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The Complicated and Complex Ebola Viral Disease (EVD) in West Africa

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Ebola virus disease (EVD) is a severe, often fatal illness in humans caused by the Ebolavirus which is a member of the *Filoviridae* family. Ebola first appeared in 1976 in two simultaneous outbreaks in Sudan and in the Democratic Republic of Congo. The latest outbreak of EVD in West Africa (starting in Guinea, then Liberia, Sierra Leone and Nigeria) is the largest ever reported, with 1,975 clinical cases of which 1,069 have died as at 11th August 2014 [2]. The spread across countries has been fuelled by travel. The outbreak has been designated as a public health emergency of international concern. In Nigeria, 5 of the 12 confirmed cases have been discharged from the hospital. Is EVD still as deadly as was thought?

Introduction

Ebola virus disease (EVD) is a severe, often fatal illness in humans caused by the Ebolavirus which is a member of the *Filoviridae* family. It was formerly known as Ebola haemorrhagic fever and has a case fatality rate of up to 90%.

Ebola first appeared in 1976 in two simultaneous outbreaks in Sudan and in the Democratic Republic of Congo (in a village near the Ebola River). The Ebolavirus has 5 distinct species, three of which have been associated with large EVD outbreaks in Africa while the other two, found in the Philippines and China can infect humans but no illness or death has been reported till date [1].

The latest outbreak of EVD in West Africa (starting in Guinea, then Liberia, Sierra Leone and Nigeria) is the largest ever reported, with 2615clinical cases of which 1427 have died as at 20th August 2014 [2]. The spread across countries has been fuelled by travel. The outbreak has been designated as a public health emergency of international concern [3].

Transmission

Ebola is introduced into the human population through close contact with the blood, secretions, organs or other body fluids of infected animals such as chimpanzees, gorillas, fruit bats, monkeys, forest antelopes and porcupines found ill or dead or in the rainforests in Africa. Ebola then spreads in the human community through direct contact with blood, secretions, organs or other body fluids of infected people through broken skin or mucous membranes. Spread can also be through indirect contact with environments contaminated with such fluids. Burial ceremonies in which mourners have direct contact with the body of the deceased person can also aid the transmission of Ebola. Health-care workers have frequently been infected while treating patients with suspected or confirmed EVD. This has occurred through close contact with patients when infection control precautions are not strictly practiced [1]. Nigeria has already lost two health workers to this disease within the current epidemic.

Signs and Symptoms

EVD is a severe acute viral illness characterized by flu-like symptoms: sudden onset of fever, intense weakness, muscle pain, headache and sore throat. These symptoms begin to manifest from two to twenty-one days following exposure to the virus. As the disease progresses, more severe symptoms manifest, which include vomiting, diarrhea, bleeding rashes, impaired kidney and liver functions [1], redness of the eyes, internal and external bleeding (from the eyes, nose, ears, or rectum) [4].

Laboratory findings include low white blood cell and platelet counts and elevated liver enzymes [1].

Diagnosis

EVD manifests symptoms similar to diseases like malaria, typhoid fever, shigellosis, cholera, plague, meningitis, hepatitis and other viral haemorrhagic fevers and must be ruled out before a diagnosis of EVD can be made. The following tests can diagnose EVD in the laboratory: (1) Antibody-capture enzyme-linked immunosorbent assay (ELISA); (2) Antigen detection tests; (3) Serum neutralization test; (4) Reverse transcriptase polymerase chain reaction (RT-PCR) assay; (5) Electron microscopy; and (6) Virus isolation by cell culture [1].

Management

Severely ill patients require intensive supportive care and most importantly, rehydration with solutions containing electrolytes as patients are frequently

dehydrated [1]. Anti-coagulant is administered early in infection to prevent disseminated intravascular coagulation. Coagulant therapy is administered in late disease while oxygen therapy and pain management are instituted [5,6,7]. No specific treatment is available. Early management may increase chance of survival. New drug therapies are being evaluated including ZMapp and TKM-Ebola [8].

