Ebola Virus Disease

An Update on Epidemiology, Symptoms, Laboratory Findings, Diagnostic Issues, and Infection Prevention and Control Issues for Laboratory Professionals

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KEYWORDS

• Ebola • Viral hemorrhagic fever • Safety • Preparedness

KEY POINTS

- The 2013-2016 Ebola virus disease (EVD) outbreak in West Africa was unprecedented in both scale and location.
- The large number of patients infected has led to an increased knowledge base about EVD, though much remains to be elucidated.
- The experience in the countries directly affected, as well as those in resource-rich settings which cared for imported cases, has highlighted the requirement for clear diagnostic, management, and infection prevention and control pathways in dealing with such infections.
- Facilities should be aware of blood abnormalities, clinical manifestations, and epidemiological risks for EVD acquisition, and national recommendations regarding processing of potentially-infected clinical samples.

Funding Support & Conflict of Interest: No funding. The authors have nothing to disclose.
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Clin Lab Med 37 (2017) 269–284
http://dx.doi.org/10.1016/j.cll.2017.01.003 **labmed.theclinics.com**
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HISTORY OF EBOLA VIRUS DISEASE

Ebola virus disease (EVD) has historically been one of the world's most feared diseases. First discovered with simultaneous outbreaks in Nzara, South Sudan, and Yambuka, Democratic Republic of the Congo (previously called Zaire), by 2013 there had been more than 1700 cases with a case fatality rate ranging from 25% to 90%.[1] There are 4 strains of virus that affect humans, with Zaire ebolavirus the most commonly seen in outbreaks (the others being Sudan, Bundigbugyo, Taï Forest). Reston ebolavirus causes infection in nonhuman primates and swine, although there is serologic evidence of response to subclinical infection in humans.[2]

Until 2014, EVD was thought to be a disease that was too rapidly fatal to lead to widespread outbreaks. It was thought to be a localized, rural disease in Central Africa, with limited risk of transfer to large urban centers, with subsequent risk on onward regional or global dispersal. The largest outbreak seen to date was in Gulu, Uganda, in 2000, with 425 cases with a case fatality rate of 53%.[1] The 2013 to 2016 EVD Outbreak in West Africa radically challenged those assumptions. Recognized in early March 2014 in Guinea and Liberia and in May 2014 in Sierra Leone, with an index case thought to have arisen in Guinea in December 2013, by the time the World Health Organization (WHO) declared the conclusion of the Public Health Emergency of International Concern in March 2016,[3] more than 28,000 people had been infected, with more than 11,00 deaths.[4] Cases were imported into, some with localized onward transmission in Mali (8), Nigeria (20), the United States (2), the United Kingdom (1), Senegal (1), and Spain (1),[4] along with the repatriation of a further 24 patients to the United States and Europe.[5] Early modeling in September 2014 suggested that many countries could expect imported cases based on existing air traffic routes, with West African and European countries being most at risk (with up to 50% likelihood suggested for Ghana).[6] With a reduction in service as airlines canceled travel, by the end of 2014, this was revised to a risk of approximately 3 travelers infected with Ebola virus (EBOV) departing the 3 most affected countries via commercial flights each month.[7] Many countries implemented returning traveler surveillance schemes. Models suggested that these may detect some and identify the remainder through dedicated information and passenger follow-up.[8] Although the projected number of imported cases were not seen, facilities worldwide were needed to make adequate preparations for advance management of cases, including appropriate isolation, testing, and treatment of suspected patients with viral hemorrhagic fevers (VHF).[9]

In this review, the authors highlight the epidemiology, symptoms, laboratory findings, diagnostics, and infection prevention and control issues that will be useful for laboratory professionals managing such suspect cases.

RISK ASSESSMENT OF THE RETURNING TRAVELER

Within the United Kingdom, the Advisory Committee on Dangerous Pathogens (ACDP), an expert committee of the Department of Health, produces guidelines for the recommended assessment and management of returning febrile travelers at risk of Hazard Group 4 pathogens (VHF and similar human infectious diseases of high consequence, also known as high containment pathogens). These guidelines have been recently updated to allow for more local processing of samples with recognition that the vast majority of patients who trigger a VHF screen will have an alternative diagnosis.[10] The ACDP guidelines have clear algorithms on which questions should be asked in order to ascertain whether VHFs should be considered within a differential diagnosis; these include initial screening questions on the presence or history of a fever greater than 37.5°C, and development of symptoms within 21 days of leaving a

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