



Ebola: Clinical Presentation, Evaluation, and Infection Prevention

Clinician Outreach and Communication Activity (COCA) Call

Tuesday, December 20, 2022

Continuing Education

- Continuing education is not offered for this webinar.

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 - Click on the “Q&A” button
 - Type your question in the “Q&A” box
 - Submit your question
- If you are a patient, please refer your question to your healthcare provider.
- If you are a member of the media, please direct your questions to CDC Media Relations at 404-639-3286 or email media@cdc.gov.

Today's Presenters

Trevor Shoemaker, PhD, MPH

Epidemiologist

Division of High-Consequence Pathogens and Pathology

National Center for Emerging and Zoonotic Diseases
Centers for Disease Control and Prevention

Mary Choi, MD, MPH

CDR, U.S. Public Health Service

Medical Officer, Viral Special Pathogens Branch

Division of High-Consequence Pathogens and Pathology

National Center for Emerging and Zoonotic Infectious Diseases

Centers for Disease Control and Prevention

Amy Valderrama, PhD, RN, FAAN

CAPT, U.S. Public Health Service

Nurse Epidemiologist

Division of Healthcare Quality Promotion

National Center for Emerging and Zoonotic Infectious Diseases
Centers for Disease Control and Prevention

Brian Harcourt, PhD

CDR, U.S. Public Health Service

Biosafety Officer, Viral Special Pathogens Branch

Division of High-Consequence Pathogens and Pathology

National Center for Emerging and Zoonotic Infectious Diseases
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CDC Clinician Outreach and Communication Activity (COCA) Call

December 20, 2022, 2:00 PM ET

Ebola Terminology

- Ebola disease: Umbrella term to describe clinical disease due to infection with any of the 6 viruses within the genus *Ebolavirus*:
 - Ebola virus (species *Zaire ebolavirus*)
 - Sudan virus (species *Sudan ebolavirus*)
 - Bundibugyo virus (species *Bundibugyo ebolavirus*)
 - Tai Forest virus (species *Tai Forest ebolavirus*)
 - Reston virus (species *Reston ebolavirus*)
 - Bombali virus (species *Bombali ebolavirus*)

Ebola Terminology

- Ebola virus disease: Term used to describe clinical disease due to infection with Ebola virus (species *Zaire ebolavirus*)
- Sudan virus disease: Term used to describe clinical disease due to infection with Sudan virus (species *Sudan ebolavirus*)

Person Under Investigation (PUI) for Ebola Disease

- CDC has received feedback and concerns from jurisdictions over the continued use of the term “person under investigation” (PUI)
 - Term applied inconsistently
 - Term is stigmatizing
- CDC will be transitioning away from the use of “PUI” and move towards “suspect case” of Ebola Disease
 - Revised terminology aligns with the National Notifiable Disease Surveillance System (NNDSS) case definition for viral hemorrhagic fevers

Suspect Case of Ebola Disease

- “Suspect case” of Ebola disease
 - A person with **signs and symptoms** compatible with Ebola disease AND an **epidemiological risk factor** within 21 days before the onset of symptoms
- Signs and Symptoms of Ebola Disease
 - Fever ($\geq 100.4^{\circ}\text{F}$)
 - Headache, muscle pain, joint pain
 - Weakness, fatigue, loss of appetite
 - GI symptoms including abdominal pain, diarrhea, vomiting
 - Red eyes, skin rash, hiccups, unexplained bleeding or bruising

