

**INFECTION CONTROL GUIDELINES FOR
MANAGEMENT OF SUSPECTED OR CONFIRMED
EBOLA VIRUS DISEASE (EVD)**

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I. Introduction

The Ministry of Health of Saudi Arabia has developed the following guidelines to meet the urgent need for up-to-date information and evidence-based recommendations for the safe care of patients with suspected or confirmed Ebola virus disease (EVD) in healthcare facilities. The main bulk of the guidelines has been adapted from guidelines produced by the Centers for Disease Control and Prevention (CDC)[1-3] and the World Health Organization (WHO)[4]. Early recognition of EVD is critical for prompt implementation of infection control measures to prevent transmission of this contagious and deadly infection.

II. Background

- ✦ Ebola virus disease (EVD), formerly known as Ebola haemorrhagic fever, is a severe, often fatal illness in humans that first appeared in 1976 in 2 simultaneous outbreaks, in Nzara, Sudan, and in Yambuku, Democratic Republic of Congo. The latter was in a village situated near the Ebola River, from which the disease takes its name.
- ✦ The current EVD outbreak began in Guinea in December 2013. This outbreak now involves transmission in Guinea, Liberia, Sierra Leone, and lately Nigeria. As of 6 August 2014, the cumulative number of cases attributed to EVD in the four countries stands at 1779, including 961 deaths. The distribution and classification of the cases are as follows: Guinea, 495 cases (355 confirmed, 140 suspected), including 367 deaths; Liberia, 554 cases (148 confirmed, and 406 suspected), including 294 deaths; Sierra Leone, 717 cases (631 confirmed, and 86 suspected), including 298 deaths; and Nigeria, 13 cases (0 confirmed, and 13 suspected), including 2 deaths. This is currently the largest EVD outbreak ever recorded.
- ✦ EVD outbreaks have a case fatality rate of up to 90%.
- ✦ EVD outbreaks occur primarily in remote villages in Central and West Africa, near tropical rainforests.
- ✦ The virus is transmitted to people from wild animals and spreads in the human population through human-to-human transmission.
- ✦ Fruit bats of the *Pteropodidae* family are considered to be the natural host of the Ebola virus.
- ✦ Ebola is introduced into the human population through close contact with the blood, secretions, organs or other bodily fluids of infected animals. In Africa, infection has been documented through the handling of infected chimpanzees, gorillas, fruit bats, monkeys, forest antelope and porcupines found ill or dead or in the rainforest.
- ✦ Ebola then spreads in the community through human-to-human transmission, with infection resulting from direct contact (through broken skin or mucous membranes) with the blood, secretions, organs or other bodily fluids of infected people, and indirect contact with environments contaminated with such fluids. Burial ceremonies in which mourners have direct contact with the body of the deceased person can also play a role in the transmission of Ebola.
- ✦ Men who have recovered from the disease can still transmit the virus through their semen for up to 7 weeks after recovery from illness.
- ✦ Severely ill patients require intensive supportive care.

- ✚ No licensed specific treatment or vaccine is available for use in people or animals

III. Case Definition for Ebola Virus Disease (EVD)

Suspected Case

Illness in a person who has both consistent symptoms and risk factors as follows:

- Clinical criteria, which includes fever of greater than 38.6°C, and additional symptoms such as severe headache, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained hemorrhage (gingival, nasal, cutaneous [petechiae, bruises, ecchymosis], gastrointestinal, rectal [gross or occult blood], urinary [gross or microscopic hematuria], vaginal, or puncture sites bleeding); AND
- Epidemiologic risk factors within the past 3 weeks before the onset of symptoms, such as contact with blood or other body fluids of a patient known to have or suspected to have EVD; residence in—or travel to—an area where EVD transmission is active; or direct handling of dead or alive fruit bats, monkeys, chimpanzees, gorillas, forest antelope and porcupines from disease-endemic areas. Malaria diagnostics should also be a part of initial testing because it is a common cause of febrile illness in persons with a travel history to the affected countries.

