**Reviewer's report**

**Title:** Epidemiology of Ebola virus disease transmission among health care workers in Sierra Leone - May to December 2014: Implications for Disease Prevention and Control in the Health Sector

**Version:** 2  
**Date:** 26 May 2015

**Reviewer:** Dale Fisher

**Reviewer's report:**

This manuscript needs major changes but I would like to accept eventually, given the origins of the work, the importance of the points being made and the difficult circumstances that produced it. The authors have done a lot of work on an important question. To me, this makes it even more important that the deficiencies are addressed. Overall, it is very wordy and needs the abilities of someone skilled grammatically to condense the text and make the points with greater precision. Furthermore, I recommend the authors engage someone skilled in statistical analysis to more accurately state many of the claims currently overstated.

Aside from these general comments, I make specific comments according to the categories of major, minor, and discretionary.

**Major Compulsory Revisions**

1. Consent needs to be addressed a lot more than in the 3 line version currently. Readers need to understand how this was addressed. Were interviewees given an option not to participate? You state 100% compliance, which is a concern. The limitation is important because if people were being forced to participate then (as it is not anonymized) to what degree are they coerced towards the study hypothesis which is (presumably) that ETCs are safe.

Furthermore, what instruction were interviewers given and how were they chosen? How was data collection standardized and audited? Is this the “informant guide” if so please describe what it is, who wrote it and how it was implemented. This important methodological information will define the validity of the findings.

2. Results

It would be best to steer clear of the term attack rate which refers to number infected / number exposed and in a given period of time. You haven't factored in number of exposures, asymptomatic infections or time period. You could simply state that 12% of HCWs in the country became infected during the period of the study, or something, but then the denominator concerns me as many HCWs joined and the quoted denominator I believe would be pre-outbreak. Nonetheless it's a striking number without entering the nuances of epi definitions and its terms like attack rate.

3. Also in the results better analysis is needed. Knowing that 10% of HCWs
perceive they became infected in ETCs is meaningless unless we know what %
of HCWs in this study worked in ETCs. If it is 10% then that means 100% of
those infected in ETCs believe they were infected there. Ideally relative risk for
different settings would be calculated if you knew the number of staff working
there. I am not sure if a statistician is involved with the analysis. On this basis I
don’t think Figure 3 tells us anything in the absence of any denominator.

4. The high level of stigma associated with EVD in the country may have also
discouraged….

Was this part of the study? I think not because this part of the discussion shows
the authors going off scope. The authors should review the objectives and align
their discussion accordingly.

Although our study did not show any association between late presentation of
infected HCWs and outcome of disease

Again; I think the authors are postulating on things like reasons for outcomes
which is outside the scope. The rest of this paragraph is out of scope.

Line 306-11: There are a lot of things we still need to learn but rather than move
to case management, the authors would be advised to stay within scope which is
transmission in healthcare settings. Many atypical PPE activities belong to Ebola
care; covering all skin, taping, tying, spraying people etc I would think these
activities plus the role of the environment are much more pertinent questions for
future work relevant to this paper.

The last para of discussion is very rambly and I think the point can be made in 2
sentences. I don’t think acute on chronic describes it. Its an outbreak in a very
vulnerable setting.

The MRSA analogy is also too random to introduce at this stage. What does loss
mean? Unable to work or died? I am not sure this many died in this time frame.
Also the denominator of number of HCWs is very confused by the temporary
workforce (international and national) and the short time frame of many. You
need to speak more qualitatively and only give rates with major qualification or
ideally not at all.

Limitations

Only 2 limitations are given with an intent to say they were countered. I wouldn’t
confuse recall bias with would be interviewees that had died. The point is that the
information was derived from indirect sources. Survivors that were interviewed
may have biases due to their experiences.

Watch the wording; had died at the time of data collection

I doubt that died at that time!

