Author's response to reviews

Title: A cross-sectional survey of emergency and essential surgical care capacity among hospitals with high trauma burden in a Central African country

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Author's response to reviews: see over
Dear Editorial Team,

On behalf of our research team, I would like to submit our revised manuscript: A cross-sectional survey of emergency and essential surgical care capacity in a Central African country. We appreciate the constructive criticism from reviewers. Below, we have outlined responses and revisions according to reviewers’ comments:

RESPONSES TO REVIEWERS’ COMMENTS

Reviewer 1

1. This looks like the presentation of data from a pilot study. It would be nice for the authors to state this as so or expand the data set to actually cover a more representative part of the country. Unless most of the population lives in the area covered by the selected hospitals. The small sample introduces a selection bias that will require the changing of the title if the manuscript is to be kept in its current format.

   Hospitals were selected at each level of the health system based on perceived high volume of injury and trauma-related cases according to the Ministry of Public Health of Cameroon. These sites were determined to have the greatest need for emergency and essential surgical care capacity. Text has been added to the methods section to indicate this and the title modified. (Line 120)

2. Given the small sample size and the likert scale used on the tool I would consider reporting medians instead of means in the results section. See this article on this and other issues Jamieson S: Likert scales: how to (ab)use them. Medical Education 2004, 38:1212-1218

   Medians are reported for human resources measures in the text (Line 225). The composite scores outlined in the paper for availability of emergency and essential surgical care equipment and supplies for resuscitation are derived from the median scores for each item listed in the WHO Tool by type of facility (Line 152).

3. In table 1 if the hospitals were actually visited why give a range of beds 21-50 or 700-1000? Alternatively were the administrators not sure or a likert scale was used. Given this small sample I recommend giving the actual numbers. These could be obtained since the selected hospitals are said to be within reach.
The WHO Tool uses ranges to indicate number of hospital beds. As a result, these ranges are what was recorded. However, when possible, the actual numbers of hospital beds were reported. The actual values have been reported in Table 1, where those numbers were available at the time of survey implementation.

4. For table 2 see comment number 2 above. I think medians are better as you cannot have a 0.65 of a surgeon? Let's include all the data or delete the comment under table 2.

Median values for human resources are reported in the text (Lines 230, 235). Densities are reported for human resources (Table 2), aligning with WHO reports on human resources for health, such as the World Health Report 2006. Even though the missionary hospital could not be well represented in this table due to scaling, our team still thought it important to report the number of human resources cadres available per million population across the other facilities, which serve considerably greater patient populations.

5. Table 3, I suggest inclusion of the actual numbers is more informative than mean percentage. For example 2/2 is the same as 1000/1000, that is 100%. In terms of surgical performance the hospital that does 1000 operations is definitely busier than the one that does only 2.

The information in Table 3 has been represented to parallel other reports of emergency and essential surgical care capacity assessments in low- and middle-income countries in the interest of relative comparability and conciseness (Iddriss et al, 2011, Penoyar et al., 2012). The categories indicated also represent a group of procedures that are outlined individually in the WHO Tool. Because not all procedures within each group were reported available, reporting percentages allowed us to represent these deficiencies in the table.

6. I would consider changing figure 1 into a table.

We are assuming that you are referring to Figure 2 as Figure 1 is the map of surveyed hospitals in Cameroon. We found Figure 2 a quick way for audiences to grasp the relative unavailability of particular infrastructure in relation to other hospitals by visual means.

7. Please have a look at the reference format at the end.

The last reference format has been revised in accordance with requirements, bolding the document title (Line 491).

Reviewer 2

• Do you cover all hospitals within the regions? Elaborate on the limitations of convenience sampling.

Only the four most populated regions of Cameroon have been surveyed for hospitals with high burden of injury and trauma-related cases as indicated by the Ministry of Public Health of Cameroon. Line 117 has been revised to clarify this point. These limitations are discussed at lines 366-370.

• The authors seem to use mean and median indistinctly between tables and manuscript, please verify, and clarify if using both. Examples given below.