Prevention and Control

In the absence of effective treatment and a human vaccine, the only way to reduce human infection and death is by traditional public health. This is done by finding infected patients, isolating and caring for them; finding their contacts; educate people and strictly follow infection control procedures in hospitals. Educational public health messages should focus on the following in order to reduce risk of infection:

1. Animals such as fruit bats or monkeys/apes should be handled with appropriate protective clothing and their products should be thoroughly cooked before consumption in order to reduce risk of wildlife-to-human transmission.
2. Close physical contact with Ebola patients should be avoided.
3. Gloves and other personal protective equipment should be worn when taking care of ill patients.
4. Regular hand washing is required after visiting hospitalized patients.
5. The entire population should be informed about the nature of the disease, outbreak containment measures and safe burial of Ebola patients.
6. Healthcare workers must apply standard precautions consistently with all patients, regardless of their diagnosis, at all times such as basic hand hygiene, respiratory hygiene, use of personal protective equipment, safe injection practices and safe burial practices.
7. Healthcare workers working within one meter of patients with EBV should wear a clean, non-sterile long-sleeved gown, gloves, face shield or a medical mask and goggles, and
8. Samples taken from suspected Ebola cases for diagnosis should be handled by trained laboratory staff and processed in suitably equipped laboratories [1].

Contact tracing, which involves finding everyone who may have been exposed to a person with Ebola and checking for signs of illness daily for twenty-one days, is critical to stopping the outbreak. Prompt isolation of contacts of sick Ebola patients that develop a fever or any of the symptoms of Ebola is done. Their contacts must be traced and observed for 21 days [9].

	Suspect	Laboratory Confirmed	Deaths
Guinea	607	443	406
Liberia	1082	269	624
Nigeria	16	12	5
Sierra Leone	910	804	392
Totals	2615	1528	1427

Source: Center for Disease Control and Prevention (20th August 2014)

Presently, governments of West African countries affected by the outbreak, with international support, are setting up laboratories and training technicians to conduct tests for Ebola detection [9]. Awareness and education of the public on the EVD is on-going through the mass media. Public health professionals are stationed at airports and other entry points to work with border control personnel to conduct tests on people arriving in the country and preventing sick people from Ebola-affected areas from travelling [9]. The government of Liberia closed its borders, quarantined badly-affected areas in the country, large gatherings were banned and schools were closed [10]. The government of Nigeria recently released ₦1.9 billion for the control of EVD and has appointed several public health professionals to manage the outbreak.

Complications in Containment Efforts

- Inadequate equipment given to medical personnel[11]
- Funeral practices such as washing of corpses[12]
- Poor preventive practices by people especially poor use of personal protective equipment (PPE)[13]
- 'Freeing' Ebola suspects from isolation and poor contact tracing processes[14]
- Denial by some people in affected countries, attributing the disease to sorcery[15]
- Language barriers and the look of medical teams in protective suits exaggerate fears[16]
- Healthcare workers are a significant part of the fatalities, thus impairing the response to the outbreak [17]

There has been controversy as to the release of the experimental drugs to West African countries affected by the outbreak. Some are calling for its release on humanitarian grounds while others warn that making unproven drugs widely available would be unethical [18,19].

Economic Effects

- Poor patronage of hotels
- Reduced passenger traffic on airlines[20]
- Closure of markets and stores[21]
- Rise in stock prices of a Canadian pharmaceutical company developing an experimental Ebola treatment[22]

Possible Spread to the Federal Capital Territory

The staff of a private facility in Abuja, the Federal Capital Territory in Nigeria were very alive to their responsibility when on August 20th, 2014, a lady was referred to their center for treatment. The 38 year old female,

single, mother of two who travelled from Lagos Nigeria (where Patrick Sawyer was diagnosed and died) was manifesting some clinical signs of EVD – sudden onset of fever, vomiting, facial swelling, redness of the eyes, bleeding from facial sores and several other symptoms. Although there was no direct contact with known cases of EVD, the staff isolated the lady, called for support from Excellence & Friends Management Care Center (EFMC), a public health outfit in Abuja Nigeria. With EFMC involvement, the FMOH and NCDC were notified as well as the Abuja Epidemiology Unit. These steps led to the immediate review of the case, collection of blood specimens for investigations, and quarantine. Personal protective equipment were used to protect all staff who had direct contact with the lady. The rest of the staff applied normal infection control techniques. Treatment of secondary bacterial infections was commenced while awaiting the PCR results on the samples taken. She was also rehydrated with intravenous infusions (Dextrose/Saline). At the time of this report, she was still under close observation with strict barrier nursing in an isolated ward awaiting the reports of her PCR test.

