

## China takes an active role in combating an Ebola outbreak: On-site observations and reflections from a Chinese healthcare provider

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### Summary

As one of the active participants in the global fight against the 2014 outbreak of Ebola virus disease (EVD) in West Africa, China supplied many resources, including medical experts and scientists as well as medical supplies, to the affected countries. A member of the first contingent of Chinese public health experts who worked in Sierra Leone for 65 days, I am pleased to have this opportunity to review the major work done by our team to help deal with the Ebola epidemic in Sierra Leone. This is the first time that a Chinese public health training team has worked in West Africa. The team provides trainings for people from local communities in an effort to encourage local residents to get involved in the war against Ebola. However, the implementation of active measures against Ebola in West Africa was hampered somewhat by certain drawbacks in the area in terms of the health system, the shortage of medical resources, the high illiteracy rate, unhealthy lifestyles, and traditional funeral rites. All of these aspects need to be gradually improved in the aftermath of Ebola, and I believe that this is an area in which the Chinese public health system can play an important role.

**Keywords:** Ebola virus disease, Sierra Leone, public health system, China's role

In light of strengthening global ties, an outbreak of Ebola virus disease (EVD) in West Africa in 2014 posed a serious threat to global public health. According to data from the World Health Organization (WHO), there were 28,388 confirmed, probable, and suspected cases of Ebola in Guinea, Liberia, and Sierra Leone prior to September 30, 2015 and 11,296 deaths (1). Seventy-five percent of human emerging infectious diseases are transmitted by animals (2), and the Ebola virus (EBOV) is thought to be transmitted by fruit bats (3). At present, EVD is still believed to be a disease with natural foci, which means that every outbreak originates from the first person who initially becomes infected through contact with bush animals. The virus then spreads rapidly among human beings. Clearly, this epidemic also poses new challenges to the creation of a public

health system in China.

The outbreak of EVD severely impacted global public health. During the outbreak, the Chinese Government took quick action by donating money and supplies and by sending a large number of military and civilian medical professionals to the affected countries to combat the epidemic. A member of the first contingent of Chinese public health experts who worked in Sierra Leone for 65 days, I am pleased to have this opportunity to share my frontline experiences and thoughts here.

### 1. Major work done by Chinese experts to combat EVD in Sierra Leone

The major work done by me and other experts can be summarized as follows: *i*) Regular training of Sierra Leone healthcare providers and other professionals in relation to combating EVD. Training courses included information on the epidemiology and transmission of EVD and the current Ebola epidemic, descriptions of Ebola infection and principles of control, and instruction in safety assessment and intervention strategies. *ii*)

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Attending the national Ebola case management meeting organized by the World Health Organization (WHO) and the Ministry of Health of Sierra Leone twice a week to express our views and provide suggestions to help draft guidelines to control Ebola. *iii*) Visiting the Sierra Leone EVD treatment center to gain first-hand practical experience in the treatment and management of EBV and exchanging information on the epidemic with Chinese medical staff and the second contingent of the EBV training team. *iv*) Noting the progress of control of the epidemic and informing experts in China of the most recent guidelines for managing EBV. These efforts helped to establish rules and protocols for fighting the cross-border spread of the disease and also to prepare medical facilities to admit patients with EVD or patients suspected of having EVD.