Confirmed Case

A suspected case with laboratory-confirmed diagnostic evidence of Ebola virus infection.

IV. Laboratory Diagnosis

- Laboratory tests to confirm EVD should only be performed in MOH-accredited laboratories and verified with a WHO-accredited reference laboratory.
- Extreme caution should be exercised in collecting, transporting, and shipping samples from EVD patients.
- To confirm EVD, blood samples from the patient should be collected in 2 types of tubes a) EDTA (CBC) blood tubes for the PCR test and viral isolation from plasma; and b) Plain tube (red-top) for antibody and antigen detection tests and viral isolation from serum. At least 2 EDTA and 2 plain tubes should be collected to be able to confirm the diagnosis in two independent laboratories.
- Please refer to the MOH Guidelines for Specimen Collection, Transport, Testing, and Submission for Patients with Suspected Infection with Ebola Virus Disease for details.

- Laboratory tests used in diagnosis include:

Timeline of Infection	Diagnostic tests available
Within a few days after symptoms begin	<ul style="list-style-type: none"> • Antigen-capture enzyme-linked immunosorbent assay (ELISA) testing • IgM ELISA • Polymerase chain reaction (PCR) • Virus isolation
Later in disease course or after recovery	<ul style="list-style-type: none"> • IgM and IgG antibodies
Retrospectively in deceased patients	<ul style="list-style-type: none"> • Immunohistochemistry testing • PCR • Virus isolation

V. Patient Placement

- Isolation Units should be identified as EVD isolation units. These units should be able to function as a self-contained closed unit with no movement of patients in or out.
- Place the patient in a single room (containing a private bathroom) with the door closed
- Isolation units should maintain a log of all persons entering the patient's room
- Keep all routine supplies for patient care outside of the isolation room.
- Utilize isolation carts for extra supplies.
- Keep containers with decontamination solutions in the anteroom.
- Restrict entry to only those considered essential.
- Do not move patients in the isolation room/unit in or out unless absolutely necessary.
- Do not interchange staff in this area with other areas in the hospital.

VI. Personal Protective Equipment (PPE)

- All persons entering the patient room should wear at least:
 - Gloves
 - Gown (fluid resistant or impermeable)
 - Eye protection (goggles or face shield)
 - Face mask
 - Additional PPE might be required in certain situations (e.g., copious amounts of blood, other body fluids, vomit, or feces present in the environment), including but not limited to:
 - Full body (overall) water-proof suit that covers the whole body from head to ankles.
 - Double gloving
 - Disposable shoe covers

- Recommended PPE should be worn by HCWs upon entry into patient rooms or care areas.
- Upon exit from the patient room or care area, PPE should be carefully removed and discarded without contaminating one's eyes, mucous membranes, or clothing with potentially infectious materials.
- Hand hygiene should be performed immediately after removal of PPE.

VII. Patient Care Equipment

- Dedicated medical equipment (preferably disposable, when possible) should be used for the provision of patient care.
- All non-dedicated, non-disposable medical equipment used for patient care should be cleaned and disinfected according to manufacturer's instructions and hospital policies.

VIII. Patient Care Considerations

- Limit the use of needles and other sharps as much as possible
- Phlebotomy, procedures, and laboratory testing should be limited to the minimum necessary for essential diagnostic evaluation and medical care
- All needles and sharps should be handled with extreme care and disposed in puncture-proof, sealed containers

IX. Aerosol Generating Procedures (AGPs)

- An aerosol-generating procedure (AGP) is defined as any medical procedure that can induce the production of aerosols of various sizes, including small (< 5 micron) particles.
- Aerosol-generating procedures that may be associated with an increased risk of infection transmission includes both elective procedures such as bronchoscopy, sputum induction, elective intubation and extubation, as well as emergency procedures such as cardiopulmonary resuscitation, initiation of Bilevel Positive Airway Pressure-BIPAP, emergency intubation, open suctioning of airways, manual ventilation via umbo bagging through a mask before intubation.
- Avoid AGPs for EVD patients.
- Additional precautions when performing aerosol-generating procedures:
 - Wear N95 masks –Every healthcare worker should wear a fit tested N95 mask (or an alternative respirator if fit testing failed e.g., powered air purifying respiratory or elastomeric respirator). Additionally, when putting on N95 mask, always check the seal.
 - Wear eye protection (i.e. goggles or a face shield that fully covers the front and sides of the face).
 - Wear a clean, non-sterile, long-sleeved water-proof gown and gloves (some of these procedures require sterile gloves).
 - Wear disposable shoe covers.

