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Ebola Crisis of 2014: Are Current Strategies Enough to Meet the Long-Run Challenges Ahead?

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The outbreak of the Ebola virus disease (EVD) in 2014 mobilized international efforts to contain a global health crisis. The emergence of the deadly virus in the United States and Europe among health care workers intensified fears of a worldwide epidemic. Market incentives for pharmaceutical firms to allocate their research and development resources toward Ebola treatments were weak because the limited number of EVD cases were previously confined to rural areas of West Africa. We discuss 3 policy recommendations to address the long-term challenges of EVD in an interconnected world. (*Am J Public Health*. Published online ahead of print March 19, 2015: e1–e3. doi:10.2105/AJPH.2015.302576)

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THE EBOLA VIRUS DISEASE (EVD) outbreak of 2014 sparked a global public health crisis and the mobilization of international efforts to contain it. The exponential growth of cases across West Africa in the 3 most affected nations of Guinea, Liberia, and Sierre Leone prompted the World Health Organization (WHO) to declare the EVD outbreak a public health emergency of international concern.[1] In October 2014, the emergence of EVD in the United States and Europe among health care workers intensified fears of a devastating worldwide epidemic.

Although the deadly virus has occurred periodically since 1976, previous outbreaks caused fewer than 1000 human deaths each because the outbreaks were confined to rural areas.[2,3] As of December 2014, more than 7500 deaths were attributed to the EVD outbreak. Based on recent data, the WHO estimated a case fatality rate of 70.8% in West Africa, and predicted that the number of EVD cases would be more than 20 000 people by the end of the year.[1] Currently, the deadly virus is thought to reside in asymptomatic fruit bats.[4] Periodic outbreaks might be associated with lack of rain, which is thought to bring primates and humans in closer contact with fruit bats.

RELEVANCE TO PUBLIC HEALTH POLICY

Why is the Ebola virus relevant to US public health officials, policymakers, and citizens? First, the global community has become more mobile and interconnected. One factor that contributed to the rapid growth of infections in Guinea, Liberia, and Sierra Leone is the cross-border traffic near the outbreak's epicenter, which has easy road connections between rural villages and densely populated urban areas. Travel and trade among these 3 West African countries and with Europe, Asia, and the United States have increased. Second, the United States has the resources and scientific knowledge to develop vaccines and treatments for EVD infections. Finally, the United States has a national security interest to address bioterrorism by conducting basic research on effective treatments for lethal infectious diseases.

A global public health crisis caused by the rapid spread of EVD would have devastating economic and social effects on West Africa. In October 2014, the World Bank estimated that Guinea, Liberia, and Sierra Leone had already lost 2 to 3 percentage points of gross domestic product in 2014 because of the EVD outbreak.[5] For West Africa as a whole, the medium-term economic impact through 2015 is likely to be between $3.8 billion and $32.6 billion, depending on how long the disease continues to spread.[5] This finding strengthens the case for substantial international support. Social effects from the crisis include the deaths of parents, which strain family structures and produce orphans. Fear and distrust of health care workers and government authorities can exacerbate the spread of EVD, and make it more difficult to contain and track cases of infection. The public health infrastructure and delivery systems of the most affected countries—Guinea, Liberia, and Sierra Leone—are simply overwhelmed. Finally, the EVD outbreak has already had an adverse impact on health care workers and communities in the United States and Europe, by spreading fear, imposing air travel restrictions, and diminishing the flow of trade.

CURRENT STRATEGIES AND ROLE OF MARKET INCENTIVES

Two broad strategies are currently available to contain the rapid spread of the EVD outbreak. The main containment strategy is designed to reduce the growth rate of infections by diagnosing EVD as early as possible. This entails isolating the patient, tracing all patient contacts for a 21-day period, adhering to infection control procedures, and conducting safe burials. In the short to medium term, containment is the best strategy available to reduce the uncontrolled spread of the virus. Early analyses suggest that if the EVD transmission rate can be reduced by 50% or more in Guinea, Liberia, and Sierra Leone, the epidemic can diminish.[1]