## *2. More active therapy can reduce the mortality rate*

The outbreak of EVD was a terrible disaster, but it was also a rare learning opportunity for medical personnel to learn how to prevent and control epidemics from occurring again (4). The main clinical symptoms of EVD are severe gastrointestinal symptoms in the form of vomiting and severe diarrhea, which lead to fluid loss, metabolic abnormalities, and hypovolemic shock. When the patient is unable to drink water, fluids must be administered intravenously. However, a number of critically ill patients died because they failed to receive sufficient fluids. Obviously, if patients receive more active treatment and supportive care, especially with regard to sufficient fluids and preventing and correcting electrolyte abnormalities, then the EVD mortality rate could be drastically reduced (5). Although there were reports indicating that some patients in the ICU received excessive fluids that caused pulmonary edema, the delay and lack of intravenous fluids is still a common problem at Ebola treatment centers. According to current statistics, Ebola treatment centers reduced the Ebola mortality rate to 39% merely by providing active rehydration therapy. Some experimental treatments and vaccines are being developed or are currently available. Several patients received a transfusion of serum from previous patients who recovered from EVD so that they can acquire antibodies against EBOV via passive immunization. Passive immunization can also be accomplished by obtaining antibodies against EBOV from infected animals. ZMapp (6) is a combination drug that includes many monoclonal antibodies and that has been used to treat patients with EVD, some of whom recovered. Several antivirals, *e.g.* Favipiravir (anti-influenza virus drugs) and Brincidofovir, have demonstrated efficacy when used to treat patients with an early stage of the disease in preliminary clinical trials (7). The TKM-Ebola injection, made by the Canadian company Tekmira Pharmaceuticals, blocks the replication and transmission of EBOV. However,

there are serious problems with the clinical evaluation of vaccines and their therapeutic efficacy (8,9).

## *3. The Chinese public health system should play a greater role in the aftermath of Ebola*

Working on the frontlines to prevent and control the epidemic, I realized that the national response center in West Africa plays a leading role in organization, coordination, management, and implementation of a series of rapid responses to control the outbreak. The health minister is in charge of all control efforts. He holds a meeting for relevant personnel to exchange information and he coordinates daily efforts by international organizations, and he then reports directly to the Council of Ministers and the President. Continued and comprehensive guidance, sufficient manpower, and a large amount of supplies provided by the international community greatly helped to effectively combat the epidemic in countries stricken by Ebola.

Multi-sector control efforts used in China played an important role in controlling the epidemic in West Africa. This was the first time a Chinese public health training team has worked in West Africa. The team trains people from local communities in order to encourage local residents to become involved in the war against Ebola. However, the implementation of active measures against Ebola in West Africa was hampered somewhat by drawbacks in the area in terms of the health system, the shortage of medical resources, the high illiteracy rate, unhealthy lifestyles, and traditional funeral rites. All of these aspects need to be gradually improved in the aftermath of EVD, and I believe that this is an area in which the Chinese public health system can play an important role. Thanks to the support of the United Nations Mission for Ebola Emergency Response (UNMEER) and other partners (including the Chinese Government), the three affected countries now have the ability to isolate and treat patients diagnosed with EVD and they have sufficient resources to ensure that the bodies of the deceased are treated in a safe and dignified manner.

The American CDC has many permanent agencies in African countries, and they have played a leading role in the prevention and control of this epidemic. Though various infectious diseases have been effectively controlled in China, the study of tropical diseases and parasitic diseases should not stop in China. Moreover, this study needs to be extended to Africa. Chinese-built hospitals have long played an important role in Africa, so existing health care networks should be used to create a disease prevention and control system. After an outbreak of EVD, the Chinese CDC should send personnel abroad. Given these needs, a specialized agency should be created to implement Chinese multi-sector control efforts in foreign countries. The agency should be organized by the Ministry of Health and

Family Planning Commission and receive a regular budget so that its effectiveness is ensured.

China can organize training courses for public health professionals from African countries and allow trainees to practice at all levels of the disease prevention and control system. A model zone could be initially established and then gradually replicated elsewhere. China assisted in the construction of level 3 biosafety laboratories in Africa. These laboratories were rationally designed and efficiently organized, and they have the ability to effectively protect laboratory personnel and the surrounding environment. The laboratory in Sierra Leone was built with Chinese aid, and it plays an important role in combating Ebola and studying other tropical diseases.

This is the first time that Chinese public health personnel have been sent abroad on such a large scale, and we should compile our experiences and lessons. The dispatching procedures will be optimized and various standard operating procedures (SOPs) will be modified in order to alleviate the concerns of volunteers. Moreover, reasonable standards will be established to ensure logistical support and limit occupational exposure.

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