PEER REVIEW HISTORY

BMJ Paediatrics Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	Improved oxygen systems in district hospitals in Lao PDR: a prospective field trial of the impact on outcomes for childhood pneumonia and equipment sustainability.
AUTHORS	Gray, Amy; Morpeth, Melinda; Duke, Trevor; Peel, David; Winter, Christian; Satvady, Manivanh; Sisouk, Kongkham; Prasithideth, Bouasengnighnom; Detleuxay, Khamsay

VERSION 1 - REVIEW

REVIEWER	Brown, Nick sdh, UK and aku, Pakistan Competing interests: none
REVIEW RETURNED	03-Jun-2017

GENERAL COMMENTS	You are to be congratulated on undertaking this study which, very appropriately, focuses as much on the pragmatic side of oxygen delivery as on the outcomes I have only a few minor comments on what is a truly excellent manuscript 1. Emphasis Even with the inherent limitations of a non-randomised before and after study, the finding of lower case fatality is very important and this should be the main message. I would suggest presenting the ORs for effect of the concentrators in the before and after intervention eras in both the 'experimental' and control groups. The fact that there was a similar reduction in proportion of unwell children discharged in both groups between eras suggests a Hawthorn effect of study participation. This should be discussed. The fact that, despite this, significantly fewer children died in the post intervention era in the concentrator group, suggests a non-Hawthorn independent effect of oxygen therapy. I would present this as the main finding and the concentrator maintenance issues as the secondary one 2. Do you have any data on readmissions with empyema or other complications ? 3. As a result of the design, there are 4 groups rather than the usual 2 which makes the data harder to present/highlight. One way around this would be to rearrange table 3 so that the intervention group appears in columns 1 and 2 (pre/post) and controls in 3 and 4 (pre and post). The ORs can then be presented more easily I would do the same with tables 4a and 4b so readers can satisfy themselves that there is no temporal bias in admission characteristics. There are quite a number of tables: could 4a ad 4b be combined ? I would move the current table 2 so that it appears after

	4. As above, I would make the main focus of the discussion the reduction in CFR while maintaining the modesty and caution in its interpretation 5. Were there any adverse incidents (for example, fire) as a result of the concentrators ? 6. Finally, a map of the clinic settings geographically would give the background a little more flavour Thanks Nick Brown

REVIEWER	Magnus, Dan Bristol Royal Hospital for Children, UK Competing interests: None
REVIEW RETURNED	02-Jul-2017

GENERAL COMMENTS	Important piece of work. I have not come across a study providing as much of a comprehensive quantitative look at the equipment components in child health outcomes with pneumonia. The authors do address the issue of confounding in their discussion but this was my only real concern about the work, knowing as we do that a range of additional factors which may result in better child health outcomes often accompany the presence of more advanced levels of equipment. But overall a methodologically sound approach I felt and a project with both clinically and epidemiologically important findings.

VERSION 1 – AUTHOR RESPONSE

Please find our response the reviewer's and editors comments below:

1. We are aware of the potential significance of our findings which demonstrate a lower case fatality in the intervention group and believe this is important. As the reviewer suggests we want to be cautious about our interpretation of this finding given the study's limitations and for this reason have tried not to over emphasize them - as this is then often the "take-home" message from a study such as this, rather than acknowledging the engineering burden that accompanies this. For this reason we have laid the scene in both the methods and results sections with engineering component of this study first. We acknowledge there may be a Hawthorn effect in our study but believe the reduction in the proportion discharged unwell is due to a combination of factors including secular improvements in ability afford care, the presence of oximeters which may have provided a more objective reason to avoid discharging a child home, and to a potential Hawthorn effect due to study participation.

In response to the reviewer's comments we have added more specific reference to the Hawthorn effect and further clarification of these issues in paragraph 6 of the discussion.

2. There is no data on readmissions in complications of pneumonia. Hosptials in Lao PDR to not yet have the capacity in their hospital systems to link different presentations under the same patient identity - this would have required . Furthermore most of the study hospitals had no, or limited, radiological facilities to confirm a diagnosis such as empyema. Finally, we suspect our intervention may have not altered this outcome which instead relies on other aspects of case management such as appropriate antibiotic treatment, which we did not seek to alter in the current intervention.

3. We have made the suggested changes in Table 3 with data divided according to control and intervention groups, and then according to the study era to assist readers with evaluating variation across time periods. In doing so we are aware we highlight the difference in the proportion of severe pneumonia cass post-intervention (in both control and intervention groups). We have added description of this to paragraph 1 under Results: Clinical outcomes. In paragraph 6 of our discussion we have commented on its possible contribution to better outcomes in both hospitals (also in response to the reviewer's first point). However, this is does explain the mortality trends seen in intervention hospitals alone. Tables 4a and 4b have been merged into one table (Table 4).

We have elected to retain our original statistical comparison in Table 4 for many of the reasons state above - the study design is complex, it is not simply 2 groups with 2 possible outcomes. Therefore we aim to present the data in a way which avoids over-sinterpretation or analysis. However, for the outcomes of "discharged unwell" and "died" we have instead added a relative risk description in the text in the 3rd and 4th paragraph (respectively) of the results section:clinical outcomes to assist the reader with interpretation of the degree of change observed. We believe a relative risk is more apppropriate than an odds ratio since it is comparing before and after an intervention in the same hospital cohort.

4 Our reponse to this point parallels point 1. We have altered the end of the first paragraph in the discussion section to emphasize the reduction observed in case-fatality rates. However we have kept the structure of the discussion otherwise the same. Our aim is to emphasize the challenges, maintenance and engineering burden which was required to achieve the changes observed in clinical care and outcomes.

5.There were no adverse incidents as a result of concentrators. We have clarified this at the end of paragraph 4 in the results section under "Equipment outcomes".

6. We considered the inclusion of a map but given the amount of data in tables and figures we aimed to present in this paper, we felt we should prioritse these rather than the map, which would provide a geographical reference but not add to the understanding of study outcomes.