

WEST AFRICAN EBOLA VIRUS DISEASE (EVD) OUTBREAK - 2014 WHEN SHOULD YOU THINK EBOLA?

Transmission, Clinical Diagnosis, & Risk Assessment

Infection Control and Prevention

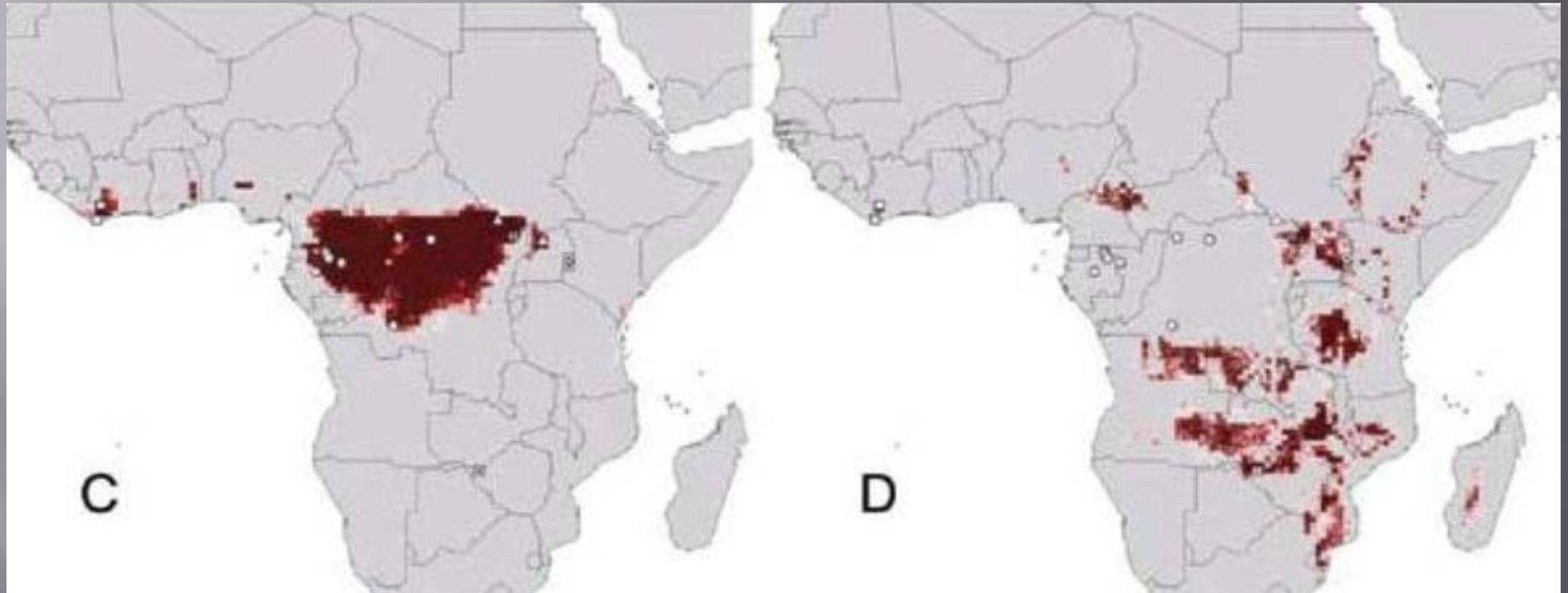
Reporting

Course of Illness

Indication for Testing

Management/Experimental Treatments

Distribution of Endemic Areas of Ebola and Marburg viruses (before 2014 outbreak)



Distribution of Ebola (C) and Marburg viruses (D)

Past Ebola outbreaks have occurred in the following countries:

- ▣ Democratic Republic of the Congo (DRC)
- ▣ Gabon
- ▣ South Sudan
- ▣ Ivory Coast
- ▣ Uganda
- ▣ Republic of the Congo (ROC)
- ▣ South Africa (imported)

Countries with cases of Ebola

Countries with Widespread Transmission

- ▣ Guinea
- ▣ Liberia
- ▣ Sierra Leone

Countries (Affected Areas) with Localized Transmission

- ▣ Nigeria (Port Harcourt and Lagos)
- ▣ Spain (Madrid)
- ▣ United States (Dallas, TX)