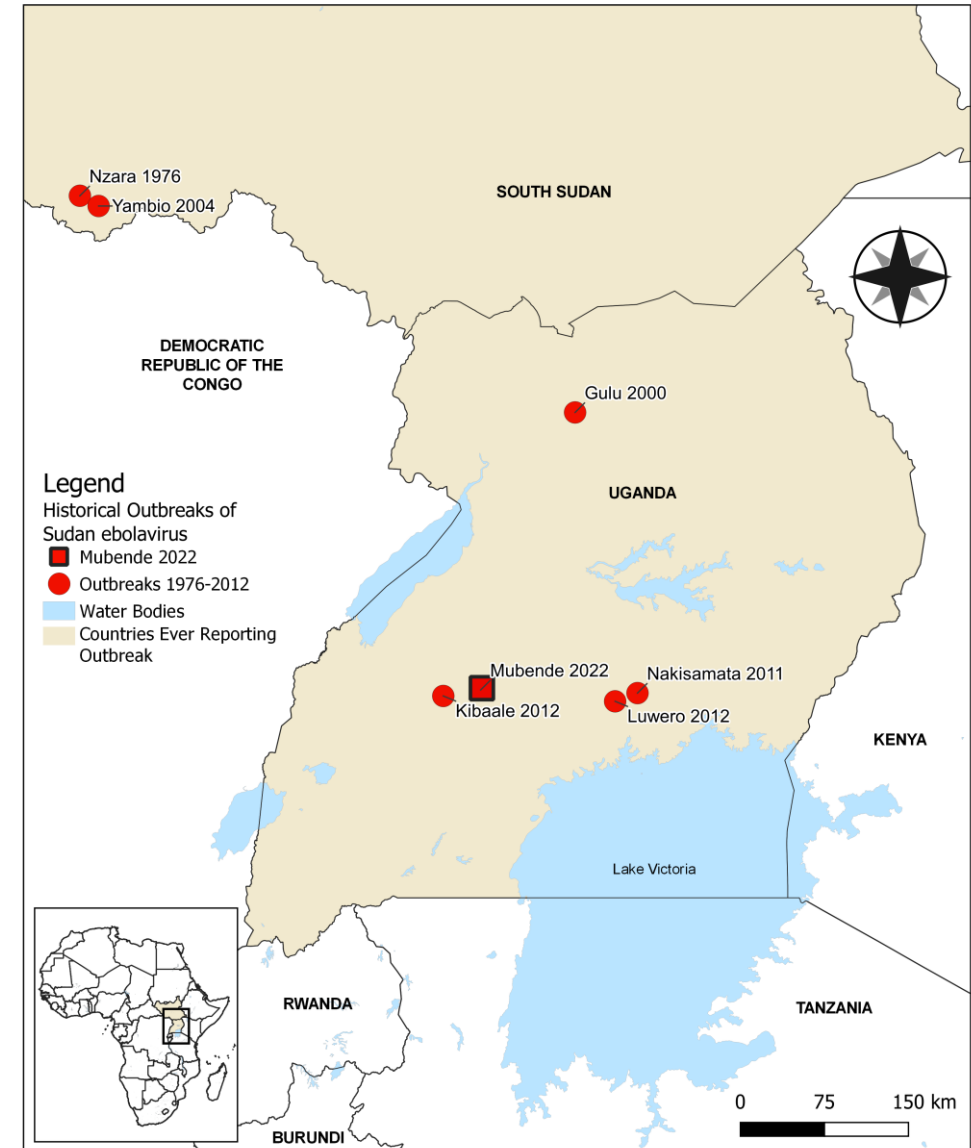
Epidemiologic Risk Factors for Ebola Disease

- Contact with a symptomatic person with suspect or confirmed Ebola disease or any objects contaminated by their body fluids
- Experience a breach in infection prevention and control precautions that result in the potential for contact with body fluids of a patient with suspect or confirmed Ebola disease
- Contact with semen from a man who has recovered from Ebola disease
- Participated in any of the following activities while in an area with an active Ebola outbreak:
 - Contact with someone who was sick or died, or contact with any objects contaminated by their bodily fluids
 - Attended or participated in funeral rituals, including preparing bodies for funeral and burial
 - Worked in a healthcare facility or laboratory
 - Visited a healthcare facility or traditional healer
 - Contact with bats or wild animals
 - Work or spend time in a mine/cave

