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Editorial

Are Isolation and Quarantine Really the Best we can Offer After Forty Years of Ebola Outbreaks?

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Unless you live on a planet on your own, you have witnessed or at least heard of the global Ebola scare and frenzy. The latest Ebola virus disease (EVD) or Ebola hemorrhagic fever (EHF) outbreak, which according to Doctors Without Borders started in a small village near Gueckedou in Guinea in March 2014 [1], has so far infected more than 13,000 people in West Africa (Guinea, Sierra Leone, Liberia, Senegal and Nigeria) and claimed about 4,900 lives according to the recent figures from the World Health Organization (WHO) [2]. Let us remember that the very first Ebola virus outbreak was reported in 1976 simultaneously in Soudan and in Zaire (current Democratic Republic of Congo), causing over 600 cases in both countries, and about 430 deaths [3, 4]. It is only later that the disease appeared around the "*Legbala*" river area, the indigenous name that will be turned into Ebola river from which the disease gets its name. Since then, there have been a total of 25 outbreaks, with a mortality rate ranging from 0 to 100% [2-4]. These outbreaks have primarily been geographically restricted in the Central Africa rainforest area (Democratic Republic of Congo, Uganda, Congo, Sudan and Gabon). Before the current one, only one outbreak was registered in West Africa, and that was in Ivory Coast in 1994, where only one person was infected and actually survived [3,4]. However, the current outbreak is by far the worst by any standard of measure, generating more cases and deaths than all the others combined. The most severely affected countries are Liberia (6,535 cases and 2,413 deaths, mortality rate of 36.9%), Sierra Leone (5,235 cases and 1,500 deaths, mortality rate of 28.7%) and Guinea (1,906 cases and 997 deaths, mortality rate of 52.3%), according to the WHO [2].Outside these three countries, only Nigeria and Senegal have registered one diagnosed case of Ebola each in Africa [5], but both countries have recently been declared Ebola-free by the WHO. This is also the very first time that the Ebola virus has crossed the African's borders to reach Europe and North America, with 3 diagnosed cases in Spain (2 deaths and 1 treated), 1 diagnosed and treated case each in France and in Norway, 3 diagnosed cases in Germany (1 treated, 1 in treatment and 1 death) and 9 diagnosed cases in the United States (7 treated, 1 in treatment and 1 death) [5]. It is thus understandable that the WHO has declared the current Ebola outbreak "a Public Health Emergency of International Concern".

Despite the numerable previous outbreaks, the current one seems to have taken the world by surprise. Many countries around the world have had their own Ebola scare. In the United State where 8 out of the 9 cases so far diagnosed have been successfully treated, several states including New York, New Jersey, Maine and Illinois have put in place a a controversial 21-day mandatory quarantine for "high-risk individuals" and medical workers returning from West Africa. According to the Associated Press, even North Korea officials have announced that they will quarantine foreigners for 21 days over fears of the spread of the Ebola virus, although no case of Ebola has been diagnosed in that county.

Now, how can a virus that, according to the WHO, cannot survive bleach or 5 minutes in boiling water can inflict so much damage over the years, and generate such a global panic. The obvious answer is the lack of a proven treatment developed to cure this disease. To put this in perspective, remember that the first case of HIV-AIDS was diagnosed around the same period as the first Ebola outbreak. Although no cure is available for treating HIV-AIDS, several anti-retroviral drugs have been developed over the years, and the lifespan of HIV-infected patients has been significantly improved. Unlike HIV-AIDS, till the current outbreak, no drug has ever been developed to treat the Ebola Virus Disease. In fact, isolation, quarantine and case management have been and still the most effective way to reduce the spread of the disease. Furthermore, treatment has mainly consisted of oral or intravenous fluids to improve survival. Blood plasma from Ebola survivors has also proven to improve the conditions or to fully cure infected individuals. Worst, there is still no good technique for early detection of the Ebola infection, and the only options for potentially infected individuals are the monitoring of their body temperature for potential fiver while waiting for the "magical" 21 days of incubation till the symptoms appear.

The severity of the current outbreak and the ease with which it quickly spread over the continents seem to have provoked the kind of fear and social mobilization that obliges governments and the scientific community to react and to find a cure for such a deadly disease. As a result, a dozen of antiviral medications developed for other applications are currently being tested as

potential cure for the Ebola Virus Disease (EDV), and some of them have even been approved for emergency use in the current crisis. Among them, Favipiravir, a drug approved in Japan against influenza and that was used to cure the French nun who contracted Ebola in Liberia [6], BCX4430 developed by BioCryst Pharmaceuticals and which is currently in Phase 2 trials for the treatment of Ebola [7, 8], Brincidofovir used in the USA as experimental drug in the treatment of the first patient diagnosed with Ebola that was visiting from Liberia and that later died [9], Lamivudine, which is a HIV-AIDS drug currently used in Liberia in a combination therapy against Ebola [10], and JK-05 developed through a collaborative effort between the Chinese Academy of Military Medical Sciences and the Chinese Shaun Pharmaceutical, which has been fast tracked through human trials for Ebola treatment after successful tests in mice [11].

A number of vaccines are also currently in clinical trials including ZMapp, a monoclonal antibody used to cure at least two patients in the United States, although it was given to the Spanish priest with Ebola infection that later died [12], cAd3-EBOZ based on an attenuated version of a chimpanzee adenovirus (cAd3) developed by the National Institute of Allergy and Infectious Diseases (NIAID in the United States) in collaboration with GlaxoSmithKline [13],the Vesicular Stomatitis Virus (VSV-EBOV) developed by the Canadian National Microbiology Laboratory and licensed to New Link Genetics [14], Triazoverin developed by the Russians [15],and TKM-Ebola [16].All these vaccines have being fast-tracked through human clinical trials and most of them have now past Phase I. If this new trend continues, it is more likely that some of these drugs and vaccines will make it to the market, and by the next outbreak, we will have much better treatments to offer than isolation, quarantine and case management.

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