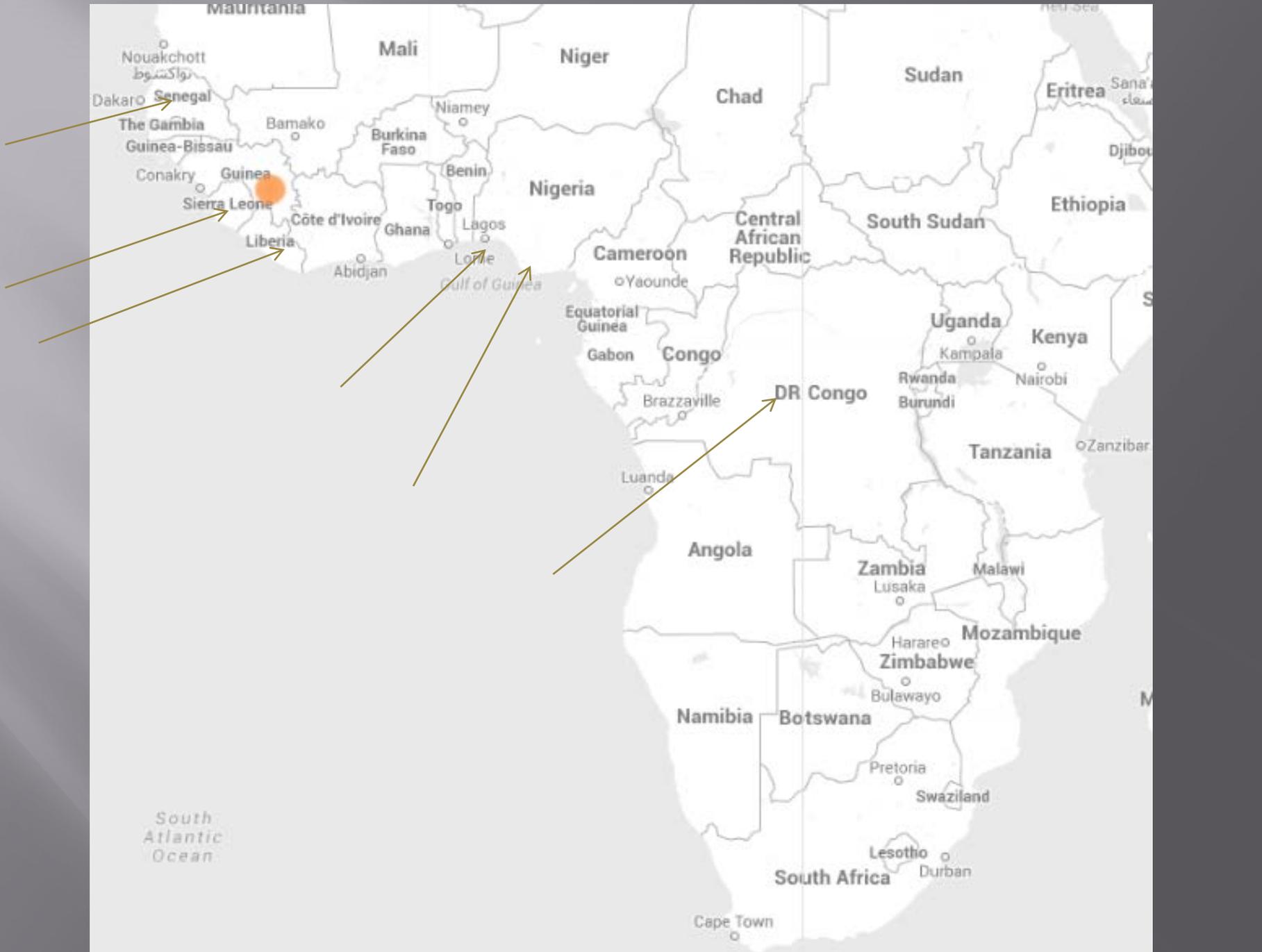
Countries (Affected Areas) with Travel-associated Case(s)

- ▣ Senegal (Dakar)

Persons who entered Nigeria on or after September 30, 2014 are *not at risk* for exposure to Ebola.

Persons who entered Senegal on or after September 20, 2014 are *not at risk* for exposure to Ebola.





