Commentary

CrossMark

Ebola, global health and the role of technology

Abbreviations: WHO, world health organization; EVD, ebola virus disease; UNICEF, united nations children's fund

Utibe Effiong

Research Scientist, University of Michigan Risk Science Center, USA

Correspondence: Utibe Effiong, Research Scientist, University of Michigan Risk Science Center, Risk Science Center University of Michigan School of Public Health, 1415 Washington, Heights Ann Arbor MI 48108, New York, USA, Tel 7345464407, Email ueffiong@umich.edu

Commentary

In Africa's Meningitis Belt,[1] November to January the beginning of the dry season signals the start of the meningitis epidemic. Many more people will be infected than have been killed during the current Ebola epidemic. Thousands will die. Yet there is little talk or even preparation to mitigate its impact. Seventeen years ago, I survived meningitis during one of the annual epidemics that kills thousands of children and young adults in West Africa every year. In fact, according to UNICEF,[2] as at March 2014, while the 2014 meningitis season was still on, there had been nearly 23,000 cases with about 1,400 deaths. Data[3] from the World Health Organization (WHO) indicates that by June the number of cases had risen beyond 34,000 with nearly 2,500 deaths.

That I survived meningitis under circumstances marked by limited technology and health services is certainly instructive for us today as we battle Ebola. Fortunately the fight against this deadly infection need not be with low level technology. The high level technology we need is available and, hopefully, the people to deploy them are reading this right now. What exactly do we need to do? To be clear, tackling any disease outbreak requires a good understanding of the disease as well as the environmental, cultural and political factors that influence the occurrence, distribution and spread of that disease. And so to beat this Ebola outbreak and to prevent a recurrence of similar outbreaks there is need to tackle the disease along with its determinants. The good news is that there are potential technological solutions for every aspect of this Ebola outbreak.

According to the World Health Organization,[4] Ebola virus disease (EVD) is characterized by sudden onset of fever, fatigue, muscle pain, headache and sore throat. This is followed by vomiting, diarrhea, rash, symptoms of impaired kidney and liver function and in some cases both internal and external bleeding. Ebola spreads through human-to-human transmission via direct contact with body fluids of infected people and with surfaces and materials such as bedding and clothing contaminated with these fluids. Cultural factors, such as burial ceremonies in which mourners have direct contact with the body of the deceased person, play a role in the transmission of Ebola. It can be difficult to differentiate Ebola from other infectious diseases such as malaria, typhoid fever and meningitis. Confirmation that symptoms are caused by Ebola virus infection are made by using serological tests, genomic assays, electron microscopy and virus isolation by cell culture. There is as yet no proven treatment available for Ebola and no licensed vaccines are available yet. However, supportive care such as rehydration with oral or intravenous fluids and treatment of specific symptoms, improves survival as have been seen in the United States.[5]

In talking about specific examples of what technology can do to help the situation, some of these ideas that have been put forward by Epidemiologist Larry Brilliant.[6] Beginning with screening and diagnosis, reliable rapid diagnostic kits could make the job a lot easier. Remember that the symptoms of Ebola are not specific to disease. Therefore we need kits that can quickly detect Ebola and rule out malaria or typhoid fever. This is even more important for airport screening because some travelers may take medications that mask a fever if there is one. If we ever consider screening all travelers out of the hot zone of West Africa, rapid test kits will be essential. It is also essential that this technology, as well as others, be made affordable for mass deployment.

Wearable devices, such as electronic bracelets, could also be engineered to provide continuous monitoring of the body temperature of Ebola contacts under supervision or quarantine. These devices may even provide real-time updates and enhance active monitoring[7] by public health authorities. In the Ebola treatment units it would be a good idea to have multifunctional kits that can also evaluate a patient's general health status with the ability to tests for liver function, renal function and electrolytes status at the same time. This will obviate the need to conduct those tests on separate machines in different buildings thereby limiting the chances of disease spread. The health care workers in the hot zone also need to be kept cool. Wearing a full cover Tyvek suit in 100*F heat is no mean task. Can we create comfortable protective suits?

With regards to surveillance for new outbreaks and contact tracing, smart phone apps and low cost automated voice or text messaging could be developed. On both platforms, people concerned about a risk for Ebola could key in their concerns and receive feedback that help them seek appropriate care. Data from such system would help epidemiologist detect new outbreaks and trace the contacts of Ebola patients. How about using technology to ensure that quarantine conditions are made more humane? We still hear of people breaking out of quarantine[8] to find food for themselves. Yet in some cases, the food aid meant for those communities lie in warehouses! Coordinating the international Ebola response has been a challenge. Information technologists could create a regional disease surveillance and response network to share protocols and information, and as well build trust among agencies working across borders.

Yet it will not be enough to target technology at the disease alone. We must also act on the cultural and political factors that have encouraged the occurrence and persistence of infectious disease outbreaks in the developing world. Can we create affordable technologies that will improve literacy and educate the masses? Can we make gadgets that will help pull people out of poverty? Are there systems that can help make governments accountable and elections truly free and fair? The public health systems in West Africa will become strong only when

political governance is good. What I am saying about Ebola is true for all infectious diseases. Indeed, there are many viruses and bacteria out there just waiting to create global disruption. We call them Emerging Infectious Diseases. And so the time to act is now. With the right technology we can combat this outbreak and prevent the occurrence of others. Remember, infectious diseases do not respect international borders.

Acknowledgements

None.

Conflict of interest

The author declares no conflict of interest.

References

1. PATH. *Map of Africa's meningitis belt*. USA: PATH: Driving Innovation to Save Lives; 2014.

2. Bausson G. *West Africa on alert for meningitis epidemic*. India: Media Centre, Unicef; 2015.

3. World Health organization (WHO). *Bulletin Hebdomadaire de retro-information sur la meningite cerebrospinale: Weekly feedback bulletin on cerebrospinal meningitis*. Africa: World Health organization; 2014.

4. World Health organization (WHO). *Ebola virus disease*. Africa: World Health organization Fact sheet N0103; 2014.

5. Centers for Disease Control and Prevention (CDC). *Cases of Ebola Diagnosed in the United States*. USA: Centers for Disease Control and Prevention; 2014.

6. Brilliant L. Ebola: What Should We Do Now? *The wall street Journal*. 2014.

7. Centers for Disease Control and Prevention (CDC). *Interim U.S. Guidance for Monitoring and Movement of Persons with Potential Ebola Virus Exposure*. USA: Centers for Disease Control and Prevention; 2014.

8. Al Jazeera America. *Thousands in Sierra Leone break Ebola quarantine to find food*. USA: Al Jazeera and The Associated Press; 2014.