- Perform procedures in a negative pressure room. When a negative pressure room is not available, conduct the procedure in a private room. Room doors should be kept closed during the procedure except when entering or leaving the room, and entry and exit should be minimized during and shortly after the procedure.
- Limit the number of persons present in the room to those essential for patient-care and support.
- Perform hand hygiene before and after contact with the patient and his or her surroundings and after PPE removal.
- Conduct environmental surface cleaning following procedures (see section below on environmental infection control).
- If re-usable equipment or PPE (e.g. Powered air purifying respirator, elastomeric respirator, etc.) are used, they should be cleaned and disinfected according to manufacturer instructions and hospital policies.
- Collection and handling of soiled re-usable respirators must be done by trained individuals using PPE as described above for routine patient care.

X. Environmental Infection Control

- Diligent environmental cleaning and disinfection and safe handling of potentially contaminated materials is paramount, as blood, sweat, emesis, feces and other body secretions represent potentially infectious materials
- HCWs performing environmental cleaning and disinfection should wear recommended PPE (described above) and consider use of additional barriers (shoe and leg coverings, etc.) if needed.
- Face protection (face shield or facemask with goggles) should be worn when performing tasks such as liquid waste disposal that can generate splashes.
- Follow standard procedures, per hospital policy and manufacturers' instructions, for cleaning and/or disinfection of:
 - Environmental surfaces and equipment
 - Textiles and laundry
 - Food utensils and dishware

XI. Safe Injection Practices

- Facilities should follow safe injection practices as specified under Standard Precautions.
- Any injection equipment or parenteral medication container that enters the patient treatment area should be dedicated to that patient and disposed of at the point of use.

XII. Duration of Infection Control Precautions

Duration of precautions should be determined on a case-by-case basis. Factors that should be considered include, but are not limited to: presence of symptoms related to EVD, date symptoms resolved, other conditions that would require specific precautions (e.g., tuberculosis, *Clostridium difficile*) and available laboratory information

XIII. Monitoring and Management of Potentially Exposed Healthcare Workers (HCWs)

- Facilities should develop policies for monitoring and management of potentially exposed HCWs
- Persons with percutaneous or mucocutaneous exposures to blood, body fluids, secretions, or excretions from a patient with suspected EVD should:
 - Stop working and immediately wash the affected skin surfaces with soap and water. Mucous membranes (e.g., conjunctiva) should be irrigated with copious amounts of water or eyewash solution
 - Immediately contact occupational health/supervisor for assessment and access to postexposure management services for all appropriate pathogens (e.g., Human Immunodeficiency Virus, Hepatitis C, etc.)
- HCWs who develop sudden onset of fever, intense weakness or muscle pains, vomiting, diarrhea, or any signs of hemorrhage after an unprotected exposure (i.e. not wearing recommended PPE at the time of patient contact or through direct contact to blood or body fluids) to a patient with EVD should:
 - Not report to work or should immediately stop working
 - Notify their supervisor
 - Seek prompt medical evaluation and testing
 - Notify public health/infection control departments
 - Comply with work exclusion until they are deemed no longer infectious to others
- For asymptomatic HCWs who had an unprotected exposure (i.e. not wearing recommended PPE at the time of patient contact or through direct contact to blood or body fluids) to a patient with EVD:
 - Should receive medical evaluation and follow-up care including fever monitoring twice daily for 21 days after the last known exposure.
 - Hospitals should consider policies ensuring twice daily contact with exposed HCWs to discuss potential symptoms and document fever checks
 - May continue to work while receiving twice daily fever checks, based upon hospital policy and discussion with local, state, and federal public health authorities.
 - Asymptomatic HCWs are not allowed to travel by commercial conveyances (airplane, ship, and train).
 - Local travel for asymptomatic HCWs (e.g. taxi, bus) should be assessed in consultation with local public health authorities.