2022 Sudan Virus Disease Outbreak

2022 Sudan Virus Disease Outbreak

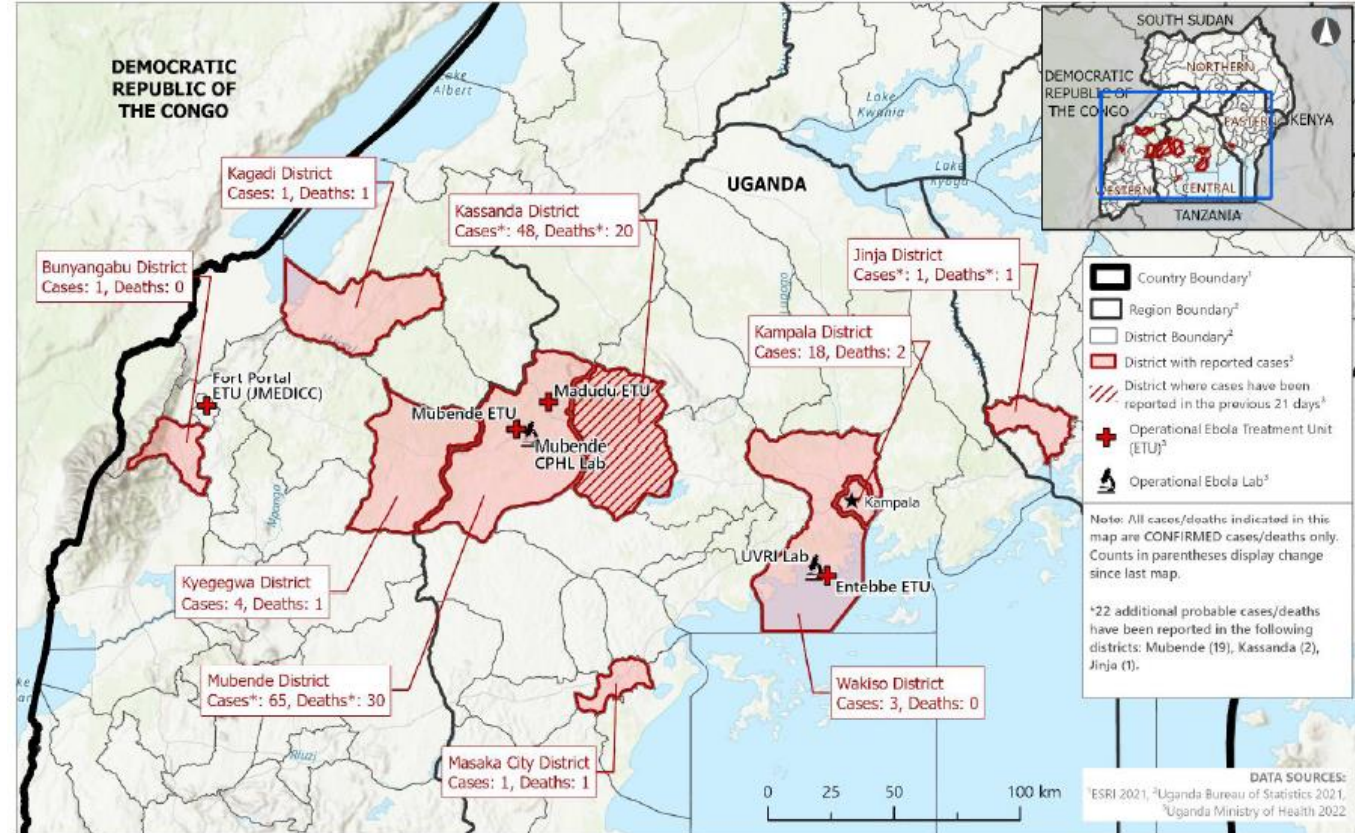
- September 20, 2022, the Ministry of Health declared an outbreak of Sudan virus disease in Mubende District
- 5th outbreak of Sudan virus disease in Uganda
 - 227 deaths
 - Case Fatality Rate (CFR): 53%
- Largest outbreak: Gulu, Uganda with 425 cases



Case Counts as of December 20, 2022

- 164 cases; 142 confirmed, 22 probable
- Cases reported in 9 districts:
 - Mubende
 - Bunyangabu
 - Kagadi
 - Masaka
 - Jinja
 - Kassanda
 - Kyegegwa
 - Wakiso
 - Kampala
- 77 deaths; 55 confirmed, CFR: 47%

Uganda: Sudan Virus Disease Outbreak 2022
Affected Areas (Data as of 7 Dec 2022)



Case Counts by District — As of December 20, 2022

District	Total Cases	Deaths	Days Since Last Confirmed Case
Bunyangabu	1	0	80
Jinja	2	2	38
Kagadi	1	1	83
Kampala	18	1	36
Kassanda	50	22	23
Kyegegwa	4	1	53
Masaka City	1	1	49
Mubende	84	48	37
Wakiso	3	0	44
Total	164	77	23

Risk of Sudan Virus Disease Spread

- Risk of importation into the US is currently assessed as low
 - Low number of travelers and no direct flights to the United States
 - Exit screening of air passengers is being conducted in Uganda
 - Uganda has experience in responding to Ebola disease including outbreaks of Sudan virus disease

Request for Sudan Virus Testing

- September 20 – December 14, 2022, CDC has conducted consultations on 35 ill returning travelers from Uganda
 - Sudan virus testing was performed for 3/35 returning travelers; all tested negative
- From January 2017 – December 2021 there have been 7 outbreaks of Ebola disease
 - During this period, CDC recommended testing for 9 ill returning travelers from outbreak countries; all tested negative