Mauritania

Mali

Niger

Chad

Sudan

Eritrea

Nouakchott
Dakar
Senegal

The Gambia
Guinea-Bissau

Bamako

Burkina Faso

Niamey

Conakry
Guinea
Sierra Leone

Côte d'Ivoire

Ghana

Benin

Togo
Lagos

Nigeria

Cameroon

Central African Republic

South Sudan

Ethiopia

Abidjan

Lomé
Gulf of Guinea

Equatorial Guinea

Gabon

Congo

Luanda

Brazzaville

Angola

DR Congo

Uganda

Kenya

Kampala
Rwanda
Burundi

Tanzania

Zanzibar

Zambia
Lusaka

Malawi

Harare
Zimbabwe

Mozambique

Namibia

Botswana

Pretoria

Swaziland

Lesotho

South Africa

Durban

Cape Town

South Atlantic Ocean

Causative Agent

▣ Family Filoviridae

■ Genus Ebolavirus

1. Bundibugyo virus (BDBV)
2. Sudan virus (SUDV)
3. Tai Forest virus (TAFV)
4. Ebola virus (EBOV)- formerly Zaire Ebola virus
 - Causative agent of the West African Outbreak (2014)
5. Reston virus (RESTV) – not considered to cause disease in humans

The strain causing this outbreak is distinct from the strain that caused the outbreak in the Democratic Republic of Congo (DRC)

■ Genus Marburgvirus

Transmission

- ▣ The natural reservoir host of Ebola viruses has not yet been identified
- ▣ The initial case is believed to be due to infection through contact with an infected animal

Likely Host – Fruit Bat

Human-to-human transmission is spread through direct contact with blood or body fluids to:

- Urine (virus present late in disease)
 - Saliva
 - Sweat
 - Feces
 - Vomit
 - Breast milk
 - Semen (up to 3 months post-resolution)
- Infection via breastfeeding
- Abstinence for at least 3 months after resolution of illness
use of condoms if abstinence is not possible

OR

- Objects (like needles and syringes) that have been contaminated with the virus

OR

- Infected animals

Transmission

When infected body fluids come in contact with:

1. Broken Skin
2. Mucous Membranes
 - Eyes
 - Nose
 - Mouth

Who is at risk of becoming infected during human-to-human transmission outbreaks?

- ▣ Healthcare providers caring for Ebola virus infected and symptomatic patients
- ▣ Family and friends in close contact (<3 feet) with infected and symptomatic patients

Why?

- ▣ They are more likely to come in contact with infected blood or body fluids of the sick patient

Incubation Period

- ▣ Range: 2 to 21 days after exposure to Ebola
- ▣ Average: 8 to 10 days
- ▣ The incubation period may be related to the infection route
 - 6 days for injection
 - 10 days for contact

Initial Symptoms:

- ▣ Abrupt onset of fever
- ▣ Nonspecific symptoms
 - May include chills, myalgias, and malaise

Differential Diagnoses to Consider & Rule-Out or Rule-In

Other more common infectious diseases:

- Malaria
- Typhoid Fever
- Meningococemia
- Other Bacterial infections (e.g., pneumonia)

About 5 days after onset of symptoms:

Gastrointestinal symptoms

- Severe watery diarrhea
- Nausea
- Vomiting
- Abdominal pain

Other symptoms

- Chest pain
- Shortness of breath
- Headache or confusion
- Conjunctival injection
- Hiccups

The Rash

Diffuse erythematous maculopapular rash

- ▣ 5 – 7 days post-illness onset
- ▣ Usually involves the neck, trunk, and arms
- ▣ Desquamate around day 8 or 9

Rash is commonly missed in dark-skinned

- ▣ Desquamation may be only sign that rash occurred

Complications During Course of Illness

- ▣ Pregnant women may experience spontaneous miscarriages
- ▣ Secondary Infections

Bleeding frequency in the current outbreak

- ▣ Unexplained bleeding has been reported
 - 18% of patients
- ▣ Most often **blood in the stool** has been reported
 - About 6% of patients

Less Common & Late Occurring Symptoms & Signs:

