We write to provide an update on the evolving Ebola outbreak in West Africa. Of particular relevance for infectious disease specialists is information on the identification and care of possible imported cases of Ebola virus disease (EVD) in the United States. This communication is current as of August 21, 2014, and contains links to the sources where anticipated updates will be found in the near future.

**EPIDEMIOLOGY**

In early 2014, investigation of cases of fever, vomiting, and severe diarrhea led to the identification of EVD in Guinea [1]. Previously only a single case of human infection with Tai Forest ebolavirus in Ivory Coast in 1994 had been reported [2], and EVD was viewed as endemic in Central, but not West, Africa. The Ebola virus identified in Guinea appears to have had a common ancestor with Zaire ebolavirus strains circulating in Central Africa, with subsequent parallel evolution with them [1]. As of August 21, 2014, EVD in West Africa is now the largest and most complex epidemic of Ebola ever. More than 2000 cases with a fatality rate of approximately 60% have occurred in Guinea, Sierra Leone, Liberia, and Lagos, Nigeria. The World Health Organization now registers it as a Public Health Emergency Of International Concern [3].

**CLINICAL ASPECTS**

Fever, myalgia, vomiting, diarrhea, and/or abdominal pain are among the most consistently observed signs early in the course of EVD [4, 5]. These symptoms are nonspecific and can be seen in other illnesses (eg, malaria, typhoid fever, and Lassa fever) common in the areas where EVD is presently occurring. Clinically evident bleeding is noted in only about one-third of cases [6].

It is critical to take a travel history from patients presenting with these symptoms [7]. This includes dates and location of travel to and within affected areas, not just of the patient but of others with whom the patient has been in close contact. For those who have traveled to areas with ongoing Ebola transmission, questions should focus on close contact with or care of ill persons, clinical or laboratory work in medical facilities, preparation of the dead for burial or participation in funeral rites, and handling of bats, rodents, or primates [8]. Use of personal protective equipment (PPE) with any of these activities should be assessed as well. The average incubation period is 8–10 days (range, 2–21 days) [4].

**APPROACH TO THE PATIENT**

At the present time in the United States, ill persons who have been in one of the outbreak countries should have both symptoms of and risk factors for EVD to be a suspected case [8] including (1) fever of >38.6°C (101.5°F) and (2) severe headache, muscle pain, vomiting, diarrhea, abdominal pain, or hemorrhage.

If the ill patient has the following exposures in their history, EVD should be suspected:

1. High-risk exposures: percutaneous or mucous membrane exposure to body fluids of EVD patients, direct care of EVD patients without PPE, laboratory exposure to body fluids of confirmed EVD patients without standard PPE or biosafety precautions, and direct exposure to deceased persons (including at funeral rites) in areas with EVD transmission.
2. Low-risk exposures: household or casual contact with an EVD patient, and provision of care or casual contact in medical facilities in affected areas.

A helpful flowchart for these case and contact evaluations has been prepared [9].

**DIAGNOSTICS**

Routine hematology, chemistry, and other testing of suspected EVD patients can be done safely in clinical laboratories; the phlebotomist and laboratory personnel should utilize infection control steps already described for specimen collection and specimen processing in the laboratory [10]. A printable fact sheet is now available [11].

Consultation with state or local public health departments must be done for all persons with possible EVD and/or contacts and in conjunction with making arrangements for Ebola testing [10].

Diagnostic methods include viral detection in blood by real-time reverse transcription polymerase chain reaction (PCR) and serology for IgM and IgG. Ebola virus in blood is usually detectable by PCR by 3 days after symptom onset. Viral cultures should not be ordered on patients with suspected EVD, as Ebola virus isolation should only be performed in a Biosafety Level 4 facility. Blood should be collected in plastic collection tubes, not glass.

**INFECTION CONTROL**

Infectious disease specialists are particularly attuned to the rapid importation of infectious diseases facilitated by air travel today. Along with our public health colleagues, infectious disease specialists can bring valuable perspective and balance to the identification, isolation, and care of persons with possible EVD.

Infection control is an integral part of preparedness and can be divided into 3 interrelated areas: (1) clinical care of patients, (2) clinical laboratory testing of biological specimens from patients, and (3) environmental decontamination and disposal.

