

Infectious Disease Outbreaks: The Need For an All-in Approach

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(See the Major Article by Kelly et al on pages 2021–9.)

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As of March 29, 2020, the 2018 to 2020 outbreak of Ebola virus disease (EVD) in the Democratic Republic of Congo (DRC) has led to 3453 cases and 2264 deaths [1]. This outbreak should be remembered for several major successes. First, the PALM trial [2] represents a major milestone as a randomized, controlled, therapeutic trial during an outbreak that compared 4 different therapeutic approaches to optimized standard of care therapy. Second, vaccination as a control measure of viral hemorrhagic fevers began almost immediately after the outbreak was recognized [3]. It is unfortunate that the outbreak will also be remembered for another reason. It is the first EVD outbreak to occur in the midst of active, civil conflict. For the entire duration of the outbreak, both local and international responders have had to contend with the threat of violence, some of which was directed specifically at the EVD response [4]. It is sad that the threat of violence against healthcare workers and Ebola treatment units (ETUs) has been an issue in several different Ebola virus outbreaks [5, 6]. However, the ongoing and pervasive

violence instigated by armed militias and other actors during the current outbreak is unprecedented. Such violence not only threatens the safety of healthcare workers and likely reduces their ability to work effectively in the ETUs, but it also interferes with the work of surveillance teams and may decrease the confidence of the local population in the response.

In their article entitled “Identifying mechanisms of violence that impact Ebola virus disease transmission during the 2018–2019 outbreak in the Democratic Republic of the Congo,” Kelly et al [7] test the hypothesis that violent events directly targeting the Ebola response result in greater transmission than violence that does not directly target the Ebola response. Specifically, they measure the impact of different types of violence on EVD transmission. Data on case counts were obtained through the daily situation reports produced by the DRC Ministry of Health. Violent events were obtained from 2 sources: the Armed Conflict Location & Event Data Project and World Health Organization situation reports. Two thousand seven hundred seventy-four probable and confirmed EVD cases were included, as well as 656 violent events. Sixty-two violent events were Ebola-targeted whereas the remaining 594 were not. Their results indicate that Ebola-targeted violence results in increased transmission to a greater degree than non-Ebola-targeted.

The control of EVD outbreaks requires a multifaceted approach that includes

early detection of suspected cases, isolation of those cases, identification and tracing of contacts, and the prevention of new infections [8, 9]. These goals can only be accomplished through social mobilization and risk communication, highly specialized medical care and infection control practices, support for safe burial practices, and vaccination of those most at risk [10, 11]. Community mistrust of responders as well as social resistance to medical burials, quarantine rules, and the misunderstanding of strongly limited visitation rules at ETUs are also barriers to Ebola virus control efforts [12]. A lack of institutional trust and belief in misinformation have been linked to reduced adherence to EVD preventive measures.

Although it is intuitive that violence, especially Ebola-targeted violence, will impact disease transmission, Kelly et al [7] adequately estimate that degree of impact. However, despite the continuous threat of violence, progress in controlling the outbreak has been made. Multiple international nongovernmental organizations are working hand in hand with each other and with local institutions as never before. Thousands of people have been vaccinated. Randomized, controlled trials comparing 4 different therapeutics have been successfully completed. The standard of care has been raised. How did this happen in the face of violence? Effective social mobilization is based on trusted sources communicating critical risk mitigation strategies [13]. At some point during this

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outbreak, local and international partners gained the support of the local community. In other words, the local community did their part to end the outbreak by supporting responders and heeding to their advice to get tested if symptomatic and to practice social distancing.

