
Managing Ebola in Low-resource Settings: Experiences from Uganda

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Abstract

Five outbreaks of Ebola virus disease of the Sudan Ebola virus and the Bundibugyo Ebola virus occurred in Uganda from 2000 to 2012. The attack rates and the case fatality rates were much higher for the former than the later. Fever and bleeding manifestations associated with the clustering of cases were typical clinical features. Close contact with infected person was probably the major route of spread. Apparent asymptomatic and atypical Ebola infection was demonstrated in some close contacts, suggesting past unrecognised exposure or cross-reacting antibodies. A zoonotic connection was apparent in monkeys and asymptomatic villagers. The Ministry of Health together with its partners contained the outbreaks, sometimes with delays, but at least once promptly. Early detection and communication yielded the best ideal outcomes. A community-based response ensured timely case search and contact tracing for the isolation and management of patients. The syndrome-based EVD case definition and the laboratory screening tests for Ebola were used to detect cases. However, their unknown specificity and sensitivity and their low positive predictive values were a major weakness in the screening process. Validation of the criteria and the tests at the local level was essential. There were gaps in isolation procedures as 64% of the health care workers were infected after the isolation units were established. Palliative treatment was an important part of management as it improved survival and public confidence. Therefore, survival and not just quarantine must be emphasized and be a critical component of EVD management. Substantial investment in human resource for health is needed to attract, reward, retain and compensate health workers. Collaboration and partnerships at national and international level is vital in building health systems for early surveillance and management of emerging infections. The Uganda experience provides opportunities for further research on some of these strategies that could improve the management and control of Ebola in low resource countries.

Keywords: Ebola, outbreaks, detection, management, resources

1. Introduction

1.1. Ebola Virus Disease (EVD)

Five outbreaks of EVD occurred in Uganda between 2000 and 2012 [1–4]. In this paper, we describe our experience, challenges and opportunities that existed during the Ebola outbreaks in Uganda. The Gulu outbreak in 2000 was the largest and most complex occurrence in the midst of an insurgency and severely deteriorated social services [5]. The first reported outbreak of EVD was identified in 1976, in the DR Congo, on the border of Sudan [6]. Since then, there have been 26 outbreaks in Equatorial Africa occurring in DR Congo, Gabon, Sudan and Uganda. The majority of these outbreaks were minor. The most serious outbreak occurred in West Africa in 2014 causing some 23,000 cases and 11,000 deaths in Liberia, Guinea and Sierra Leone [7]. Of the five known species (EBOV, SUDV, RESTV, TAFV, BDBV) only three are associated with disease. The *Zaire ebolavirus* has the highest case fatality (90%) while the *Sudan ebolavirus* is medium at 50–55% [8]. The *case fatality for the Bundibugyo ebolavirus* is low at 34%. There is no known cure yet for the disease. Ebola symptoms mimic several common diseases in the tropics including malaria.

Lymphoid tissue such as the liver, spleen, and thymus are critical targets which are often severely damaged leading to liver necrosis, bleeding manifestations and shock. Organ damage leads to a series of metabolic dysfunctions which maintain blood pressure homeostasis [9, 10]. Fruit bats are potential reservoirs of the *Zaire ebolavirus* through direct contact with freshly killed bats or when ingested as food [11]. Asymptomatic infection of between 4–15% among the pygmies in Gabon and DR Congo [12] has been demonstrated suggesting some previous exposure to Ebola or cross-reacting strains. Ebola has been isolated from seminal fluids 61 days after onset of illness [13]. This may be a potential source of infection in large outbreaks in low resource settings. Direct contact with body fluids of an infected person (dead or alive) via broken skin or mucosal surfaces is probably the most important route of infection [14]. The intramuscular route is perceived to be more effective [14]. In poor healthcare settings, contaminated needles and syringes are likely sources of infection. Re-use of needles, for instance, played a key role in escalating the epidemics in Sudan and DR Congo in 1976 [15].

1.2. Ebola outbreaks in Uganda 2000–2012

In 2000, some 425 cases and 224 deaths occurred in Gulu district and 31 health care workers were infected. The affected village was Rwot Obillo, 14 km north of Gulu towards the border with South Sudan. The local community was inaccessible because of on-going military operations against insurgency in the area. On the 8th of October, 2000, three student nurses died in Lacor hospital [1]. On the 12th of October the Sudan Ebola virus was confirmed among the blood samples taken. Nearly 2 million people most of whom lived in camps were at risk in the region [16]. Rural residents commuted to Gulu town for fear of Ebola and abduction from LRA rebels. Two patients in Gulu escaped to Masindi and Mbarara districts, but were followed, isolated and contained. The outbreak lasted 6 months.

- Either an epidemiologic *link* to a person with probable or confirmed EHF, OR
 - Either no specimen collected for laboratory testing or a negative laboratory result in a specimen collected 0-3 days after onset of symptoms in a person with suspected EHF.
- Confirmed case**
- Laboratory confirmation of infection by isolation of virus from any body fluid or tissue, OR
 - Detection of *viral antigen* in any body fluid or tissue by antigen-detection ELISA, reverse transcription-PCR, or immuno-histochemistry, OR
 - Demonstration of serum Ebola virus-specific IgG antibodies by ELISA, with or without IgM, in any person with suspected or probable EHF.
- Contact** A person who had slept in the same household and/or had direct physical contact with a person (dead or alive) with suspected, probable, or confirmed EHF, and/or had been exposed to an infected person or to an infected person's secretions, excretions, tissues, or linen within 3 weeks after that person's onset of illness.
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