Editorial

Could the Devastation From Ebola Occur in Asia?

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Outbreaks originating from animal reservoirs continue to take the world by surprise. Whether it is a novel virus such as Middle East respiratory syndrome (MERS) or severe acute respiratory syndrome (SARS) or a novel epidemiologic course of a known virus such as influenza and Ebola, no two outbreaks are the same. No one predicted the current unrelenting progress of Ebola Zaire virus in West Africa which is devastating Liberia, Sierra Leone and Guinea. Usually, Ebola outbreaks occur in most years and are controlled within months locally. This time, however, the international response has not kept up with the epidemic. This is despite the "Herculean" efforts of non-government organisations led by Médecins Sans Frontières (MSF) and the World Health Organization (WHO), the latter in the wake of massive funding cuts in the last 5 years.

The spread of this Ebola epidemic is not consistent with estimated R_0 (reproductive) values of 1-2, i.e. each case infects 1 to 2 other people. Patients are rejected from Ebola Treatments Units as they are full and the inability to remove infected individuals from the community is driving transmission above usual transmission rates. The scale of the crisis means that even dead bodies are often not removed for days. We do not know the real transmission rates as epidemiologists there cannot even keep up with the numbers.

An estimated 20,000 cases of infections is predicted in the months to come. Ongoing transmission well into 2015 is inevitable. Desired infection control practices and social mobilisation activities are increasingly not possible. There is already a breakdown of what were already vulnerable healthcare systems. Major secondary consequences from the epidemic can be expected – malaria, tuberculosis, maternal health, diabetes etc. If there follows a breakdown in essential services (power, water, food, communications), then a true humanitarian crisis will follow.

There is potential for an escalation of societal unrest already seen in isolated episodes. The region has experienced decades of civil wars which may have contributed to people being less willing to accept authority, and less willing to accept contact tracing, movement restrictions and attempted quarantine, so critical early in the outbreak.

Liberia, Sierra Leone and Guinea are home to over 20 million people. If Ebola were to establish in neighbouring Nigeria with an estimated 180 million population, the scenarios are beyond imagination. Nigeria has already experienced local spread in small numbers and Senegal has its first imported case, a known contact travelling against advice.

Control of this outbreak requires a significant divergence from the traditional response and this is happening with a major deployment of foreign medical teams. Furthermore an approach to management of Ebola in the community is necessary. It is happening there now and the population needs support. Liberia will soon be receiving a mass distribution of home care kits. Ebola Care Centres are being discussed for people to care for a family member away from the home (Fig. 1). These are indeed appearing spontaneously and community-driven.

There is also a call by several experts to fast track the introduction of experimental drugs and vaccines.[1] Many have been in development but none taken through to even phase 1 studies possibly because of the difficulties of establishing phase 3 trials during outbreaks and a non-

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*A/Prof Dale Fisher and Ms Sharon Salmon, Assistant Director of Nursing, were in Liberia early in the Ebola outbreak in April and at the time of publication had returned to assist in the international response. A/Prof Fisher was involved during SARS (receiving a courage foundation medal) and H1N1 with several Global Outbreak Alert Response Network (GOARN) deployments. He was recently appointed to the GOARN International steering committee. Both Fisher and Salmon have strong affiliations with GOARN and the World Health Organization (WHO), particularly in the area of facilitating outbreak response trainings.

Fig. 1. Community lead Ebola Care Centres appear spontaneously, given that the official Ebola treatment Units are full. Assistance was sought to find more appropriate sites such as this which is a closed vocational training centre.

viable business case for advancement. We are therefore now left with an inadequate understanding of whether such therapeutics are a worthy part of the response, or a distraction.

Preparedness plans and exercises are being undertaken by many distant countries globally. Asia is increasingly connected to West Africa and the consequences of an Ebola outbreak in a large Asian city with pre-existing suboptimal surveillance and infection control practices paints a bleak picture.[2] Still this "probably" won't happen especially since people from the 3 most affected countries are not frequent travellers to Asia. Commercial air travel into and out of those 3 countries has also all but stopped. One could hypothesise that the most likely people to import the disease are those returning home to Asia, such as a recent scare from Philippines workers.