Because the 2018–2020 EVD outbreak in DRC appears to be close to an end, the world faces another pandemic. The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus threatens the healthcare systems of developed and developing healthcare systems alike. Today, there are hundreds of thousands of cases of coronavirus 2019 (COVID-19) in many countries. Hospitals in developed nations, including the United Kingdom, Italy, and the United States, are struggling to treat patients in hospitals that are all too frequently filled beyond capacity. Shortages of personal protective equipment are in short supply. In some hospitals, 2 patients must share the same ventilator. Yet the same rules of outbreak control applied in the DRC are being encouraged. Major cities are ordering businesses to close. Millions of people are ordered to stay home. Testing is being ramped up to identify the sick so that they can be isolated and separated from those most at risk. Hospitals are prohibiting people from visiting stricken family members. Highly specialized medical care is being implemented to save as many of those with severe symptoms as possible. We are pleading with the general public to abide by these intrusive rules, which many of us became familiar with during the EVD outbreaks of 2013–2016 and 2018–2020. Unlike EVD, SARS-CoV-2 appears to pose the greatest threat to a small portion of the population. We are asking everyone to make financial, educational, and social sacrifices for those most at risk. Once again, outbreaks begin to wane when communities

listen to trusted voices and commit as one to make these sacrifices. When it comes to outbreaks, we must convince communities to join together, trust our leaders' advice and be all in it together.

Notes

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References

1. World Health Organization. AFRO Dashboard 2020. Available at: <https://who.maps.arcgis.com/apps/opsdashboard/index.html#/e70c3804f6044652bc37c37d8fcef6c>. Accessed 31 March 2020.
2. Mulangu S, Dodd LE, Davey RT Jr, et al.; PALM Writing Group; PALM Consortium Study Team. A randomized, controlled trial of Ebola virus disease therapeutics. *N Engl J Med* **2019**; 381:2293–303.
3. World Health Organization. Ebola Ring Vaccination Results April 12, 2019. Geneva: World Health Organization; **2019**. Available at: <https://www.nature.com/articles/d41586-019-03667-1>. Accessed 31 March 2020.
4. Maxmen A. *Ebola responders killed as violence flares*. *Nature* **2019**.
5. Nossiter A. *Fear of Ebola breeds a terror of physicians*. *New York Times* **2014**. Available at: <https://www.nytimes.com/2014/07/28/world/africa/ebola-epidemic-west-africa-guinea.html>. Accessed 31 March 2020.
6. Callimachi R. *Fear of Ebola drives mob to kill officials in Guinea*. *New*

York Times **2014**. Available at: <https://www.nytimes.com/2014/09/19/world/africa/fear-of-ebola-drives-mob-to-kill-officials-in-guinea.html>. Accessed 31 March 2020.

7. JD Kelly SW, Sinai C, Moe CA, et al. Identifying mechanisms of violence that impact Ebola virus disease transmission during the 2018–2019 outbreak in the Democratic Republic of the Congo. *J Infect Dis* **2020**.
8. Faye O, Boelle PY, Heleze E, et al. Chains of transmission and control of Ebola virus disease in Conakry, Guinea, in 2014: an observational study. *Lancet Infect Dis* **2015**; 15:320–6.
9. Walldorf JA, Cloessner EA, Hyde TB, MacNeil A; CDC Emergency Ebola Vaccine Taskforce. Considerations for use of Ebola vaccine during an emergency response. *Vaccine* **2019**; 37:7190–200.
10. Jiang H, Shi GQ, Tu WX, et al. Rapid assessment of knowledge, attitudes, practices, and risk perception related to the prevention and control of Ebola virus disease in three communities of Sierra Leone. *Infect Dis Poverty* **2016**; 5:53.
11. Iliyasu G, Ogoina D, Otu AA, et al. A multi-site knowledge attitude and practice survey of Ebola virus disease in Nigeria. *PLoS One* **2015**; 10:e0135955.
12. Claude KM, Underschultz J, Hawkes MT. Ebola virus epidemic in war-torn eastern DR Congo. *Lancet* **2018**; 392:1399–401.
13. Vinck P, Pham PN, Bindu KK, Bedford J, Nilles EJ. Institutional trust and misinformation in the response to the 2018–19 Ebola outbreak in North Kivu, DR Congo: a population-based survey. *Lancet Infect Dis* **2019**; 19:529–36.