Ebola Virus Disease in Uganda: A global emergency call

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ABSTRACT

The Ministry of Health of the Republic of Uganda declared the Ebola virus disease (EVD) outbreak on 20th September 2022 after a patient infected with the rare Sudan strain of Ebola virus (EBV) died in the Mubende district. Since the year 2000, several outbreaks of the EVD from the Sudan strain have been reported in Uganda and it has been more than a decade since the last case of EVD (Sudan strain) was reported in the country. EVD is a severe, often fatal illness that affects humans and other primates and presents with varied neurological and gastrointestinal symptoms.

This article has explored various efforts by the World Health Organization and the Ministry of Health of the Republic of Uganda to coordinate outbreak preparedness and response. Certain recommendations have been made to individuals and the government for early management and prevention of the EVD. Further emphasis has been also laid on effective isolation, triage, and screening of symptomatic patients.

1. Introduction

On 20th September 2022, the Ministry of Health of the Republic of Uganda declared to the state and notified the World Health Organisation (WHO) about the Ebola Virus Disease (EVD) outbreak in Uganda [1,2]. This was after a case was confirmed at Mubende Regional Referral Hospital in Mubende district within the central part of the country [1]. As reported by the Permanent Secretary of the Ministry of Health (MoH) of Uganda, one suspected case of Viral Hemorrhagic Fever (VHF) a 24-year-old male from Ngabano village in Madudu sub-county was identified presenting with high-grade fever, tonic-convulsions, blood-stained vomitus and diarrhoea, loss of appetite and pain while swallowing, dry cough, bleeding in the eyes which symptoms had started on 11th September 2022 [1]. He was then isolated at Mubende Regional Referral Hospital [1]. When analyzed at Uganda Virus Research Institute (UVRI) laboratory, the test sample taken from the suspected case was positive for EVD (Sudan strain) confirming the first Ebola outbreak in Uganda in a decade. The patient died on 19th September 2022 [3]. In September, six suspicious deaths have occurred so far which are still being investigated by the National Rapid Response Team within Mubende and the bordering districts of Kiboga and Mityana and as of 21st September, eight suspected cases are receiving care in a health facility [3]. EBV is a severe, often fatal illness that affects humans and other primates. It has six different species Tai Forest virus, Reston virus, Bombali virus, Bundibugyo virus, Sudan virus, and Zaire virus three of which (Bundibugyo, Sudan, and Zaire) have formerly caused large outbreaks [4]. Seven Sudan ebolavirus outbreaks have been registered in the past, four occurring in Uganda and three in Sudan. The recent reported Sudan ebolavirus outbreak in Uganda was in 2012, though the country reported a Zaire ebolavirus outbreak in 2019 which was due to cross-border movement from the Democratic Republic of Congo (DRC) formerly Zaire. EVD outbreaks have occurred in Uganda in the years 2000, 2007, 2011, 2012, and 2019 with the largest outbreak occurring in 2000–2001 with a complete of 425 cases and 224 deaths reported [5–8]. According to the WHO, the case fatality rates of the Sudan virus species varied from 41% to 100% in the previous outbreaks [9], and early initiation of supportive treatment showed to significantly reduce Ebola deaths [10]. This paper aims to describe the situation of the newly discovered Ebola outbreak in central Uganda and to recommend some lessons that might inform on the control of the outbreak (see Fig. 1).

2. Epidemiology and outbreak of Ebola Virus Disease in Uganda

EVD is not a new disease in Uganda, the number of cases and deaths from different strains of the Ebola virus (EBV) has been reported for about two decades since 2000 (Table 1) [11]. EBV has six known strains among which the Sudan ebolavirus strain has been reported about four times in Uganda with a case fatality rate ranging from 36% to 100% in the previous outbreaks. On 20th September 2022, the Ugandan Ministry of Health (MoH) declared an EVD outbreak in Mubende District, this was after a confirmed death of a 24 year old male from Ngabano village in Madudu Sub-County whose sample tested positive for Sudan ebolavirus by the Uganda Virus Research Institute at Mubende Regional Referral Hospital in Uganda [12]. The Ministry of Health also reported that a total of eight suspected cases of EVD have been identified and they are all receiving treatment in health facilities [12]. Since the year 2000, several outbreaks of Sudan ebolavirus have been reported in Uganda and it has been more than a decade since the last case of Sudan ebolavirus case to be reported in the country (Table 1) [7,12]. However, in the year 2000–2001, Uganda experienced the first huge outbreak of EVD in Guru District with 224 confirmed deaths [13].

