.e. did the units actually have some expired and some non-expired, or were they totally different units?) Are all types of units expected to have all medications? E.g. is a basic health unit expected to have quinine injections, or would you expect these to be mainly at referral units? It is sometimes difficult to ascertain the ‘expected’ denominator for these factors when just % are given.

8. Still on the subject of denominators – another example under ‘Quality of ACT dispensing and counseling’ – you state ‘6.1% were weighed’ – but how many patients would you expect to be weighed? Just the kids? Unlikely to routinely weigh adults at outpatient consultations? If just the kids, for example, you could state ‘x% of children under x years were weighed’, which may represent a more meaningful statistic.

9. Discussion – 2nd paragraph – monotherapy has large been successful phased out – would think the relevant % here is 95% - i.e. you found no CQ in 95% of facilities.

10. Your point about the Hawthorne effect can be expanded a bit – for example the much higher rate of patient microscopy/RDT testing than expected is highly likely to have been a result of this! Did you look in the lab log books to see if this was an unexpected ‘peak’ on the survey day? This could have had a knock-on effect therefore in how the patients actually got treated – you could imagine that on a ‘normal’ day, more patients would have been treated as per your last rows in Tables 3 and 4 (‘treatment when no test done’) – and therefore lower rates of case-management adherence seen – this warrants discussion.

11. Instead of the map, could you put in a flow chart of the decision tree for health workers? i.e. what are the recommendations they are supposed to follow – febrile Y/N, test positive/negative etc with the treatment regiments? (I imagine there is something like this in the health worker guidelines?) You can replace the map with a sentence saying something like the sample of health facilities was evenly spread among the population of north Sudan...
Discretionary revisions

12. Although this work is described as a ‘survey’, it actually appears to be an audit – i.e. you are evaluating the proportions of certain factors/processes which you expect to be in place (e.g. you expect 0% of chloroquine in health facilities according to policy recommendations, but you find 5%). Perhaps you could consider using this terminology at some point in the manuscript.

13. Would like to know whether the policies extend to private facilities, and if so, why they were not included in the survey? If not, would be good to state that this is the reason they were not included.

14. Table 3 Title – perhaps make clear this is a patient denominator, rather than facility.

15. As regards point (2) above, >5’s are known to vomit more – perhaps this could be a reason for utilising injections? Was this symptomatic information collected at baseline?

16. It would be nice to see the point about future qualitative research required in the conclusions. There are several studies now published very similar to this one, but I was left wondering WHY health workers had not attended ACT based case-management training (didn’t know? No access? No funds? Not interested? Etc etc), WHY do health workers not follow the recommendations even when they have the tests/medications etc....these are the questions which need to be answered from this kind of ‘audit’ work, and you could highlight this here. Some qualitative work would be necessary to understand the reasons for the shortfalls / non-compliance with recommendations before large scale implementation of RDTs, for example, particularly the non-adherence to first-line recommendations for positive patients, and the continued treatment of negative patients – why is this happening, and how can it be addressed to avoid potential future waste of resources?

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

Declaration of competing interests:

I declare that I have no competing interests.