Seizures

cerebral edema

Bleeding

Petechiae

ecchymosis/bruising

oozing from venipuncture sites

mucosal hemorrhage

Frank hemorrhage is less common

What is being seen in the current outbreak

The most common signs and symptoms reported

- ▣ From symptom-onset to the time the case is detected:
 - Fever (87%)
 - Fatigue (76%)
 - Vomiting (68%)
 - Diarrhea (66%)
 - Loss of appetite (65%)

Patients with fatal disease

(mean of 7.5 days from symptom-onset to death during the current outbreak in West Africa)

- ▣ Usually develop more severe clinical signs early during infection
- ▣ Die typically between days 6 and 16 of complications
 - Multi-organ failure
 - Septic shock

Risk Factors for Fatal Outcomes

- ▣ Age >45 years old
- ▣ Unexplained bleeding
- ▣ Number of other signs and symptoms
 - Diarrhea
 - Chest pain
 - Cough
 - Difficulty breathing
 - Difficulty swallowing
 - Conjunctivitis
 - Sore throat
 - Confusion
 - Hiccups
 - Coma or unconsciousness

In non-fatal cases

- ▣ May have fever for several days and improve, around day 6
- ▣ Survivors can
- ▣ Have a prolonged convalescence
- ▣ The case fatality proportion among patients with a known outcome is about 71%
(ranges from 46% in nigeria to 69-72% in guinea, sierra leone and liberia)

Laboratory Findings

- ▣ On admission
 - **Leukopenia** frequently with **lymphopenia**
- ▣ Later
 - **Elevated neutrophils** and a left shift
 - **Platelet counts** decreased - 50,000 to 100,000
 - **Amylase** – elevated
 - (pancreatic involvement - inflammation/infection)
 - **Hepatic transaminases** - elevated
 - ▣ Aspartate Aminotransferase (**AST**) > Alanine Aminotransferase (**ALT**)
 - ▣ Peak at more than 1,000 IU/L
 - **Proteinuria**
 - **Prothrombin (PT)** - prolonged
 - **Partial Thromboplastin Times (PTT)** - prolonged
 - **Fibrin degradation products** – elevated
 - ▣ Disseminated intravascular coagulation (DIC)

CASE DEFINITION FOR EBOLA VIRUS DISEASE (EVD)

- ▣ **Person Under Investigation (PUI)**
- ▣ A person who has both consistent symptoms and risk factors as follows:
 1. Clinical criteria, which includes fever of greater than 38.0 degrees Celsius or 100.4 degrees Fahrenheit, and **additional symptoms** such as severe headache, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained hemorrhage; AND
 2. Epidemiologic risk factors within the past 21 days before the onset of symptoms, such as contact with blood or other body fluids or human remains 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 bats or non-human primates from disease-endemic areas.

CASE DEFINITION FOR EBOLA VIRUS DISEASE (EVD)

Probable Case

- A PUI whose epidemiologic risk factors include high or low risk exposure(s) (see below)

Confirmed Case

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

EXPOSURE RISK LEVELS

High risk exposures

A high risk exposure includes any of the following:

- Percutaneous (e.g., needle stick) or mucous membrane exposure to blood or body fluids of EVD patient
- Direct skin contact with, or exposure to blood or body fluids of, an EVD patient without appropriate personal protective equipment (PPE)
- Processing blood or body fluids of a confirmed EVD patient without appropriate PPE or standard biosafety precautions
- Direct contact with a dead body without appropriate PPE in a country where an EVD outbreak is occurring

EXPOSURE RISK LEVELS

Low risk exposures

A low risk exposure includes any of the following

- **Household contact** with an EVD patient
- **Other close contact** with EVD patients in health care facilities or community settings.

Close contact is defined as

1. Being within approximately **3 feet (1 meter)** of an EVD patient or **within the patient's room or care area** for a prolonged period of time (e.g., health care personnel, household members) while *not wearing recommended personal protective equipment* (i.e., standard, droplet, and contact precautions; see Infection Prevention and Control Recommendations)
2. **Having direct brief contact** (e.g., shaking hands) with an EVD patient while *not wearing recommended personal protective equipment*.