Medians were calculated for human resources and availability of equipment and supplies for resuscitation scores. Using these median scores for availability of equipment and supplies, means of the medians were calculated to result in composite scores across types of facilities, as described in the methods section (Lines 156-162). Revisions have been made to clarify this in the results section as well.
Means were used to represent the proportions of facilities and procedure types available by level of the health system.

- **Figure 2**: Include availability of functioning pulse oximeter, if possible

  *Pulse oximeter is not included as an indicator using the WHO Tool, and thus, is not possible to report given the data obtained.*

- **Table 2**:
  - Did you consider the population served by each hospital in the denominator of your calculation? E.g. Qualified surgeons General Hospital: $11.5/3,000,000 \times 1,000,000 = 3.83$ vs $11.5/6,000,000$ (adding the estimated populations from each hospital) $\times 1,000,000 = 1.92$? Similarly for this particular example could you use the exact estimates instead of >3 mil?

    *Yes, the population served by each hospital was used as the denominator of the calculation using the total number of human resources by type of facility as the numerator, similar to the latter example noted above. This has been updated in line 152. Exact estimates could not be used for those populations at >3 million. As a result, 3 million was used.*

  - Are values median number of providers per 1,000,000 population?

    *Median values are noted in the text. However, Table 2 indicates total human resources by occupational category by type of hospital per million population, paralleling how these numbers are reported in WHO reports, such as the World Health Report 2006.*

  - Total should add up to n=11, if the Missionary hospital is not included.

    *This revision has been made in Table 2.*

- **Line 30**: additional “of” before heads of facilities.

    *This revision has been made, now in line 31.*

- **Line 115**: Which sociodemographic characteristics of the population in this area? Is it representative of Cameroon?

    *While a statistically representative sampling is beyond the scope of this evaluation, hospitals were selected to ensure a range of sociodemographic characteristics in the populations served by these facilities. This was done to guard against undue selection bias for wealthier, urban populations that have greater access to general hospitals that typically have greater resources for emergency and essential surgical care (Line 120).*

- **Line 118**: Why is the unsafe use of motorbikes more prevalent in the West Region? Could you provide a reference? Is this not the case for the rest of the country?

    *Hospitals were selected in regions of Cameroon that are most populous. As a result, it is expected that there is greater use of motorbikes in these areas corresponding to expected greater prevalence of associated injury and trauma. However, due to challenges of conducting research in this setting, this has not been confirmed. The Extreme North Region of Cameroon is designated a high-risk area due to ongoing conflict, and so was excluded from consideration.*
• 126: Did the investigators receive a standardized training? Was the survey tool implemented in English? Was it translated to French? If so, who did the translation and were there mechanisms in place to reach consensus?

Study investigators who implemented the WHO Tool are experienced researchers in public health also involved in study conception and design. Study investigators translated the survey tool into French, often the primary language across Cameroon. Any conflicts were resolved through consensus. Another investigator back translated the tool following data collection to ensure fidelity. Revisions have been made in the text to indicate this procedure (Lines 140-144).

• 126: Were there mechanisms in place to reduce the likelihood of transcription errors?

All interviews were conducted by at least two trained researchers in public health. The majority of data collected was discrete and quantitative in nature, making recording data relatively straightforward. Transcriptions were recorded by one of the researchers, and then reviewed by the second researcher for errors.

• Line 161: Consider reporting the actual number, instead of “most” since there were only three. E.g. “Three district hospitals had 81 to 100 beds and most reported 501 to more than 5000 admissions annually.

This revision has been made in the text, and updated according to actual values (Line 178).

• Line 176-177: Although it is probably true that both General hospitals had between 101 and 200 children (<15 years) requiring surgical procedures, this cannot be inferred from your table 1. Consider including this to the last sentence, which refers particularly to Laquinthinie Hospital, if this is the case.

Line 196 has been revised according to this comment.