3. Aetiology of Ebola Virus Disease

EBV is a microscopic parasite which belongs to the Filoviridae family, under the order of Mononegavirales, also constituting the families
The word Filoviridae is derived from Latin meaning ‘thread’ as the shape of the virion mimics a twisted thread when examined by an electron microscope [14]. This virus was initially identified in 1976 when two independent Ebola Hemorrhagic Fever epidemics occurred eight hundred kilometres apart in Southern Sudan (Nzara) and Northern Zaire (Yambuku) [12]. The disease is named ‘Ebola’ after a tiny river close to the Yambuku Catholic Mission, which served as the focal point of the 1976 EHF outbreak [15, 16]. During the virus’s discovery in Zaire (the Democratic Republic of the Congo (DRC)), it caused an outbreak of 318 patients including an 88% Ficase-fatality rate over two months [17]. The ingestion of meat from infected animals including apes, chimpanzees and monkeys serves as the zoonotic route of infection for the EBV in humans. Bats have also been found to harbour some EBV strains [14]. Although the natural reservoirs are fruit bats infected with filoviruses, which have an extremely high genetic variety, the major sources of transmission during an outbreak are sick humans or contact with infected deceased individuals [14]. However not all strains of the virus are seen to have an animal reservoir, this idea is supported by the geographically constrained incidence and long-term genetic stability of strains originating in Sudan and Uganda [18]. A novel EBV known as Bundibugyo ebolavirus (BDBV) was discovered in 2008 from clinical isolates in Uganda during an outbreak [19]. Once a host has been infected and a virus has been incubated, the host may typically be non-contagious and asymptomatic varying from a few days to weeks [20]. Through damaged skin or mucosal membranes, the virus may enter a new host. The virus may also penetrate the host without causing harm to the mucosal barrier.

### Abbreviations

- **EVD**: Ebola Virus Disease
- **EBV**: Ebola Virus
- **MoH**: Ministry of Health
- **VHF**: Viral Hemorrhagic Fever
- **UVRI**: Uganda Virus Research Institute
- **DRC**: Democratic Republic of Congo
- **WHO**: World Health Organisation
- **BDBV**: Bundibugyo ebolavirus
- **CDC**: Centre for Disease Control
- **PPE**: Personal Protective Equipment
- **PCR**: Polymerase Chain Reaction

### Table 1

| Year(s) of Outbreak  | Confirmed Strain | Suspected Cases | Confirmed Death | Case Fatality Rate |
|---------------------|------------------|----------------|-----------------|-------------------|
| 2000–2001           | Sudan            | 425            | 224             | 53%               |
| 2007–2008           | Bundibugyo       | 131            | 42              | 32%               |
| 2011                | Sudan            | 1              | 1               | 100%              |
| 2012                | Sudan            | 11             | 4               | 36%               |
| 2012–2013           | Sudan            | 6              | 3               | 50%               |
| 2019                | Zaire            | 4              | 1               | 100%              |
| 2022-Current        | Sudan            | 8              | 1               | 12.5%             |

**Fig. 1.** Summary of ebola virus disease outbreak in Uganda: Origin, mode of transmission, symptoms and recommendations.
Uncertain periods of the virus’s survival outside of the human body are likely. To prevent contamination and spread, patients’ blankets, garments, and medical equipment are burnt or discarded as medical waste [20].