Year	Number of Persons Tested	State/Jurisdiction
2017	3	VA, NC, MD
2018	3	TX, CO, GA
2019	1	PA
2020	0	-
2021	2	IL, CO

Ebola Disease

Ebola Disease in Humans

- Serious, highly transmissible, often rapidly fatal
- Caused by infection of one of four viruses within the genus *Ebolavirus*
 - Ebola virus (species *Zaire ebolavirus*)
 - Sudan virus (species *Sudan ebolavirus*)
 - Bundibugyo virus (species *Bundibugyo ebolavirus*)
 - Tai Forest virus (species *Tai Forest ebolavirus*)
- Without treatment, Ebola disease has a high mortality rate
- Based on evidence and the nature of other similar viruses, it is believed that Ebola is a zoonotic disease and that certain, yet unknown, species of bats are the most likely reservoir

Person-to-Person Transmission

- In infected individuals, the virus can be found in all body fluids:
 - Blood
 - Feces/Vomit
 - Urine
 - Tears
 - Saliva
 - Breast milk
 - Amniotic fluid
 - Vaginal secretions
 - Sweat
 - Semen
- Contact with the body fluids of a person that is sick or has died of Ebola disease
- Ebola is not spread through airborne transmission

Signs and Symptoms

- Signs and symptoms of Ebola disease include :
 - Fever
 - Headache
 - Fatigue
 - Muscle pain/Joint pain
 - Anorexia
 - Sore throat
 - Abdominal pain
 - Rash
 - Diarrhea
 - Vomiting
 - Conjunctivitis
 - Unexplained bleeding/bruising*
- No sign or symptom is pathognomonic for Ebola disease
- Fever is not universally present
- Bleeding/bruising is not universally present

* Includes bleeding from the gums, mouth, nose, bloody vomit, bloody stools, bleeding from injection sites, vaginal bleeding outside of a menstrual cycle

INFECTION

Infection occurs after exposure to a person who is sick or has died of Ebola.



NOT
CONTAGIOUS

•
EXPOSURE TO
THE VIRUS

INFECTION

Infection occurs after exposure to a person who is sick or has died of Ebola.



INCUBATION PERIOD

- It can last from 2-21 days (usually 4-17 days)
- Person feels well and has no symptoms
- **The person cannot transmit the virus**



**EXPOSURE TO
THE VIRUS**

**NOT
CONTAGIOUS**

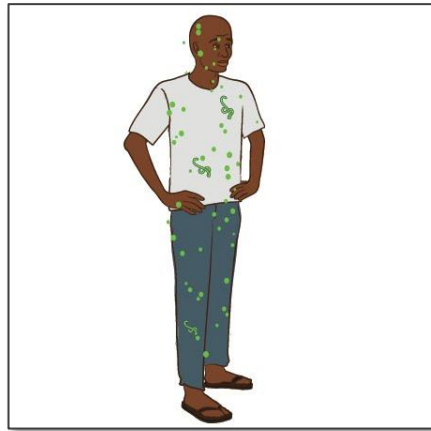
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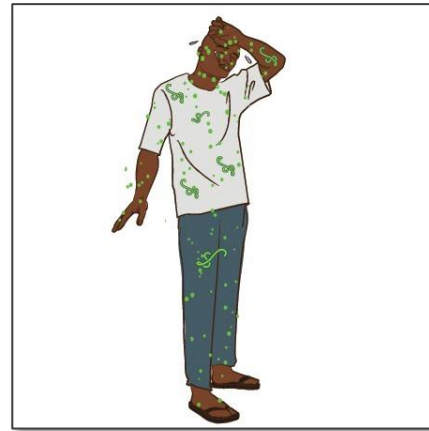
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DRY PHASE

Common signs and symptoms are

- Fever
- Fatigue
- Headache
- Joint pain
- Muscle pain
- Back pain
- Sore throat