So the current text can be considerably shortened but there are so many other
limitations including non-anonymity, inability to calculate genuine rates and
relative risks due to moving denominators, various data collectors (?non
standardized) etc
Conclusions
I don’t think the authors have really defined risk, for the reasons stated already.
Sentence one is good and qualitative. Nurses are the most infected but they are
also the greatest in number and have the greatest number of opportunities to
becoming infected so the second sentence is not necessarily true. This para
could be halved in size.
The recommendations do not fit here. I think you could take the points from 1 and
2 and add to the conclusions. The other 3, 4 and 5 are outside the scope of this paper

Minor Compulsory Revisions
1. Abstract: 47.4% is not most
Conclusion is too strong. This study has not shown where the infections occur. It
only demonstrates the perception.
2. Background
The first 3 paragraphs are not relevant specifically and can be reduced to one or
2 sentences.
The 4th para sets the scene best. But I wonder of the origins of this sentence
below. Is there a reference as most outbreaks only last a few months?
In contrast to previous outbreaks, HCW infections have continued into the late
stages of the current outbreak.
In the para starting on line 104 it is important that the capabilities of a
retrospective survey are not overstated. This does not describe or investigate
anything other than perceptions of etc etc. is it reasonable to state a hypothesis
ie HCWs believe that the workplace was safe, if so which workplace? Is it limited
to ETCs?
3. Methods
Para 2 starting on line 118 should be background. It is a system already in place
and is not part of study methodology. It is useful information but is presented in a
disordered way jumping from forms to patients to blood to forms. Please tidy up
grammatically. Would it be possible to describe the efficiency of this system? Eg
%compliance, timeliness etc. that would help the reader understand the
limitations of data flow.
Data collection: I am not sure we need all these subheadings but will leave with
the editors.
4. within results; There are excessive numbers that do not need repeating if in
tables or figures. I think the tables are ok. Figure 1 could be eliminated and
expressed at text.
Figure 2 apparently mirrors the overall outbreak at the time so is not important
unless it brings more information. Would it be possible to describe some clusters
within this figure? The lines around 180 talk about peaks without describing why.
Were there clusters in ETC or non ETC settings? Do the authors have information on infections in holding wards or CCC’s as these are unique to this outbreak and maligned by some.

5. Line 185; Basic IPC training for HCW was intensified in the country starting from September 2014

I am assuming this is background so could be moved there with elaboration on quality, reach and reinforcement of IPC training programmes and compare between settings.

Para starting at line 195: Please define “contact” and ensure it is you as intended through this para.

6. Para starting on line 210: No need to repeat what is table 3, just refer to it.

7. Line 220: did the analysis show demographic indicators of late presentation. Its not about outcomes but infectivity. Did, age, gender or place of work matter? Eg an older male doctor in a clinic versus a young female nurse in an ETC?

8. I received no table 5 but I can imagine what it looks like. once again, do not repeat the table in text. I expect it is better in table format and the relevant para can be more interpretative and refer to it.

9. in the discussion; 'significant stigmatisation of HCWs working in dedicated EVD facilities in Sierra Leone which has resulted in denial of access to services such as rented accommodation'

I find this an odd example. Is this the most common form of stigmatization? Can you reference something on HCW stigma in Sierra Leone?

10. I do not think ref 19 is relevant at all; it’s a different virus, setting and scale. I also disagree that hcw infections were “unabated”. They probably mirrored the total outbreak but if the authors feel the HCW infection rate was disproportionate to the total rate then they have the data to show it.

The para beginning on line 264 could be about 1/3 the size to make the same (important) point
Likewise the next para is lengthy.

Discretionary Revisions

1. Discussion

Could you mention ideally with examples, just to what degree normal health care functioning was interrupted and hypothesise to what degree this was due to a reasonable fear of infection by staff.

Please be careful to make the point that these are perceptions not absolutes.

2. "this should in turn encourage more HCWs to volunteer for work in dedicated EVD isolation units"

Was this a problem? I think not. The problem is the delay in making non ETC HCFs safe. The flow on being the rarely mentioned impact on non EVD morbidity
and mortality.

**Level of interest:** An article of importance in its field

**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