No known exposure

- ▣ Having been in a country in which an EVD outbreak occurred within the past 21 days and having had no high or low risk exposures

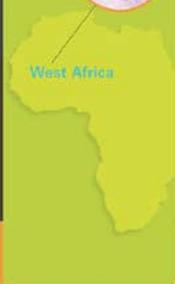
Could it be **EBOLA?**



Think Ebola



West Africa



Evaluate the patient



- Do they have:
 - Fever (subjective or $\geq 100.4^{\circ}\text{F}$ or $\geq 38^{\circ}\text{C}$)
 - Other symptoms, including:
 - Severe headache
 - Muscle pain
 - Weakness
 - Diarrhea
 - Vomiting
 - Abdominal (stomach) pain
 - Unexplained hemorrhage (bleeding or bruising)
- Take a detailed **travel and exposure history**. In the past 21 days, has the patient been:
 - To an area with Ebola
 - Exposed to an Ebola patient

Consult with public health



- Do you have a question about a possible case of Ebola?
 - For a list of state and local health department numbers, visit: <http://www.cdc.gov/vhf/ebola/outbreaks/state-local-health-department-contacts.html>
- Do I need to test?
 - You, the health department, and CDC will work together to determine if testing is necessary

Care Carefully



What **SHOULD** be done for a patient under investigation (PUI) for Ebola virus disease?

1. Activate the hospital preparedness plan for Ebola.
2. Isolate the patient in a separate room with a private bathroom.
3. Ensure standardized protocols are in place for PPE use and disposal.
4. Interview the patient for symptoms, contacts and travel history.
5. Consider and evaluate for all potential alternative diagnoses.
6. Ensure patient has the ability to communicate with family.

What **SHOULD NOT** be done for a patient under investigation (PUI) for Ebola virus disease?

1. Don't have any physical contact with the patient without putting on appropriate PPE.
2. Don't neglect the patient's medical needs.
3. Don't forget to evaluate for alternative diagnoses.
4. Don't perform elective tests or procedures.
5. Don't allow visitors without putting on appropriate PPE.

For more information on how to care for a person under investigation for Ebola, please visit: <http://www.cdc.gov/vhf/ebola/index.html>



Ebola Virus Disease (Ebola)

Algorithm for Evaluation of the Returned Traveler



FEVER (subjective or $\geq 100.4^{\circ}\text{F}$ or 38.0°C) or compatible Ebola symptoms* in a patient who has resided in or traveled to a country with wide-spread Ebola transmission** in the 21 days before illness onset
* headache, weakness, muscle pain, vomiting, diarrhea, abdominal pain, or hemorrhage

NO

Report asymptomatic patients with high- or low-risk exposures (see below) in the past 21 days to the health department

YES

1. Isolate patient in single room with a private bathroom and with the door to hallway closed
2. Implement standard, contact, and droplet precautions (gown, facemask, eye protection, and gloves)
3. Notify the hospital Infection Control Program and other appropriate staff
4. Evaluate for any risk exposures for Ebola
5. IMMEDIATELY report to the health department

HIGH-RISK EXPOSURE

Percutaneous (e.g., needle stick) or mucous membrane contact with blood or body fluids from an Ebola patient

OR

Direct skin contact with, or exposure to blood or body fluids of, an Ebola patient

OR

Processing blood or body fluids from an Ebola patient without appropriate personal protective equipment (PPE) or biosafety precautions

OR

Direct contact with a dead body (including during funeral rites) in a country with wide-spread Ebola transmission** without appropriate PPE

LOW-RISK EXPOSURE

Household members of an Ebola patient and others who had brief direct contact (e.g., shaking hands) with an Ebola patient without appropriate PPE

OR

Healthcare personnel in facilities with confirmed or probable Ebola patients who have been in the care area for a prolonged period of time while not wearing recommended PPE

NO KNOWN EXPOSURE

Residence in or travel to a country with wide-spread Ebola transmission** without HIGH- or LOW-risk exposure

Review Case with Health Department Including:

- Severity of illness
- Laboratory findings (e.g., platelet counts)
- Alternative diagnoses

Ebola suspected

Ebola not suspected

TESTING IS INDICATED

The health department will arrange specimen transport and testing at a Public Health Laboratory and CDC

The health department, in consultation with CDC, will provide guidance to the hospital on all aspects of patient care and management



U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

** CDC Website to check current countries with wide-spread transmission:
<http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html>

TESTING IS NOT INDICATED

If patient requires in-hospital management:

- Decisions regarding infection control precautions should be based on the patient's clinical situation and in consultation with hospital infection control and the health department
- If patient's symptoms progress or change, re-assess need for testing with the health department