NOT
CONTAGIOUS

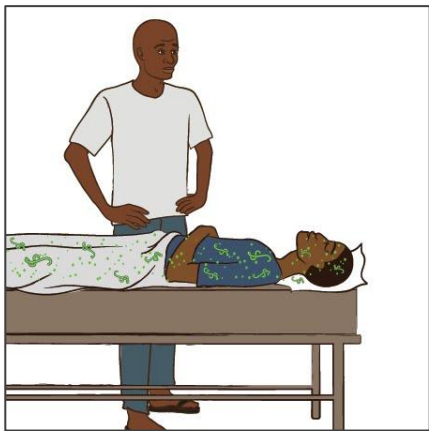
CONTAGIOUS

EXPOSURE TO
THE VIRUS

DAY 0
OF THE DISEASE

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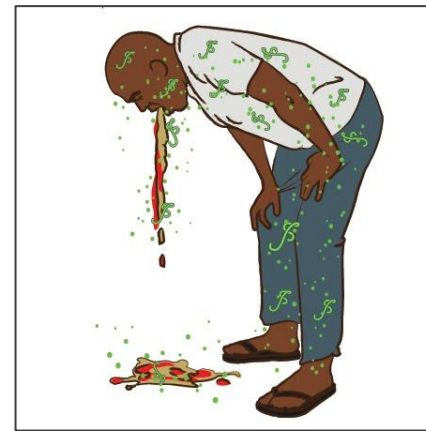
- Fever
- Fatigue
- Headache
- Joint pain
- Muscle pain
- Back pain
- Sore throat



WET PHASE

Common signs and symptoms are

- Diarrhea
- Nausea/vomiting
- Bleeding occurs in some cases
- Hiccups
- Eye redness



NOT
CONTAGIOUS

CONTAGIOUS

EVEN MORE
CONTAGIOUS

EXPOSURE TO
THE VIRUS

DAY 0
OF THE DISEASE

DAY 4
OF THE DISEASE

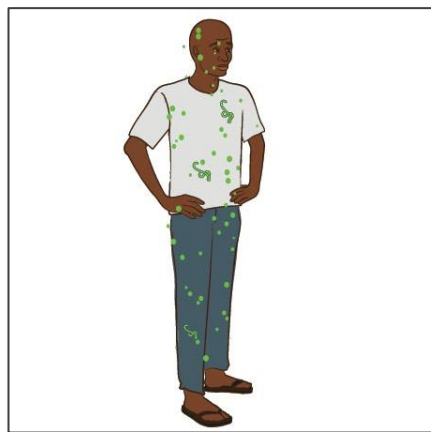
INFECTION

Infection occurs after exposure to a person who is sick or has died of Ebola.



INCUBATION PERIOD

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- **The person cannot transmit the virus**



DRY PHASE

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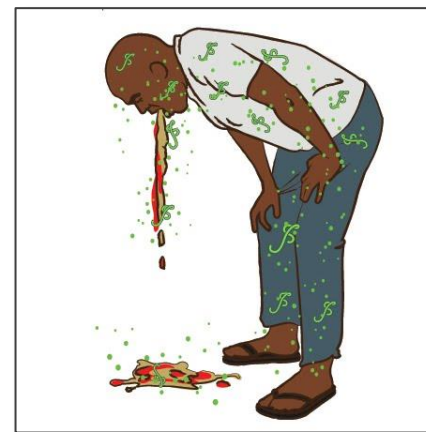
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- Back pain
- Sore throat



WET PHASE

Common signs and symptoms are

- Diarrhea
- Nausea/vomiting
- Bleeding occurs in some cases
- Hiccups
- Eye redness



- The patient becomes more contagious as the disease progresses.
- In fatal cases, death occurs on average 7 to 10 days after the onset of symptoms.
- The amount of Ebola virus is highest at the time of death.



EXPOSURE TO THE VIRUS

NOT CONTAGIOUS



DAY 0 OF THE DISEASE

CONTAGIOUS



DAY 4 OF THE DISEASE

EVEN MORE CONTAGIOUS



DAY 7-10 OF THE DISEASE

THE MOST CONTAGIOUS

Diagnostic Testing Considerations

- Reverse transcription polymerase chain reaction (RT-PCR) is the diagnostic test of choice for acutely ill persons with suspected Ebola disease
- Symptom onset date is critical to interpreting RT-PCR results
- In a symptomatic patient, a negative RT-PCR test result from a blood specimen collected **less than 72 hours** after onset of symptoms does not rule out Ebola disease
- A negative RT-PCR test result from a blood specimen collected from a symptomatic patient **more than 72 hours after symptom onset** rules out Ebola disease