• Line 217: You mention a range of paramedics and/or midwives for district hospitals and one for general hospitals, and later report on a single number per million population for each type of Hospital. How was this number obtained?

Actual numbers of human resources by occupational category were obtained from each facility. Thus, the ranges indicate the range of human resources reported by each individual facility by type of facility. Table 2 indicates densities rather than totals to better represent the availability of human resources with regards to population served.

• Line 234: was dilatation and curettage included in the Ob/Gyn category referred the least or Ob/Gyn category as a whole? Please clarify.

Line 256 has been revised to clarify. Obstetrics and gynecology as a category has been removed from the sentence as it was included in error.

• Line 246-248: Is this mean or median score?

This is a mean score by type of facility. Revisions have been made in the text to clarify this (Lines 271, 273).
• Line 248: Consider including a total column to table 4? 1.4 is the mean overall score? If not consider rewording line 246. Mean calculated values based on table 4: District 1.6, Regional 1.4, General 1.6, Missionary 1.9

_A total row has been added to Table 4. This is the mean overall composite score, and scores are as noted in the reviewer’s comment._

• Line 254: Please change regional for Missionary per table 4.

_This revision has been made in the text (Line 277)._ 

• Line 256: shouldn’t this also be Missionary per table 4?

_Line 279 has been reviewed to clarify that this text is applicable only among general hospitals._

• Line 259: s missing in hospitals.

_Line 282 has been revised accordingly._

• Line 380: K (M’K’N) initial missing in conducted and supported data analysis section.

_Line 407 has been revised accordingly._

• Figure 1: Missionary hospital does not show up in the figure.

_Figure 1 has been revised accordingly._

• It would be interesting to include population density map of the region.

_This is a very thoughtful suggestion and we agree that a population density map would be very interesting. We explored various resources, however we have unfortunately not been able to find a recent and reliable density map for Cameroon._

• Figure 2: Please edit label “Available emergency care management.”

_Figure 2 has been expanded and set to the appropriate layout to display the full term, “Available emergency care management guidelines.”

• Table 1: Label General instead of Referral, for consistency in the since it is manuscript and across tables.

_Revision has been made accordingly._

• Please clarify * for Regional Hospitals if the estimated population was not reported.

_Revision has been made to remove * as it was included in error as a remnant of previous drafts._

• Table 3:

• Not clear how you came up with these percentages, could you please clarify. Perhaps consider including the N and % in parenthesis?
Data analysis procedures for Table 3 are described in lines 154-156 of the methods section. The proportion of hospitals reporting availability of individual procedures was determined by type of facility. Procedures were categorized by type of procedure. Mean percentages across procedures by category were tabulated.

Is obstetric fistula repair (Line 225) included in Ob/Gyn procedures**?

Yes, obstetric fistula repair was included in Ob/Gyn procedures. Table 3 has been revised to indicate this.

• Line 164: please clarify what you mean by: the past year, calendar year from August to July or from January up to August? Was this standardized across hospitals? Please clarify in Selection of Hospitals or Survey implementation.

Past year is to mean the past calendar year from survey implementation from August to July. Line 184 has been revised to clarify this point.

• Line 168: there are no other hospitals in the Southwest region? Also, please reference and clarify population, since Table 1 shows not reported.

There are no other regional hospitals in the Southwest region. The population referenced in the text represents the total population of the region, not necessarily the catchment population of each individual regional hospital. This was not reported in data collection.

• Line 210: please consider- “surgery and anesthesia combined at 13.86”

Line 232 has been revised accordingly.

• Line 205-218: human resources paragraph is hard to follow given the data from table 2. Please consider including the data from table (e.g. median of 11.5 [3.8 per million population] qualified surgeons available) to the text and/or vice versa.

Medians are reported in the text. Table 3 is intended to supplement understanding of the current shortage of human resources for emergency and essential surgical care given the considerable population served by these facilities without exhaustive repetition between the table and text.

Please let us know if there are any further revisions necessary. Thank you for your time and consideration of our manuscript submission.

Sincerely,

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