Ebola treatment beds prevented 57,000 Ebola cases and 40,000 deaths in Sierra Leone

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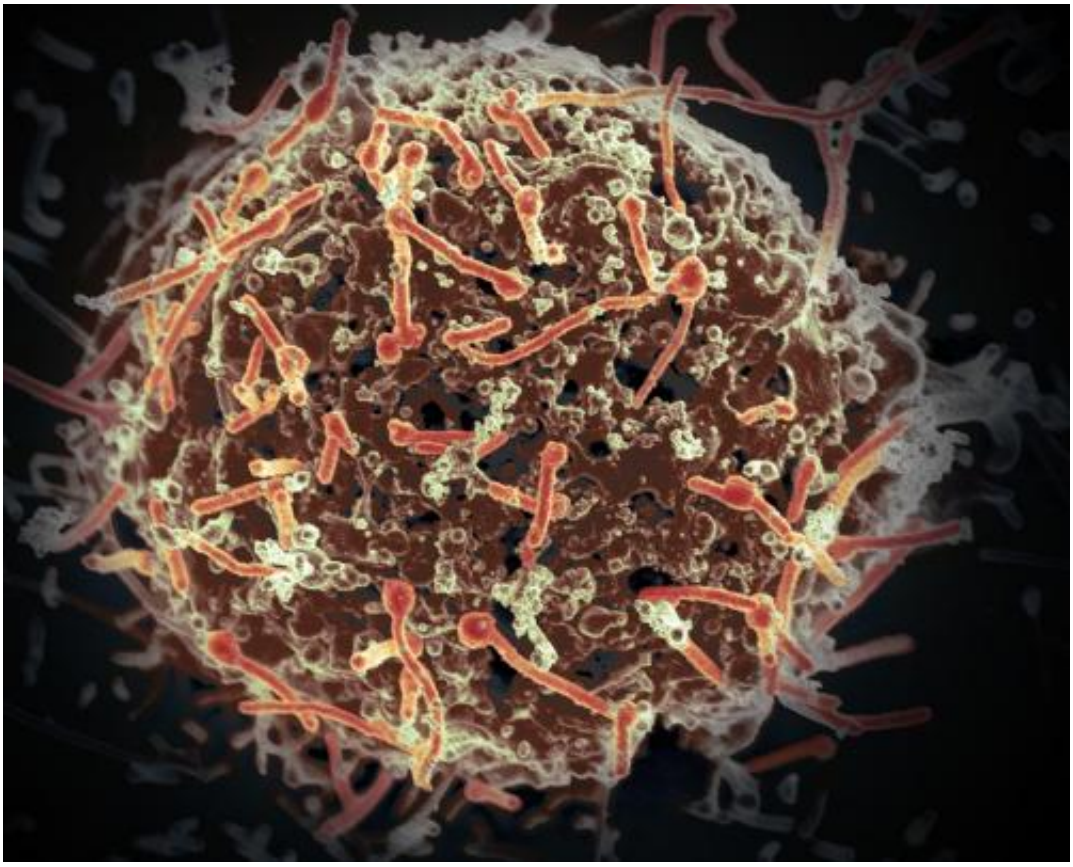

The Ebola virus, isolated in November 2014 from patient blood samples obtained in Mali. The virus was isolated on Vero cells in a BSL-4 suite at Rocky Mountain Laboratories. Credit: NIAID

The introduction of thousands of Ebola treatment beds by the UK and Sierra Leone governments and NGOs prevented an estimated 57,000

Ebola cases and 40,000 deaths in Sierra Leone, according to new research published in the *Proceedings of the National Academy of Sciences*.

The UK played a leading role in the response to the crisis in Sierra Leone. This focused on increasing the number of available treatment beds which isolated the ill to prevent further infections in the community, changing behaviour so people suspected of having Ebola sought treatment early, and making burials safe.

Lead author Dr Adam Kucharski, Lecturer in Infectious Disease Epidemiology at the London School of Hygiene & Tropical Medicine, said: "Our findings show the unprecedented local and international response led to a substantial decline in Ebola transmission. Given the rapid growth of the outbreak in Sierra Leone, if those beds hadn't been in place to isolate the ill and avert further infections, the epidemic could have been much worse."

Figures from the World Health Organization state there have been 13,945 reported cases of Ebola in Sierra Leone to date [1], with an estimated 70% of infections resulting in death during 2014 [2]. With many cases in Sierra Leone potentially going unreported, the real figure is likely to be much higher.

Between September 2014 and February 2015, more than 1,500 treatment beds were introduced in Ebola holding centres and community care centres, and a further 1,200 in Ebola treatment units, to support the overstretched health system in Sierra Leone.

Using mathematical models, researchers estimated the potential impact additional treatment beds had in bringing about the decline of the Ebola outbreak. They separated out the effect of beds from other factors that reduced transmission, such as behaviour change, community

engagement, improved case finding and increase in safe burials.

Taking into account both reported and presumed unreported cases, the researchers say 57,000 Ebola cases were prevented up to February 2015 as a direct result of the introduction of treatment beds. Given that the Ebola case fatality rate in Sierra Leone was near 70%, the researchers estimate this averted 40,000 deaths.

However, they estimate that had the beds been introduced just one month earlier, an additional 12,500 reported and unreported cases could have prevented. If only 60% of Ebola cases were reported (as has been stated in field studies), this figure equates to 7,500 reported cases [3] - more than half of the total number of cases recorded by the World Health Organization.

Study co-author Professor John Edmunds of the London School of Hygiene & Tropical Medicine, said: "There has been much criticism of the international community's slow response to the Ebola outbreak. Our analysis suggests putting treatment beds in place just one month earlier could have further reduced the size of the outbreak and potentially saved thousands of more lives. The way we prepare for, and respond to, future outbreaks of Ebola and other infectious diseases needs to be strengthened."

Beginning in December 2013, the world's largest ever Ebola epidemic primarily affected Liberia, Guinea and Sierra Leone in West Africa. Liberia has recently been declared Ebola free, while Guinea and Sierra Leone have very few cases left.

The study authors have played an active role throughout the Ebola crisis, providing data to assist governments and NGOs in planning their response. The London School of Hygiene & Tropical Medicine is involved in many aspects of the ongoing Ebola response, including

clinical trials of vaccines and convalescent plasma treatment, and work to strengthen global response to infectious disease epidemics.

This new research by Dr Kucharski and colleagues was funded by the Research for Health in Humanitarian Crises (R2HC) Programme, managed by Enhancing Learning and Research for Humanitarian Assistance (ELRHA). The £8 million R2HC programme is funded equally by the Wellcome Trust and DFID.

The researchers chose to focus on the impact of beds due to limited available data on other control measures in some districts of Sierra Leone. They note that with better data on the timing and role of different interventions - both clinical and non-clinical - it would be possible to obtain more accurate estimates about the precise contribution of different factors to the decline of the epidemic.

More information: Adam J. Kucharski, Anton Camacho, Stefan Flasche, Rebecca E. Glover, W. John Edmunds, and Sebastian Funk. Measuring the impact of Ebola control measures in Sierra Leone. *Proceedings of the National Academy of Sciences*. DOI: 10.1073/pnas.1508814112

[1] Figures as of 7 October 2015: apps.who.int/ebola/ebola-situation-reports

[2] West African Ebola Epidemic after One Year—Slowing but Not Yet under Control. *New England Journal of Medicine*. DOI: 10.1056/NEJMc1414992
www.nejm.org/doi/full/10.1056/NEJMc1414992

[3] 7,500 figure calculated separately by researchers and does not appear in *PNAS* paper.

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