Treatment: Sudan Virus

- There is no FDA-licensed treatment for Ebola disease caused by Sudan virus
- MBP134
 - Experimental two antibody cocktail therapy
 - Demonstrated efficacy in preventing mortality due to infection with Sudan virus, Ebola virus, and Bundibugyo virus in non-human primates
- Supportive treatment can improve chances of survival when provided early
 - Intravenous fluids/electrolytes
 - Symptomatic treatment for vomiting, diarrhea

Vaccine: Sudan Virus

- There is no FDA-licensed vaccine for Sudan virus
- Three experimental vaccine candidates undergoing evaluation in Uganda
- Based on available evidence, Ervebo[®] — the FDA-licensed vaccine against Ebola virus (species *Zaire ebolavirus*) — will not provide cross-protection against Sudan virus infection

Recommendations for Clinicians

Recommendations for Clinicians: Travel History

- Collect travel history for ill patients presenting with a clinical picture suggestive of an infectious etiology

- Ask about risk factors for Ebola disease

Contact with a symptomatic person with suspect or confirmed Ebola disease or any objects contaminated by their body fluids

Experience a breach in infection prevention and control precautions that result in the potential for contact with body fluids of a patient with suspect or confirmed Ebola disease

Contact with semen from a man who has recovered from Ebola disease

Participated in any of the following activities while in an area with an active Ebola outbreak:

- Contact with someone who was sick or died or any objects contaminated by their body fluids
- Attend or participate in funeral rituals, including preparing bodies for funeral and burial
- Worked in a healthcare facility or laboratory
- Visited a healthcare facility or traditional healer
- Contact with bats or wild animals
- Work or spend time in a mine/cave

Recommendations for Clinicians: Differential Diagnosis

- Include Ebola disease in the differential diagnosis for ill travelers recently arrived from Uganda
- Malaria is the most common cause of undifferentiated fever after travel to sub-Saharan Africa
 - Nearly all signs and symptoms of Ebola disease can also be seen in malaria
 - Malaria, especially *P. falciparum* can progress rapidly; early diagnosis and treatment is key to survival — Malaria testing **should not** be delayed
 - Ask about malarial prophylaxis and adherence
 - History of taking malaria prophylaxis does not exclude malaria
- Test for malaria in any febrile traveler recently arrived from Uganda

Recommendations for Clinicians: Infection Control

- Implement strict infection prevention and control (IPC) measures at the healthcare facility when evaluating symptomatic suspect Ebola disease patients
- IPC measures remain in place until Ebola testing has been resulted
- Strict measures are necessary to prevent spread of the virus in the healthcare facility and community

Recommendations for Clinicians: Notification

- If you are concerned your patient may have Ebola disease, first contact your state/local, tribal, or territorial health department and follow jurisdictional protocols for patient assessment
 - Identify points of contact and contact information for your state/local health departments, including on-call information
 - CDC Emergency Operation Center (770-488-7100) can also assist in finding contact information for state and large jurisdictional health departments
- As a resource for public health departments, CDC's Viral Special Pathogens Branch is available 24/7 for consultations by calling CDC Emergency Operations Center (770-488-7100)
- We strongly encourage consultation with CDC for patients in whom Ebola disease testing is being considered

Initial CDC Consultation

- Connected with subject matter experts (SMEs) in viral hemorrhagic fevers at CDC
- Discuss the patient's travel history, epidemiologic risk factors, clinical course, diagnostic tests performed, infection control measures in place
- Make a collective decision as to whether testing is recommended
- Final decision to proceed with testing for Ebola disease rests with the treating physician
- Work with the hospital/state health department to arrange for shipment and testing of the specimen

Benefits of Clinical Consultation — Clinician/Jurisdiction

- CDC has the most up-to-date information on the outbreak
- Provide context to your patient's epidemiologic risk factors
 - No sign or symptom is pathognomonic for Ebola disease; decision to test for Ebola is primarily driven by assessing epidemiologic risk factors
 - CDC has resources in country that may be able to provide context for your patient's travel and activities

Benefits of Clinical Consultation — Clinician/Jurisdiction

- Opportunity to ask facility-specific questions
- Facilitate and coordinate testing and shipment of specimens
- In the event the healthcare facility does not have the capacity to care for the suspect Ebola patient, CDC can facilitate discussions to potentially arrange transport to an alternate healthcare facility

Benefits of Clinical Consultation — Patient

- Consultation call provides a forum where pros/cons of testing can be weighed in order to collectively make a decision that is in the best interest of the patient
- Decision to test for Ebola disease necessitates implementation of strict infection control measures
- Infection control measures may limit the patient's access to care
- Duration of time strict infection control measures must be in place can be prolonged