This level of coordination was possible because of intense immediate national response, massive public awareness and education on the cause, signs and symptoms and possible presentations of EVD.

Policy and Governance

While it took several weeks for international organizations to come to the aid of Nigeria, the Nigerian- led control team championed by the Lagos State Ministry of Health, with support from the Federal Ministry of Health through the Nigerian Center for Disease Control and Prevention (NCDC) instituted immediate control measures to prevent the spread of this disease. The role of the National Institute for Medical Research (NIMR) in Yaba, Lagos led to the quarantine, management and subsequent discharge of five of the confirmed cases of this viral disease – which hitherto had 90% mortality rate.

In 2008, Nigeria began the Nigeria Field Epidemiology and Laboratory Training Program (NFELTP). This award winning program funded by US Center for Disease Control and Prevention (CDC) has, along with their Resident Advisor, Dr. Patrick Nguku, been in the forefront of this control process. Residents are currently in the field tracing contacts, maintaining surveillance on the exposed, reviewing documents and ensuring an immediate end to this crisis. The involvement of the NFELTP residents and fellows added great support to the national response – thus the significant reduction in the number of cases in Nigeria.

The recent release of more than N1.9 billion ($11.9 Million) by the federal government is worthy of commendation. However, the fund should be released immediately (if this is yet to be done) to the field staff for effective epidemic control and response.

These steps are strong evidence for national led control programs. Africa has come of age and should therefore take their destiny in their hands.

Moving Forward

As Nigeria, like the rest of the world works towards infectious disease control and prevention, there is a need to learn from developed nations of the world as well as from the current ongoing EVD epidemic. The resources are mostly domiciled at the federal level, but the infections and mortalities occur mostly at the state level. Federal government should therefore begin the process of supporting states control infections through block granting. This will financially empower state governments to meet the immediate needs in every epidemic even before support from the federal government is obtained.

Also, the recent death of the doctor in First Consultant who managed Mr. Sawyer is also another lesson for Nigeria and Nigerian government. Federal government should fund research efforts in Nigeria and by Nigerians for the rest of the world. It is amazing that there are little or no inventions from Nigeria despite the highly skilled human resources for health and scientist in Nigeria. Annual federal budgets should be shared to improve State surveillance activities, local research efforts as well as retention of good and skilled scientists in Nigeria.

Nigeria should, therefore, as a matter of urgency fund researches in such indigenous diseases like Lassa fever, Malaria and EVD. This will in the long run reduce work hours lost to illness, improve productivity and when successful, increase inflow of foreign exchange into Nigeria. Also it will create new jobs for the teaming fresh graduates in Nigeria, minimize brain drain and improve health outcomes in all facilities of Nigeria.

Conclusion

Ebola virus disease is a serious disease that has caught regional and global attention. In view of the high case fatality of the disease, it is critical that interventions be put in place to strengthen weak health systems by adequately training and equipping medical personnel, instituting infection control policies, strengthen contact tracing capacity, laboratory diagnostic capacity and provision of intensive care units with isolation capacity. Communication and awareness campaigns are important in responding to disease outbreaks as they provide more information on diseases and clear misconceptions. Simple public health practices such as hand hygiene and environmental sanitation are paramount in controlling Ebola virus disease outbreak and all other future disease outbreaks.

The recent establishment of Nigerian Center for Disease Control (NCDC) a few years ago was a great foresight and we believe that the current outbreak is a chance for them to prove their relevance in Nigerian public health world. It is time to stop waiting for foreigners to solve our national problems. It is time to stand up and defend the nation against dangerous organisms such as Ebola virus. It is time to build structures that will withstand the test of time. NCDC

should stand up to the challenge and prove to Nigerians that they have similar capacity as their counterparts in other parts of the world including USA and South Africa.

The global politics of health should not be allowed to hinder the use of possible preventive serum on exposed persons anywhere in the world. African leaders should therefore rise up and take the bull by the horn as they work to protect the lives of their people.