4. Current efforts to mitigate Ebola Virus Disease in Uganda

The EBV is a rapidly transmitted virus that can spread widely due to the movement of infected individuals across national and international borders [21]. One of the six species of the EBV, the Sudan strain, has so far been identified in seven cases, including one fatality, in the Mubende district [21]. The regional referral hospital where the illness was verified this week, is treating 10 probable virus-infected patients, and 43 contacts have been identified [21]. This is the first time Uganda has encountered the Sudan strain of the EBV since 2012 [21]. This has prompted officials to work on containing the spread of this new strain through various measures [21]. The WHO is aiding the Ugandan authorities to try and contain this virus; it is working on delivering medical supplies, dispatching personnel, and will be sending isolation tents to the affected area. Uganda already has six viral hemorrhagic fever kits, one of which was sent to Mubende [21]. Although there are no treatments for the Sudan strain, early detection of infections and treatment of symptoms significantly improve the prognosis for survival [21]. The Ministry of Health has formed three sectors to coordinate preparedness and response action efforts; a national task force, an emergency operation centre, and a national rapid reaction team [22]. Representatives from several partner organisations as well as ministries, agencies, and departments are included in the national task force, which is also co-chaired by the WHO [22]. This task force also developed a matrix for collaboration to make sure that the multiple outside organisations providing financial and technical support did not duplicate efforts or leave significant gaps unfilled [22]. Ervebo (rVSV-ZEBOV) vaccine has been approved only to protect against the Zaire strain of the disease [23]. At least six potential vaccines against the Sudan strain are being developed at various stages where three of which are in the preclinical evaluation stage and the other three have Phase 1 data (safety and immunogenicity data in people) [21].

5. Recommendations to curb the ebola virus disease outbreak

5.1. For individuals

It is essential to regularly wash your hands in clean water and soap. Individuals should refrain from coming into contact with infected people’s blood and body fluids (such as saliva and semen) until they are well and have tested negative for EBV [24]. The bodies of Ebola victims should not be handled unless all necessary measures are taken, and the right protocol is followed. People should also refrain from sharing objects and areas with others, such as clothing and needles [24].

Any person exhibiting symptoms of infection must be referred for isolation, triage, and screening. Men who have survived EVD should practice safe intercourse for a year following the onset of symptoms or until the semen tests negative for EBV twice, according to the most recent WHO standards [24].

5.2. For governments

As a result of immunizations’ effectiveness in containing the Ebola outbreak in Guinea in 2021, vaccination awareness programs may be able to successfully stop outbreaks in other places [24]. To stop the spread of EBV internationally, authorities might also temporarily impose immigration restrictions on citizens of high-risk nations [24]. Access to clean water, adequate public space to prevent crowding, better transportation and communication options, and the introduction of telemedicine into the healthcare system is also essential [24–26]. Although rural nations may find it challenging to make these improvements, attempts to do so can result in a cost-effective improvement for illness detection, treatment, and immunization [24]. Additionally, health facilities need to stock up on extra PPE, hygiene items, PCR kits, and medical supplies like masks and syringes. We also advise educating healthcare professionals on EBV signs and symptoms, as well as how to identify and treat those who have the virus [24]. With order to aid in epidemic response operations, the CDC should also be ready to hire epidemiologists, experts in infectious illnesses, and nurses with ICU training [24].

6. Conclusion

Nearly a decade after its elimination, the Republic of Uganda declared an EBV outbreak after a case of the rare Sudan EBV serotype was detected in the Mubende. EVD is a severe, often fatal illness that affects humans and other primates and presents with symptoms ranging from high-grade fever, tonic convulsions, and diarrhoea. The WHO is aiding the Ugandan authorities to try and contain this virus by providing supplies and equipping personnel. In addition to coordinating preparedness and response, the Ministry of Health is also working towards developing potential vaccines against the Sudan strain. To help curb the ongoing crisis, certain recommendations have been made for individuals and governments. Individuals have been recommended to maintain personal hygiene and refrain from sharing contaminated clothing and needles. Further emphasis has been laid on effective isolation, triage and screening of symptomatic patients. The government should work on cost-effective improvements for early management and prevention of the EVD. Lastly, support from international agencies is essential to prevent further spread across the border.

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Anushree Rai: Reviewed and edited the first draft.

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Fig. 1 was drawn and analysed by author Anushree Rai.1,4

Registration of research studies
1. Name of the registry: Not Applicable
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