

Global Outbreaks Of Ebola And It's Strategic Management

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Abstract: Ebola outbreaks are more prevalent in central and west Africa. Epidemics with their statistical data was analyzed to study and document the signs and symptoms, diagnosis, transmission, incubation period and other disease characteristics. To predict standard treatment guidelines, control/prevention or the strategic management of ebola disease, Health regulatory authorities on national & international level like WHO and PAHO (Pan American Health Organization) are encouraging the research for the prevention diagnosis and treatment of ebola disease. Some antiviral drugs are found efficacious but they are still in pre-clinical and clinical trials. Although no recommended treatment and vaccination is available to the date but the only approved treatment by WHO is whole blood transfusion of the infected person.

Index Terms: Ebola Virus, pathogenic, Whole Blood transfusion, haemorrhagic fever, WHO Guidelines

1 INTRODUCTION

Ebola virus is believed to be discovered in 1976 in its first outbreak in Sudan, Nzara, Yambuku and DRC (Baron, McCormick, & Zubeir, 1983; Zhang & Wang, 2014). And later on, near ebola river and that was the very reason to name this virus as "EBOLA". It was first reported in humans in 2012 causing hemorrhagic fever so often known as Ebola hemorrhagic disease (EHF) or ebola virus disease (EVD) (Zhang & Wang, 2014). In 2013-2015 its outbreak is reported in West Africa. According to a study till 2015, 24 outbreaks were reported. And approximately 2400 cases were reported to World Health Organization (WHO) (Muyembe-Tamfum et al., 2012; Qiu et al., 2014). The outbreak of Ebola virus disease (EVD) has proven to be more lethal than all previous outbreaks in West Africa in 2014 (Judson, Prescott, & Munster, 2015). Additional to the high mortality rate, this worst proven outbreak has infected a lot of health care personnel. In Guinea, Liberia, Nigeria, Senegal, and Sierra Leone 2296 deaths were reported with the total of 4507 cases of Ebola virus disease (EVD) in September 2014 (Zhang & Wang, 2014). It has become an international issue due to lack of diagnosis and its strategic management (Lamunu et al., 2004; Team, 2014). It is a zoonotic RNA virus and its fatality rate has reached up to 90% internationally (Cenciarelli et al., 2015; Günther et al., 2011). Even we don't know the ecology of Ebola virus but the existence of anti-Ebola antibodies in sera of people who are not associated with Ebola virus indicates that endemic focus of Ebola virus activity is based on region. It's actually a pathogenic virus and about 70% of patients are led towards death with the presenting complaint of acute hemorrhagic fever (Lamunu et al., 2004).

Ebola virus belongs to Filoviridae family Hitherto (Cenciarelli et al., 2015), 5 different species of Ebola virus are discovered by scientists four from Africa and one from Philippines.

- Zaire ebolavirus (ZEBOV)
- Sudan ebolavirus (SEBOV)
- Coted'Ivoire ebolavirus (CEBOV)
- Bundibugyo ebolavirus (BEBOV) &
- Reston ebolavirus (REBOV)

Are five genetically distinct members (Panning et al., 2007). There are many signs and symptoms associated with ebola disease, firstly it causes flu like symptoms and it leads to multiple organ failure, hemorrhage, shock-like syndrome. Even after recovery of patients ebola virus remains in the body fluids and semen samples. And the symptoms may last for the life time after recovery, in which visual impairment and muscle problems are common. Ebola virus can be diagnosed by RT-PCR (Cenciarelli et al., 2015) but it is time consuming so urgently it is diagnosed by Corgenix ReEBOV Antigen Rapid Test kit. In primates, Contact exposure is the important route of transmission. Pre-exposure vaccination is still under investigations but post-exposure vaccination is not required usually because, the antibodies of ebola lasts for almost 10 years in the infected individual even after recovery.

2 INCUBATION & TRANSMISSION

The incubation period reported of ebola virus varies from 2 to 21 days after exposure. Hence, the onset of symptoms after 2 to 21 days. The observed reported incubation period of ebola is 8 to 10 days. Transmission of ebola is carried out by two ways, animal to human or by human to human. It is not air-borne and can not be transmitted through water or food generally but care should be taken from infected individuals.

4.3 Possibly with a sexual relationship even after the person has recovered from disease

There is no evidence available but scientists believe that it was first transmitted from animals (apes or monkey) to human (Weingartl et al., 2012). There is no transmission risk during the incubation period of ebola. The recovery from Ebola infection depends upon the immune system of the infected individual and the medical symptomatic treatment. No proper medical regimen is possible and no vaccine has

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been developed for the ebola disease. A person who has recovered from Ebola, develop antibodies against Ebola virus for almost ten years. Therefore, a recovered person would be safe for next ten years from ebola virus due to its "God gifted" immunity(Jaax et al., 1996).

3 SIGNS & SYMPTOMS

General symptoms include acute fever, severe headache, rash, fatigue, weakness, vomiting, loss of appetite followed by muscle pain/myalgia, difficulty in breathing, reduced urine output, chest pain or cough, maculopapular skin rash, terminal shock, haematemesis, difficulty in swallowing, stomach upset, stomach pain, bruising, unexplained internal and external bleeding and diarrhea or diarrhea with blood. Laboratory findings show lower levels of white blood cells and less platelets counts and elevated enzymes levels.

4 RECOMMENDED BY NATIONAL AUTHORITIES

The world health organization (WHO) and Pan American health organization (PAHO) recommend its member countries to consider and apply following steps for precaution and treatment of ebola disease.