It is time for creative inventions to originate from Africa. When will Africa be the source of such a pilot serum? We think that the current outbreak again calls on our scientist to return to their laboratories. We look forward to when the National Institute for Pharmaceutical Research and Development (NIPRD) and National Institute for Medical Research (NIMR) will rise up and come up with at least a drug that can justify their establishment and funding. If not for Ebola, at least for malaria, cholera, or other common diseases in Nigeria.

Finally, the Federal Ministry of Health should adopt strategies that allow her to give grants to states and institutions to manage emergencies, conduct researches and implement projects and programs. This is the way forward as seen in most advanced nations of the world.■

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References

[1] Available at http://www.who.int/mediacentre/factsheets/fs103/en/. Accessed on 14 August 2014

[2] Available at http://www.cdc.gov/vhf/ebola/outbreaks/guinea/index.html. Accessed on 23rd August 2014

[3] World Health Organization. WHO Statement on the Meeting of the International Health Regulations Emergency Committee Regarding the 2014 Ebola Outbreak in West Africa. 8 August 2014. Retrieved 8 August 2014

[4] Available at http://www.healthline.com/health/ebola-hemorrhagic-fever#Causes3. Accessed 14 August 2014

[5] Bausch DG, Feldmann H, Geisbert TW, Bray M, Sprecher AG, Boumandouki P, Rollin PE, Roth C (2007). Outbreaks of Filovirus Hemorrhagic Fever: Time to Refocus on the Patient. *The Journal of Infectious Diseases* 196: S136–S141. doi:10.1086/520542. PMID 17940941.

[6] Jeffs B (2006). A clinical guide to viral haemorrhagic fevers: Ebola, Marburg and Lassa. *Tropical Doctor* 36 (1): 1–4. doi:10.1258/004947506775598914. PMID 16483416.

[7] Nkoghé D, Formenty P, Nnégué S, Mvé MT, Hypolite I, Léonard P, Leroy E (2004). Practical guidelines for the management of Ebola infected patients in the field. *Medecine tropicale : revue du Corps de sante colonial* 64 (2): 199–204. PMID 15460155.

[8] Pollack, Andrew (7 August 2014) Second Drug Is Allowed for Treatment of Ebola. *The New York Times*, Retrieved 8 August 2014

[9] Available at http://www.cdc.gov/media/releases/2014/p0813-ebola.html. Accessed on 14 August 2014

[10] World Health Organization: Outbreak news. Ebola virus disease, West Africa – update 23 July 2014. 23 July 2014. Retrieved 27 July 2014

[11] "Liberia: Unheralded Fear - Ebola Pose Risks for Liberia Health Workers". *FrontPage Africa*. 19 June 2014. Retrieved 21 June 2014 – via AllAfrica.com.

[12] "Growing Ebola Outbreak Threatens to Overwhelm Volunteers". *Today Health*. 8 June 2014. Retrieved 21 June 2014.

[13] World Health Organization. Ebola virus disease, West Africa – update 3 July 2014. Retrieved 4 July 2014.

[14] "8 Ebola suspects freed by relatives in Sierra Leone". *Global Post*. 28 May 2014. Retrieved 21 June 2014.

[15] Anja Wolz. "Fighting fear, denial and death on Ebola frontline". *NewScientist*. (July 15, 2014)

[16] "Ebola, snakes and witchcraft: Stopping the deadly disease in its tracks in West Africa". *International Federation of Red Cross and Red Crescent Societies*. 24 June 2014. Retrieved 28 June 2014.

[17] Chan, Margaret "WHO Director-General briefs Geneva UN missions on the Ebola outbreak". World Health Organization 12 August 2014. Retrieved 14 August 2014.

[18] "Ebola Virus Warning 2014". *Los Angeles Times*. August 14, 2014.

[19] "In Ebola Outbreak, Who Should Get Experimental Drug?". *The New York Times*. August 8, 2014.

[20] Diarra A. and Hussain M. (4 April 2014). "Mali suspects first Ebola cases as regional death toll tops 90". Reuters. Retrieved 4 April 2014.

[21] "Ebola Wreaks Economic Woe In West Africa". *NPR*. 17 July 2014. Retrieved 19 July 2014.

[22] Atkins, Richard (9 August 2014). "Biotech Stock in Spotlight: As the World Awaits Ebola Treatment, Tekmira Pharma In Prime Focus". *TechNews*. Retrieved 10 August 2014.