If patient does not require in-hospital management:

- Alert the health department before discharge to arrange appropriate discharge instructions and to determine if the patient should self-monitor for illness
- Self-monitoring includes taking their temperature twice a day for 21 days after their last exposure to an Ebola patient

This algorithm is a tool to assist healthcare providers identify and triage patients who may have Ebola. The clinical criteria used in this algorithm (a single symptom consistent with Ebola) differ from the CDC case definition of a Person Under Investigation (PUI) for Ebola, which is more specific. Public health consultation alone does not imply that Ebola testing is necessary. More information on the PUI case definition: <http://www.cdc.gov/vhf/ebola/hcp/case-definition.html>



Checklist for Patients Being Evaluated for Ebola Virus Disease (EVD) in the United States

Upon arrival to clinical setting/triage

- Assess the patient for a fever (subjective or $\geq 100.4^{\circ}\text{F}$ / 38.0°C)
- Determine if the patient has symptoms compatible EVD such as headache, weakness, muscle pain, vomiting, diarrhea, abdominal pain or hemorrhage
- Assess if the patient has a potential exposure from traveling to a country with widespread Ebola transmission* or having contact with an Ebola patient in the 21 days before illness onset

Suspect Ebola if fever or compatible Ebola symptoms and an exposure are present

See next steps in this checklist and the Algorithm for Evaluation of the Returned Traveler for Ebola at <http://www.cdc.gov/vhf/ebola/pdf/ebola-algorithm.pdf>

Upon initial assessment

- Isolate patient in single room with a private bathroom and with the door to hallway closed
- Implement standard, contact, & droplet precautions
- Notify the hospital Infection Control Program at _____
- Report to the health department at _____

Conduct a risk assessment for: High-risk exposures

- Percutaneous (e.g., needle stick) or mucous membrane exposure to blood or body fluids from an EVD patient
- Direct skin contact with skin, blood or body fluids from an EVD patient
- Processing blood or body fluids from an EVD patient without appropriate PPE
- Direct contact with a dead body in an Ebola-affected area without appropriate PPE

Low-risk exposures

- Household members of an EVD patient or others who had brief direct contact (e.g., shaking hands) with an EVD patient without appropriate PPE
- Healthcare personnel in facilities with EVD patients who have been in care areas of EVD patients without recommended PPE

Use of personal protective equipment (PPE)

- Use a buddy system to ensure that PPE is put on and removed safely

Before entering patient room, wear:

- Gown (fluid resistant or impermeable)
- Facemask
- Eye protection (goggles or face shield)
- Gloves

If likely to be exposed to blood or body fluids, additional PPE may include but isn't limited to:

- Double gloving
- Disposable shoe covers
- Leg coverings

Upon exiting patient room

- PPE should be carefully removed without contaminating one's eyes, mucous membranes, or clothing with potentially infectious materials
- Discard disposable PPE
- Re-useable PPE should be cleaned and disinfected per the manufacturer's reprocessing instructions
- Hand hygiene should be performed immediately after removal of PPE

During aerosol-generating procedures

- Limit number of personnel present
- Conduct in an airborne infection isolation room
- Don PPE as described above except use a NIOSH certified fit-tested N95 filtering facepiece respirator for respiratory protection or alternative (e.g., PAPR) instead of a facemask

Patient placement and care considerations

- Maintain log of all persons entering patient's room
- Use dedicated disposable medical equipment (if possible)
- Limit the use of needles and other sharps
- Limit phlebotomy and laboratory testing to those procedures essential for diagnostics and medical care
- Carefully dispose of all needles and sharps in puncture-proof sealed containers
- Avoid aerosol-generating procedures if possible
- Wear PPE (detailed in center box) during environmental cleaning and use an EPA-registered hospital disinfectant with a label claim for non-enveloped viruses**

Initial patient management

- Consult with health department about diagnostic EVD RT-PCR testing***
- Consider, test for, and treat (when appropriate) other possible infectious causes of symptoms (e.g., malaria, bacterial infections)
- Provide aggressive supportive care including aggressive IV fluid resuscitation if warranted
- Assess for electrolyte abnormalities and replete
- Evaluate for evidence of bleeding and assess hematologic and coagulation parameters
- Symptomatic management of fever, nausea, vomiting, diarrhea, and abdominal pain
- Consult health department regarding other treatment options

