

# Ebola Outbreak in Africa: Current Issues – A Mini Review

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**Abstract** Ebola hemorrhagic Disease (EHD) is a severe, often-fatal disease in humans that was first identified in 1976 in Democratic Republic of the Congo (formerly Zaire) in Africa. Ebola hemorrhagic disease (EHD) is one of the most feared diseases known to mankind. This is because of the high mortality rate (up to 90%) associated with the disease, and also its propensity for person-to-person spread through close contact with infected tissues and body fluids of affected persons, particularly in the unprotected home-care setting and during preparation of bodies for burial, while spread is amplified in hospitals with poor infection control practices. Several western parts of the African continent are currently experiencing an unprecedented outbreak that has proved particularly challenging to contain. A hemorrhagic fever outbreak requires a comprehensive and intensive public health response that would put even an ideal healthcare system to the test. Substantial external support is always required during these events to ensure appropriate clinical management of patients, sufficient infection control procedures in difficult healthcare environments, intensive contact tracing to identify the chains of transmission of the virus. Clinical management of cases involves employing strict isolation procedures and providing symptomatic and supportive treatment as required.

**Keywords:** Ebola, hemorrhagic, Disease, Outbreak, Africa

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## 1. Introduction

Ebola hemorrhagic Disease (EHD) is a severe, often-fatal disease in humans and nonhuman primates (monkeys, gorillas, and chimpanzees) that has appeared sporadically since its initial recognition in 1976. The disease is caused by infection with Ebola virus, named after a river in the Democratic Republic of the Congo (formerly Zaire) in Africa, where it was first recognized. The virus is one of two members of a family of RNA viruses called the Filoviridae. There are four identified subtypes of Ebola virus. Three of the four have caused disease in humans: Ebola-Zaire, Ebola-Sudan, and Ebola-Ivory Coast. The fourth, Ebola-Reston, has caused disease in non-human primates, but not in humans [1]. EHD typically appears in sporadic outbreaks coinciding with the rainy season, and is usually spread in humans within a health-care setting [1].

## 2. Epidemiology

Ebola hemorrhagic disease (EHD) is one of the most feared diseases known to mankind. This is because of the high mortality rate (up to 90%) associated with the disease, and also its propensity for person-to-person spread through close contact with infected tissues and body fluids

of affected persons, particularly in the unprotected home-care setting and during preparation of bodies for burial, while spread is amplified in hospitals with poor infection control practices. The disease has nevertheless remained rare since its initial description in 1976, with no more than 2000 cases diagnosed before 2014 [2]. This is why the current outbreak of EHD in West Africa is of particular concern. Not only has the outbreak been raging for more than 6 months – to date, more than 2000 cases of EHD have been recorded in the four affected countries of Guinea, Liberia, Sierra Leone and Nigeria [3]. It is also noteworthy that this is the first recorded outbreak of EHD in this region of Africa. Historically EHD has been recorded in several central African countries, including the Democratic Republic of Congo (DRC), Sudan, Gabon, Uganda and Congo [2,3,4].

The current outbreak was officially reported by the World Health Organization (WHO) on 23 March 2014. Contact tracing has led to an index case involving a 2-year-old child who died on 6 December 2013 in the Gueckedou Prefecture of Guinea [5]. To date, a total of 462 cases from Guinea, 380 from Sierra Leone and 850 from Liberia and 14 from Nigeria have been recorded [3]. The total case tally is probably underestimated owing to inaccessibility of some of villages in the affected areas and reluctance to co-operate on the part of the local communities. The outbreak appeared to have started to wane in April, with certain affected areas not reporting any cases for weeks, but resurged in May, setting off a

second wave of cases reported in Sierra Leone and Liberia, and again in Guinea [3,6,7].

### 3. Transmission

The West African outbreak has proved particularly challenging to contain [7,8]. Certainly the extent of its spread across three countries in itself complicates all efforts, as co-ordination must be achieved across three separate healthcare jurisdictions involving the different healthcare authorities and role players in each of the countries. The affected regions generally represent resource-poor settings, with healthcare systems struggling to meet the everyday healthcare needs of the communities they serve. A hemorrhagic fever outbreak requires a comprehensive and intensive public health response that would put even an ideal healthcare system to the test. Substantial external support is always required during these events to ensure appropriate clinical management of patients, sufficient infection control procedures in difficult healthcare environments, intensive contact tracing to identify the chains of transmission of the virus (key to eventually containing the disease from further spread), appropriate risk communication to the affected communities, and comprehensive logistical support to tie everything together. Specialized and rapid laboratory responses are required to confirm or exclude diagnosis in suspected cases. Laboratory testing in this setting must also provide a differential diagnosis for Lassa fever, a hemorrhagic fever endemic to and commonly reported from the affected areas, among other likely causes of disease that may present with similar clinical features. Community perceptions, fears and reluctance to co-operate can be especially problematic, and communication barriers must be bridged by well-designed and understandable health messages. The prolonged nature of the outbreak is also imposing a burden on the support teams that are expected to work long hours away from home. A summit was coordinated by the WHO in Ghana in July 2014 to address these very issues, strategize resources for the months ahead, and put an action plan on the table [7]. EHD is caused by the Ebola virus, a filovirus that is thought to be harbored by specific arboreal bat species in the affected regions [2]. The current theory regarding the ecology of the virus holds that the virus is harbored by these bat species (bat-to-bat transmission, pathology and immunity features in bats are still to be definitively described) with incidental spillover (mechanism of transmission still to be proven) of the virus to other animal species (various species of antelope and primate have been found to be infected with Ebola virus). The virus may then spill over to the human population through contact between infected animals and humans, or direct contact with infected bats. The mode of transmission to the human population remains to be elucidated. Once the virus has entered the human population, outbreaks of EHD are often characterized by transmission of the virus in close family clusters and in the nosocomial setting [2]. Five strains of Ebola virus, which are genetically and antigenetically distinct, have been identified over the years. These include the *Tai Forest*, *Reston*, *Sudan*, *Zaire* and *Bundibudyo* viruses (*Bundibudyo* virus was identified for the first time during