A second key strategy is to develop and use effective treatments and vaccines for EVD. However, no Food and Drug Administration (FDA)-approved treatments exist as of December 2014.[6] Two promising treatments are Z-Mapp

and TKM-Ebola. Z-Mapp has already shown evidence of clinical effectiveness in macaques, but has not been subject to human clinical trials on a large scale. TKM-Ebola is also untested in humans. A promising EVD vaccine, codeveloped by the National Institute of Allergy and Infectious Diseases (Bethesda, MD) and GlaxoSmithKline (Brentford, UK) began a phase 1 test of safety and effectiveness in healthy adults in September 2014.[7] Finally, several Americans have received blood plasma donations from survivors. This "convalescent serum" is thought to contain antibodies to help fight the virus. However, limited sample sizes and the challenge of evaluating multiple treatments simultaneously make it difficult to isolate which treatment is effective.

Market incentives for pharmaceutical firms to allocate their research and development resources toward EVD treatments have been weak for some time. First, the potential market size was tiny because all previous outbreaks had fewer than 1000 deaths. Second, no human EVD cases before 2014 have occurred in the United States, where most prescription drug prices are unregulated. In West Africa, prescription drugs prices are well below US market prices because central governments are able to negotiate and obtain generous discounts. Although the current strategy of containment is necessary to meet the short-term goal of arresting the spread of EVD in West Africa, it is problematic to rely exclusively on this strategy in the long run.

THREE POLICY RECOMMENDATIONS

To spur the development of vaccines and treatments for EVD, several policy changes are needed to overcome the problem of limited market incentives for pharmaceutical firms. In this section, we highlight 3 policy recommendations to encourage the development of effective treatments and vaccines for EVD. These long-term policy recommendations seek to support and enhance EVD research initiatives that are currently in progress.

Increase Federal Research Funds

The US government should increase federal research funds to support the development of vaccines and treatments for infectious disease. In September 2014, the US Department of Health and Human Services announced short-term support to accelerate the development and production of ZMapp.[8]

The US Department of Defense also now supports development of the TKM-Ebola drug. These efforts are an important step. However, a dedicated federal funding pool to support basic research and the development of treatments for other lethal infectious diseases is needed to prepare for and tackle the public health challenges of future outbreaks, of which EVD is only the current example.

Amend the 1983 Orphan Drug Act

Policymakers should increase the 7-year market exclusivity provision of the 1983 Orphan Drug Act (ODA) to encourage greater development of treatments for infectious diseases, which include EVD. Previous studies have found that the ODA led to a significant and sustained increase in new clinical trials for orphan drugs, which affected fewer than 200 000 Americans.[9]

The ODA was also found to spur a much greater variety in approved treatments of rare diseases compared with nonrare diseases.[10] However, the largest share (33%) of orphan drugs is for cancer-related treatments.[11] According to the pharmaceutical industry, the most important benefit of the ODA is the 7-year marketing exclusivity provision.[10,11] Moving to a 10-year marketing exclusivity provision for infectious disease treatments would provide a stronger incentive for pharmaceutical firms.

Support Advance Market Commitments to Purchase Vaccines

Advance market commitments to purchase vaccines for infectious diseases may help to galvanize investments for diseases that severely affect West Africa. Earlier studies have noted that nations with developing economies, such as West Africa, face a problem of limiting market incentives for treatments by setting too low a price.[12] However, introducing advance market commitments for vaccines may spur greater development by setting a minimum price and quantity purchased if and only if a developing treatment receives FDA approval. The advance purchase of FDA-approved vaccines and treatments for EVD could be made by the WHO, the Gates Foundation, or an international consortium of nations.

CONCLUSIONS

In conclusion, the 2014 EVD outbreak sparked a global public health crisis by spreading across West Africa and other continents. Current strategies to date have focused on containing the rapid spread of EVD in West Africa, as well as developing clinically effective and safe treatments. In October 2014, the WHO announced that human testing of EVD vaccines in West Africa could begin as early as 2015. These efforts to expedite testing and clinical trials are promising. However, improving market incentives to encourage greater development of innovative treatments and vaccines for infectious diseases will be essential to address the long-term challenges of recurring public health crises in an interconnected world. ■

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Contributors

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