**CLINICAL CARE OF PATIENTS**

Appropriate isolation begins at triage for any patient with compatible symptoms and travel to an area with EVD transmission [12]. The patient should be placed in a single room with private bathroom; provider access should be limited; standard, contact, and droplet precautions should be instituted [13]. Key components of PPE include fluid-resistant or impermeable gowns, fluid-resistant face mask to cover nose and mouth, full eye protection either as goggles or full face shield, and gloves. Head covering, impermeable leg covering, and shoe covering would be used in clinical circumstances in which there are, or are likely to be, uncontrolled splashes and/or environmental contamination with biological fluids (blood, diarrheal stool, urine, vomitus). Appropriate training in and monitoring of safe removal of PPE is critical to minimize exposures of healthcare personnel.

Procedures or circumstances in which aerosols may be generated should include additional environmental and PPE measures for airborne precautions such as a negative pressure room, N-95 or greater filtering respirator, or powered air-purifying respiratory respirator [13].

Because of vastly different circumstances, facilities in Africa that care for EVD patients have used near total body covering for PPE. These include multiple patients in one area (some of whom may be quite ill), high patient to provider ratios, no or limited electricity and running water, high ambient temperatures, dirt floors, extensive environmental contamination with infected body fluids, and limited resources for environmental decontamination. Even in such difficult settings, control of EVD transmission in outbreaks has been achieved with contact and droplet isolation and guidance developed that is quite instructive [14]. A recent commentary reiterated the evidence base for the Centers for Disease Control and Prevention (CDC) infection control recommendations from experience gained during Ebola outbreaks, underscoring that even in households of EVD patients where secondary cases occurred, blood exposure, not shared airspace, was the risk factor for transmission [15].

The Infectious Diseases Society of America (IDSA) does not encourage or support the categorical use of PPE or engineering controls beyond contact and droplet isolation by a facility in the United States for every suspected EVD patient. At this time, facilities should develop approaches for care of patients with suspected EVD that are appropriate to the symptoms and severity of illness, and for which appropriate PPE and infection control measures are targeted.

**CLINICAL LABORATORY TESTING OF BIOLOGICAL SPECIMENS FROM PATIENTS**

Testing of clinical specimens should be kept to a minimum. Procedures for transport, processing, and shipment have been delineated along with steps (see above) to mitigate risk to laboratory personnel. Note is made that Environmental Protection Agency–registered disinfectants used to clean and decontaminate lab surfaces are adequate for enveloped viruses, including Ebola, when used according to manufacturer directions [10].

**ENVIRONMENTAL DECONTAMINATION AND DISPOSAL**

Disposable equipment should be used as much as possible. Environmental services staff should use PPE (as a minimum:
gowns, gloves, face mask and goggles or face shield) in their performance of cleaning and disinfection. Additional barriers (eg, leg covers, shoe covers) should be used as needed. Detailed information on environmental decontamination, disinfection, and disposal of medical and human waste is available [16]. Consideration should be given to regulated medical waste disposal, as most companies that dispose of regulated medical waste will not accept waste contaminated with Ebola virus unless it is sterilized.

**MANAGEMENT OF PERSONS WITH POSSIBLE EXPOSURE TO EVD**

Persons with either a high- or low-risk exposure to EVD should be monitored for 21 days [17]. This entails twice-daily checks for fever, self-monitoring for symptoms, and reporting any new health developments to health authorities. Restriction of activities and movement also need review with the exposed person.

**SUMMARY**

During 2014, a complex and expanding outbreak of EVD has been recognized in West Africa. Isolation of cases and follow-up of contacts are the main components of the strategy to halt the outbreak, but it will likely take months to achieve the goal. IDSA members will play key roles in preparedness and response for imported cases and should become knowledgeable of the available clinical and public health guidance. They can guide facility preparations toward plans that are clinically responsive and use resources effectively and responsibly. The IDSA is working with colleagues at the CDC, public health agencies, and professional organizations and will update members on additional developments and new guidance including anticipated provider and facility checklists, laboratory aspects, travel, and other topics.

A web version of this communication can be found at http://www.idsociety.org/2014_ebola/.

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