an outbreak in Uganda in 2008). The latter three strains have been associated with sizeable outbreaks in sub-Saharan Africa, with mortality rates of 30 - 90%. These viruses differ in geographical spread, and the *Zaire Ebola virus* has been associated with the most fatal outbreaks to date [2]. The mortality rate of the current outbreak fluctuates with the identification of new cases, but is reported to be in the range of 60 - 70% [3,7]. The current outbreak is caused by a variant of *Zaire Ebola virus* with 97% sequence identity to strains isolated from the DRC and Gabon, suggesting a parallel evolution of this virus in the affected area as opposed to introduction from these endemic areas [5].

### 4. Clinical Manifestation

Common clinical features of patients during this outbreak have included fever and severe diarrhea with vomiting; however, bleeding manifestations have not been a regular finding [5]. Generally, early signs and symptoms of EHD are very nonspecific and need to be differentiated from other causes of acute febrile illness that occur in the area, notably malaria, typhoid and bacterial dysentery. The typical signs and symptoms of EHD include fever, chills, malaise, myalgia and often a maculopapular rash. The disease progresses rapidly to multisystem involvement that may include systemic, gastrointestinal, respiratory and vascular features [2]. Patients may present with an apparent acute abdomen, and the surgical interventions that may follow represent a further risk for infection on the part of healthcare workers. Hemorrhagic manifestations, if present, may include petechiae, ecchymoses, bleeding from venepuncture sites and mucosal hemorrhages.

### 5. Management

Clinical management of cases involves employing strict isolation procedures and providing symptomatic and supportive treatment as required. No specific antiviral treatments or pre- or post-exposure vaccines have been approved or registered for use against EHD in Africa. Various drugs and vaccine candidates are reportedly at various stages of evaluation [2]. Interestingly, ribavirin which is broadly effective against many hemorrhagic fever viruses appears to have no effect on Ebola virus [9].

### 6. Control

The corner-stone for controlling an outbreak of EHD is to interrupt the viral transmission chain. In order to reduce transmission, several strict public health measures need to be implemented as quickly as possible, including isolation of patients, barrier precautions and identification and tracking of all contacts. Most of the time, outbreaks are managed by a core structure called the International Committee on Scientific and Technical Coordination, under the aegis of the World Health Organization (WHO). This committee is in charge of implementing control measure activities on a daily basis and has the following working subgroups:

- Co-ordination committee, which is responsible for all epidemic response activities, chair daily meetings and write reports for public health authorities and health partners.
- The patient management team is involved in the isolation of clinical cases in a quarantine ward, training of medical and relief personnel on the proper use of protective equipment (gloves, gowns, masks etc.), and providing medical care based on symptomatic therapy to maintain the vital respiratory, cardio-vascular and renal functions. The non-governmental organization, Doctors without Borders (MSF), has developed expertise in this field from involvement in outbreak response.
- The hygiene and sanitation team is in charge of disinfection and burial of all Ebola and non-Ebola dead bodies under safe conditions. Local Red Cross volunteers usually perform these activities.
- The epidemiological surveillance team is in charge of active and passive case finding, contact tracing and rumor-verification of suspect cases or deaths in the community.
- Social mobilization and health education are critical for controlling an Ebola outbreak since resistance from the community to freely provide information on patients, deaths and contacts are commonplace. Ebola hemorrhagic disease outbreaks have many socio-cultural aspects that need to be studied deeply as communities can reject the anti-epidemic control measures imposed by the international scientific and technical committee. The existence of rumors and legends related to the outbreaks could obscure the viral nature of the disease. Sometimes the anti-epidemic control measures needed to be adapted to the local culture, for example, funeral practices as in the 2003 Ebola outbreak in Republic of the Congo [10]. The members of this team should include medical anthropologists, local Red Cross volunteers and opinion leaders such as teachers, religious groups, et cetera, for public sensitization, education and information.
- The logistic support team is in charge of providing any administrative, logistic and technical support to the other teams, such as coordination of secretariat, transport and communication.
- The laboratory and research team is in charge of collecting, storing and shipping of clinical samples for diagnostic confirmation. This team is also

responsible for ecological studies to determine the origins of an outbreak.

- Psychosocial support for the affected family or families has been neglected during previous outbreaks, but this issue has become more and more important due to stigmatization of survivors and their families by the community.

## 7. Conclusion

Formerly sporadic, with high case fatality rates (up to 90%), the deadly Ebola hemorrhagic disease outbreaks are becoming more and more frequent in Africa, mostly in relation to increasing contact with infected wildlife. Previous epidemics were detected after a long delay, especially because of the remoteness of the epidemic focus, the lack of laboratory facilities and the poor knowledge of the disease by doctors and nurses, who confused Ebola disease with malaria or typhoid fever.

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