- 4.1 After recognition of an ebola infected patient or a specific population or a group of people its confirmation should be made by the clinical manifestations of ebola virus, the travelling history and recent exposures of the patient should also be considered. And after that it should be reported to the national or international health regulatory authorities.
- 4.2 When a person is identified with the symptoms of ebola disease monitoring should be started. The point here important to discuss is that some people may remain asymptomatic even after acquiring the disease. There monitoring is important for 21 days
- 4.4 According to WHO & PAHO the management of information is more important here and the contact finding is another important point.

For example for the tracing of contact it is important to collect a data of patient direct contacts.

- 4.4.1 Health care professional who directly monitor the patient.
- 4.4.2 The technicians and lab workers in direct contact with the patient body fluids(Jaax et al., 1996).
- 4.4.3 Care takers living with the patient at the same place.
- 4.4.4 Person having a physical relationship with the patient.
- 4.4.5 The baby having a breast feed from infected mother.

5 DIAGNOSIS & TREATMENT

The diagnosis of ebola virus may not be so easy because laboratory testing takes time and the initial symptoms are not specific or unclear often to diagnose it. Here are general tests can be used for its diagnosis:

- PCR
- ELISA
- Serological testing
- full blood count
- serum electrolytes

- Renal function
- blood culture
- blood coagulation
- IgM and IgG antibodies
- chest radiography

Infected patients are often treated with supportive care because there is no approved treatment is available. No vaccination is available for humans or animals to the date. But ebola patients are often malnourished & dehydrated so rehydration is important and the electrolyte balance one the same time. Although no licensed treatment is available but the various effective drugs are under investigation by FDA. The treatments are being studied on animals but the are still not available for the human use due to certain safety considerations. Experimental drugs or drugs under investigations were administered to the patients with the permission and supervision of the regulatory authorities but in 2014 WHO issues a statement that they are not proved effective due to some safety issues. Similarly, vaccinations are also under trials from 2003 but no FDA approved vaccine is available. A vaccine is under its trial since 2014 by NIAID/GSK. The glycoproteins of a virus named VSIV are successfully experimented on non-human susceptible species as an post exposure vaccination.

6 MEDICATIONS BEING STUDIED

6.1 Antivirals are being studied for the treatment of ebola disease. For example; Favipiravir is approved in Japan for its anti viral activity in influenza disease, has been proved effective in mice and a case in French was reported in 2014 who has cured with it. It inhibits RNA polymerase.

BCX4430(adenosine analogue) is a broad spectrum drug by B.C. pharmaceuticals, found effective but it is still in trials.

Brincidofovir is another antiviral has got its approval from FDA from its in vivo testing as an investigational drug. **Lamivudine(analogue of cytidine)**, was proved effective in treating patients in LIBERIA in 2014, by a doctor(13 out of 15) .But NIH stated that it is not satisfactory to be used in the humans as it failed in in-vivo testing afterwards.

6.2 Antisense technique, is also being studied as its another favorable treatment after the antivirals. Phosphorodiamidatetomorpholino(PMO's) oligomers & small interfering RNAs (siRNAs) are found successful in preventing the disease in non-human species. But in case of humans, Sarepta therapeutics have done with the phase 1 trials.

6.3 Estrogen selective receptor modulators, are also important to discuss here named, clomiphene and toremifene.

6.4 Whole Blood Transfusion or the transfusion of purified serum into the infected individuals is also an efficacious and comparatively safe option for the treatment. WHO kept this on the top most priority in a meeting held in 2014 september. As 7 out of 8 patients were recovered after

receiving the blood from previously recovered patients in 1999 epidemic. The world health organization has approved blood convalescents and the products whole blood transfusion to treat the ebola disease after finding this treatment successful and satisfactory results. But this method is still under controversy by some health agencies.

7 PREVENTION& CONTROL

At individual level precautions should be followed by persons especially for health care professionals and patient care takers

7.1.a As it is a zoonotic disease so that suspected animals may be a source of transmission of disease therefore wear gloves and do proper clothing while handling the animals(Weingartl et al., 2012).

7.2.a The infected person may be a cause of transmission of disease therefore be careful while attending the patient wash your hand properly take care of your personal hygiene as well.

7.3.a For health care professionals regular hand washing is must after every visit to the hospital or to the suspected patient. The safety of health care professionals are more important because the can be a huge source of contamination the whole health care system and disease transmission.

7.4.a The lab samples handling and invasive techniques should be done carefully by health care professionals. At community level the awareness is more important to prevent the onset of disease and its transmission as well .

7.1.b On the national level the country should educate their people about the disease and its deadly outbreaks.

7.2.b Infected patients should be kept in critical and isolated area under supervision. And the people who have died due to the ebola disease should be buried safely and promptly.

7.3.b Cleaning to is done properly in animal houses and husbandries and care should be taken in handling the animals

7.4.b Animal products should be washed and cooked properly before eating.

8 DISCUSSION

After the prevalence of ebola in the central and west Africa , Asia will be the next. Precautionary measures should be taken and guidelines should be made for the awareness of public. There is no vaccination or licensed treatment is available to the date. The therapeutic agents under investigations and vaccinations are mostly proven therapeutically effective in non-human species. The need of hour is the further improvements and advancements to be made in exploring more clinically effective, safe and cost effective drugs. Moreover the diagnostic skills should be improved to have more clear picture of identification of disease its diagnosis and prognosis. The approved whole bowl products by WHO should be further studied to facilitate the general public.

9 CONCLUSION

Published literature about Ebola showed that a number of features of Ebola are defined but there are certain things which are not even touched or poorly explained. There is no any data about treatment of that disease or any route to manage the disease .Mainly this virus causes disease in African countries. Studies showed that transmission of Ebola virus is through oral or conjunctival route but transmission is low when recommended guidelines are properly followed. Post infection strategies to treat that virus needs to be broadened. Early management for this disease is helpful and this done by treating inflammatory responses. it lessen the viral replication further and increase immunity. if it is not done it leads towards fatal outcomes.

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