Infection Prevention and Control

Infection Control: Key Points

- Ebola can be found in ALL body fluids of an infected person (urine, saliva, sweat, feces, vomit, breast milk, amniotic fluid, and semen)
- Transmission occurs through direct contact (such as through broken skin or mucous membranes in the eyes, nose, or mouth) with body fluids or objects that have been in contact with body fluids of a person that is sick with or has died from Ebola disease
- Triage and evaluation processes should consider and systematically assess patients for the possibility of Ebola disease
- Recommended personal protective equipment (PPE) varies depending on symptoms

Recommendations for Clinicians: Infection Control

- Notify your facility's Infection Prevention and Control Program
- Place suspect Ebola patients in a private room (containing a private bathroom) with the door closed
 - Limit room entry to essential personnel and maintain a log of all people entering
- Where possible, use disposable (preferred) or dedicated medical equipment, limiting use of needles and other sharps
- Perform only necessary tests or procedures and avoid aerosol-generating procedures (AGPs) if possible
 - If AGP must be performed follow guidance to reduce exposures (e.g., limit to essential personnel, utilize an airborne infection isolation room if available)
- Healthcare personnel should perform hand hygiene frequently
- Use and EPA-registered hospital disinfectant from [List L](#) or [List Q](#)
- Waste contaminated (or suspected to be contaminated) with Ebola virus is a Category A infectious substance

Recommended PPE: managing patients who are clinically stable and do not have bleeding, vomiting, or diarrhea

- Single-use (disposable) fluid-resistant gown that extends to at least mid-calf or single-use (disposable) fluid-resistant coveralls without integrated hood
- Single-use (disposable) full face shield
- Single-use (disposable) facemask
- Single-use (disposable) gloves with extended cuffs:
 - Two pairs of gloves should be worn
 - At a minimum, outer gloves should have extended cuffs

Recommended PPE: managing patients who are clinically unstable or have bleeding, vomiting, or diarrhea

- Impermeable garment:
 - Single-use (disposable) impermeable gown *OR*
 - Single-use (disposable) impermeable coverall
- Respiratory, head and face protection
 - PAPR with a full-face covering and head-shroud *OR*
 - N95 respirator in combination with single-use (disposable) surgical hood extending to shoulders and single-use (disposable) full face shield
- Single-use (disposable) gloves with extended cuffs. Two pairs of gloves should be worn. At a minimum, outer gloves should have extended cuffs
- Single-use disposable boot covers *OR* shoe covers (when wearing coveralls with integrated shoe covers)
- Single-use (disposable) apron

Laboratory Testing

Prior to Specimen Collection

- The Occupational Safety and Health Administration developed [Bloodborne Pathogens Standard \(29 CFR 1910.1030\)](#) to reduce the potential exposure of personnel
- All U.S. laboratories handling patient specimens must comply with this standard. Strict adherence is an initial step to protecting personnel
- Prior to receiving specimens, have in place a site-specific risk assessment to minimize risk to personnel from potential exposure from sprays, splashes, or aerosols generated during laboratory activities
- Risks should be mitigated by implementing engineering controls, administrative and work practice controls, and use of appropriate [personal protective equipment \(PPE\)](#)
- A plan for appropriate [waste management](#) must also be in place and implemented

Specimen Collection

- Refer to PPE guidance for healthcare workers during management of [clinically stable](#) or [clinically unstable](#) patients with suspect or confirmed Ebola disease
- For adults, collect two 4 mL tubes of whole blood in a plastic EDTA tube
- For pediatric patients, collect a minimum of 1 mL whole blood in a pediatric-sized plastic EDTA tube
 - Do not transport or ship specimens in glass containers or in heparinized tubes
 - Do not separate and remove serum or plasma from the primary collection container
- Immediately report potential exposures to blood, body fluids, or other infectious materials according to your institution's policies and procedures

Shipping Specimens for Testing

- Public health authorities will determine whether ebolavirus testing will occur at an LRN laboratory, CDC, or both.
- All specimens collected from patients with suspected Ebola disease must be shipped Category A as a non-select agent.
- Consider shipping requirements (e.g., Category A) for specimens being referred for routine diagnostic (non-ebolavirus) testing prior to transferring specimens to another laboratory that would not be aware of the patient's clinical context.