This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

* See 2014 Ebola Outbreak in West Africa—Case Counts or <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html> to determine if a country has widespread Ebola transmission

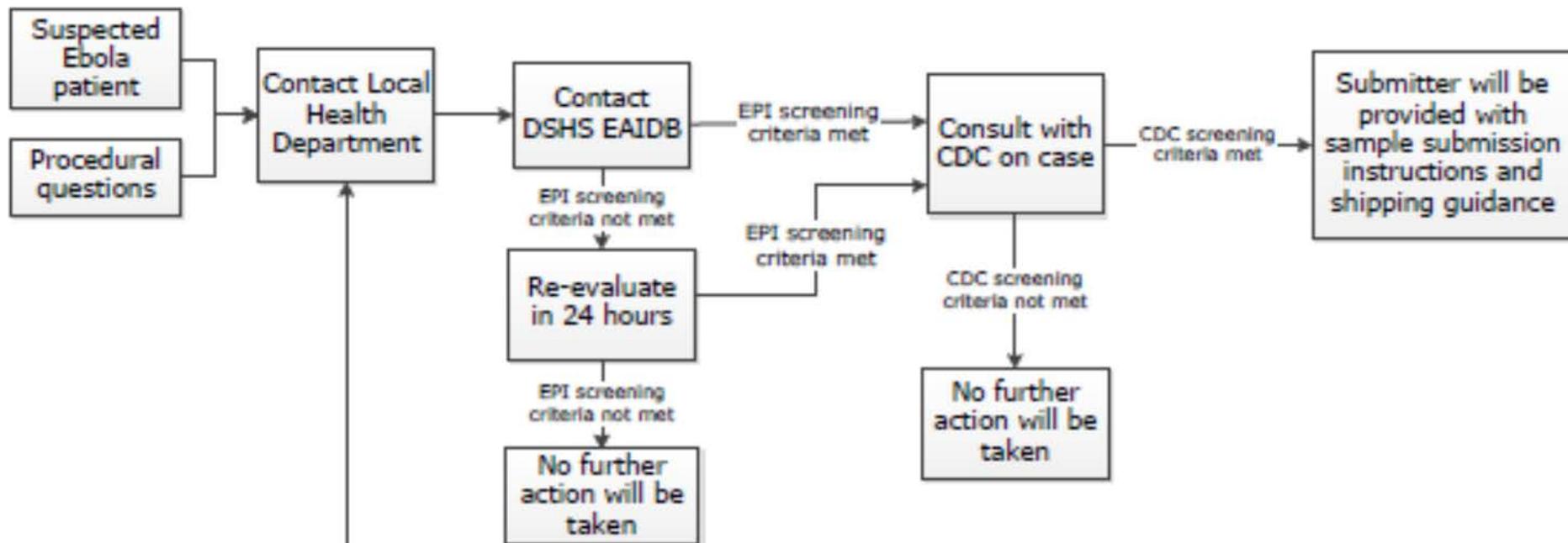
** See Interim Guidance for Environmental Infection Control in Hospitals for Ebola Virus or <http://www.cdc.gov/vhf/ebola/hcp/environmental-infection-control-in-hospitals.html>

*** See Interim Guidance for Specimen Collection, Transport, Testing, and Submission for Persons Under Investigation for Ebola Virus Disease in the United States or <http://www.cdc.gov/vhf/ebola/hcp/interim-guidance-specimen-collection-submission-patients-suspected-infection-ebola.html>

Texas DSHS Ebola Testing Algorithm

- General Ebola Information
- Patient Evaluation
- Case Definition
- Infection Prevention Guidance
- Laboratory Information
- Sample collection and transport
- Shipping
- Symptoms
 - Fever (greater than 38.6°C or 101.5°F)
 - Severe headache
 - Muscle pain
 - Weakness
 - Diarrhea
 - Vomiting
 - Abdominal (stomach) pain
 - Unexplained hemorrhage (bleeding or bruising)

CDC Website <http://www.cdc.gov/vhf/ebola/>



Find your Local Health Department:
<http://www.dshs.state.tx.us/idcu/investigation/conditions/contacts/>