Ebola outbreaks start from a single animal to human jump. Typically, a bat reservoir sustains the virus until transfer to the accidental human host probably via another primate (but not always). Amplification then takes place via human-to-human spread. Fruit bats have been implicated as a reservoir in Africa and in the Philippines.[3] In Bangladesh, 5 of 274 (3.5%) bats tested positive for antibodies against Ebola Zaire and Reston viruses but no virus was detected by polymerase chain reaction (PCR).[4] Ebola Reston virus is likely non-pathogenic in humans after observation of several human infections. Pigs in the Philippines have tested positive for Reston virus and likely pig-to-human transmission of Reston virus was documented in 2009.

In China, 32 of 843 bat samples tested positive for Ebola antibodies.[5] In Indonesia, orang utans showed specific IgG antibodies to all 5 Ebola species although they were apparently healthy. This raises the issue of primates being a potential reservoir or part of a multispecies reservoir for Ebola strains in the region.[6]

So while Ebola is known for regular animal-to-human transmission and subsequent outbreaks in Africa, we need to recognise the risk of such future "jumps" in Asia given that animal reservoirs clearly exist in the region. We have a poor understanding of the relationships between and movements of animals in the wild.[7] We know that the continuous evolution of virus lines affects transmissibility, host tolerance and virulence. This occurs in a complex ecology involving wild animals and a more vulnerable human population due to urbanisation, overcrowding and easy and cheap travel.

Ebola and other viruses will continue to cause outbreaks. Given the worldwide awareness and the lessons learnt from the scale of the West African outbreak, a sporadic case being exported to Asia will unlikely produce significant local transmission in countries with strong healthcare systems. Though human Ebola in Asia may never happen, many countries remain vulnerable so long as the animal reservoirs remain.

The West African Ebola crisis is a reminder that as a global community, we need to be better prepared. There is a need for generic regional and global preparedness. The key to our "defence" is in the traditional infection control principles of surveillance and early detection and identification of outbreaks involving established or novel agents. Doing this and then proceeding to quickly establishing interventions is beyond the capabilities of many countries where such outbreaks may start. This outbreak represents a call to the healthcare leadership of Asia's wealthy countries and its neighbours to further develop regional outbreak response capacity.

REFERENCES

1. Scale up the supply of experimental Ebola drugs; Nature vol 512, 7514. Available at: http://www.nature.com/news/scale-up-the-supply-of-experimental-ebola-drugs-1.15736. Accessed on 31 August 2014.
2. 2014 Ebola Outbreak: Worldwide Air-Transportation, Relative Import Risk and Most Probable Spreading Routes; An interactive network analysis. Dirk Brockmann, Lars Schaade, Luzie Verbeek. Available at: http://rocs.hu-berlin.de/projects/ebola/index.html. Accessed on 31 August 2014.
3. Taniguchi S, Watanabe S, Masangkay JS, Omatsu T, Ikegami T, Alviola P, et al. Reston Ebolavirus antibodies in bats, the Philippines. Emerg Infect Dis 2011;17:1559-60.
4. Olival KJ, Islam A, Yu M, Anthony SJ, Epstein JH, Khan SA, et al. Ebola virus antibodies in fruit bats, Bangladesh. Emerg Infect Dis 2013;19:270-3.
5. Yuan J, Zhang Y, Li J, Zhang Y, Wang LF, Shi Z. Serological evidence of ebolavirus infection in bats, China. Virol J 2012;9:236.
6. Nidom CA, Nakayama E, Nidom RV, Alamudi MY, Daulay S, Dharmayanti IN, et al. Serological evidence of Ebola virus infection in Indonesian orangutans. PloSOne 2012;7:e40740.
7. Olival KJ, Hayman DT. Filoviruses in bats: current knowledge and future directions. Viruses 2014;6:1759-88.