<https://www.cdc.gov/vhf/ebola/laboratory-personnel/specimens.html>

Triple packing information: <https://www.cdc.gov/vhf/ebola/laboratory-personnel/shipping-specimens.html>

Diagnostic Ebolavirus Shipping and Testing

- Presumptive testing for Ebola virus and Sudan virus is available at select [LRN reference laboratories](#). Whole blood specimens should be sent to LRN laboratories on cold packs at 2-8°C (not frozen)
- All Ebola test results must be confirmed by CDC
- Specimens sent to CDC for testing must be sent on dry ice and arrive at <-20°C ([Test Order | Submitting Specimens to CDC | Infectious Diseases Laboratories | CDC](#))
- If short-term storage is necessary, keep specimens at 2-8°C for shipping to the LRN laboratory
- Specimens sent to CDC for testing must be sent on dry ice and arrive at <-20°C

Guidance for Malaria Testing

- The gold standard Dx test for malaria is microscopic examination of thick and thin smears
- Lab staff can safely perform testing by adhering to the OSHA bloodborne pathogens standard including wearing gloves and manipulating the specimen in a biosafety cabinet
- The standard protocols for preparing and staining thick and thin smears do not sufficiently inactivate ebolaviruses

Guidance for Malaria Testing

- No modified protocol to inactivate ebolavirus for thick smears is currently recommended
- To inactivate ebolaviruses for thin smears, fix thin smears for 15 – 30 minutes in 100% methanol and follow standard procedure after
- Both thick and thin blood smears should be air-dried as fan drying may aerosolize the blood specimen
- Labs may choose to apply coverslips with rapid-drying mounting medium to stained slides

Additional Healthcare Infection Prevention and Control Guidance for Ebola

- Infection Prevention and Control Recommendations for Hospitalized Patients Under Investigation (PUIs) for Ebola Virus Disease (EVD) in U.S. Hospitals
 - <https://www.cdc.gov/vhf/ebola/clinicians/evd/infection-control.html>
- Emergency Services
 - <https://www.cdc.gov/vhf/ebola/clinicians/emergency-services/index.html>
- Identify, Isolate, Inform: Emergency Department Evaluation and Management for Patients Under Investigation (PUIs) for Ebola Virus Disease (EVD)
 - <https://www.cdc.gov/vhf/ebola/clinicians/emergency-services/emergency-departments.html>
- Interim Guidance for Environmental Infection Control in Hospitals for Ebola Virus
 - <https://www.cdc.gov/vhf/ebola/clinicians/cleaning/hospitals.html>
- Ebola-Associated Waste Management
 - <https://www.cdc.gov/vhf/ebola/clinicians/cleaning/waste-management.html>

To Ask a Question

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- If you are a patient, please refer your question to your healthcare provider.
- If you are a member of the media, please direct your questions to CDC Media Relations at 404-639-3286 or email media@cdc.gov

Joining the Q&A Session

Joel Montgomery, PhD

CAPT, U.S. Public Health Service
Incident Manager, 2022 CDC Uganda Ebola Response
Centers for Disease Control and Prevention

Joanna M. Prasher, PhD, MPH

Domestic Preparedness and Response Task Force Lead
Uganda Ebola Outbreak Response
Centers for Disease Control and Prevention

John Kools, MS

Domestic Diagnostic Assay Deployment Task Force Lead
2022 Uganda Ebola Outbreak Response
Centers for Disease Control and Prevention

Clive Brown, MBBS, MPH, MSc, DTM&H

Chief, Quarantine and Border Health Services Branch
Division of Global Migration and Quarantine
National Center for Emerging and Zoonotic Infectious Diseases
Centers for Disease Control and Prevention

Francisco Alvarado-Ramy, MD

Medical Officer, Quarantine and Border Health Services
Branch
Division of Global Migration and Quarantine
National Center for Emerging and Zoonotic Infectious Diseases
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Today's COCA Call Will Be Available to View On-Demand

- **When:** A few hours after the live call ends*
- **What:** Video recording
- **Where:** On the COCA Call webpage
https://emergency.cdc.gov/coca/calls/2022/callinfo_122022.asp

**A transcript and closed-captioned video will be available shortly after the original video recording posts at the above link.*

Additional Resources

- Continue to visit emergency.cdc.gov/coca for more details about upcoming COCA Calls.
- Subscribe to receive notifications about upcoming COCA calls and other COCA products and services at emergency.cdc.gov/coca/subscribe.asp.

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<https://www.facebook.com/CDCClinicianOutreachAndCommunicationActivity>

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