XIV. Monitoring and Management of Potentially Exposed Non-Healthcare Workers (NHCWs) in the Community

- The Department of Public Health in the Ministry of Health should identify and monitor all potentially exposed contacts who had close contact (within 1.5 meters) with a dead or alive patient after the onset of the patient's EVD illness. People who had close contact with the patient before the onset of his/her illness need not to be identified or monitored.
- Asymptomatic contacts should be contacted by the public health office at least once daily by phone for 21 days after the last contact to assess his/her health and this should be documented on daily basis in a logbook for each contact. The public health officer should inquire about any fever, intense weakness or muscle pains, vomiting, or

diarrhea, and advise those who have any of these symptoms to come immediately to a hospital for evaluation.

- Contacts should be advised to check and document their temperatures twice daily for 21 days and notify the public health office if they develop any fever (temperature more than 37.2oC) or other illness within the follow up period.
- Asymptomatic contacts may continue their daily activities and go out of their home (e.g. to work, school, or shopping). If they develop any illness, they should promptly seek medical advice.
- Asymptomatic contacts are not allowed to travel by commercial conveyances (airplane, ship, and train).
- Local travel for asymptomatic individuals (e.g. taxi, bus) should be assessed in consultation with local public health authorities.
- Patients who have recovered from EVD should abstain from sexual activity for 2 months after recovery.

XV. Monitoring, Management, and Training of Visitors

- Avoid entry of visitors into the patient's room. Exceptions may be considered on a case by case basis for those who are essential for the patient's wellbeing.
- Establish procedures for monitoring managing and training visitors.
- Visits should be scheduled and controlled to allow for:
 - Screening for EVD (e.g., fever and other symptoms) before entering or upon arrival to the hospital
 - Evaluating risk to the health of the visitor and ability to comply with precautions
 - Providing instruction, before entry into the patient care area on hand hygiene, limiting surfaces touched, and use of PPE according to the current facility policy while in the patient's room
 - Visitor movement within the facility should be restricted to the patient care area and an immediately adjacent waiting area.

XVI. Management of the Deceased

- Body washing must be done in the hospital. No washing can be done outside of the hospital setting
- HCWs dealing with the body should wear gloves, a gown, disposable shoe covers, and either a face shield that fully covers the front and sides of the face or goggles, and N95 mask. Put the body in double fluid-resistant body bag. After placing the body in the first bag, disinfect the outer surface of the bag using a hospital-approved disinfectant before placing the body in a second bag and then disinfect the outer surface of the second bag.
- All equipment, table and counter surfaces, stretchers, body boards and transport trolleys must be cleaned after every patient using hospital-approved disinfectants.

XVII. References

1. Infection Prevention and Control Recommendations for Hospitalized Patients with Known or Suspected Ebola Hemorrhagic Fever in U.S. Hospitals. CDC 1 August 2014. Available at: <http://www.cdc.gov/vhf/ebola/hcp/infection-prevention-and-control-recommendations.html>.
2. Safe Management of Patients with Ebola Virus Disease (EVD) in U.S. Hospitals. CDC 6 August 2014. Available at: <http://www.cdc.gov/vhf/ebola/hcp/patient-management-us-hospitals.html>.
3. Interim Guidance for Monitoring and Movement of Persons with Ebola Virus Disease Exposure. CDC 8 August 2014. Available at: <http://www.cdc.gov/vhf/ebola/hcp/monitoring-and-movement-of-persons-with-exposure.html>.
4. Interim Infection Control Recommendations for Care of Patients with Suspected or Confirmed Filovirus (Ebola, Marburg) Hemorrhagic Fever. BDP/EPR/WHO, Geneva March 2008. Available at: http://www.who.int/csr/bioriskreduction/interim_recommendations_filovirus.pdf?ua=1.