

Ebola Outbreak in Uganda and Preparedness in Maine

Maine Center for Disease Control and Prevention
Clinician Update



Epidemiology

2022 Uganda Sudan Virus Outbreak Epidemiology (Oct 11)

- The first confirmed case of EVD was a 25-year-old man who lived in Mubende District
- The case was quickly identified as a suspect VHF and a sample was sent to the Uganda Virus Research Institute (UVRI) and confirmed by rRT-PCR on Sept 19
- An outbreak of EVD due to Sudan virus (species *Sudan ebolavirus*) was declared by the Uganda MOH on September 20, 2022, in Mubende District, Central Uganda.
- Investigations identified suspicious cases and clusters of deaths occurring Mubende district up to 1 month prior
- Confirmed case had possible contact with probable EVD cases in health clinic

Current Outbreak Update

Total cases: 74 (54 confirmed, 20 probable)

Total deaths: 39 (19 confirmed, 20 probable)

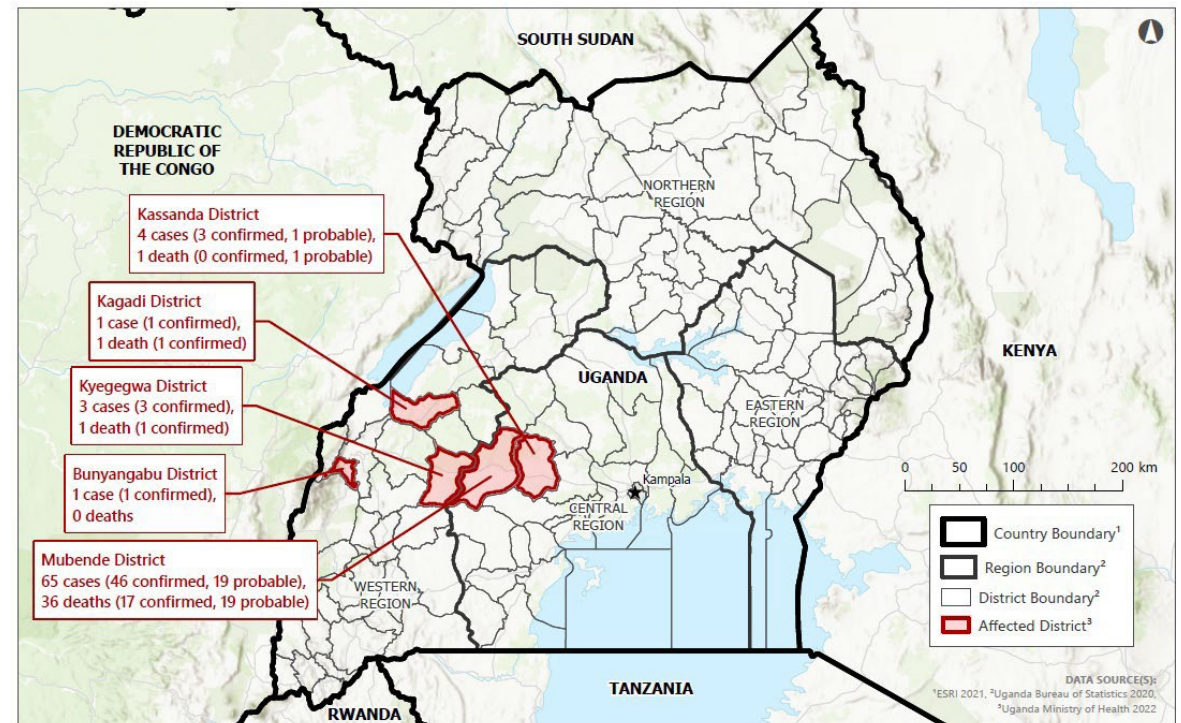
■ Case-Fatality Proportion: **52.7%**

Total recoveries: 14

Districts affected: 5

- Bunyangabu, Kagadi, Kassanda, Kyegegwa, Mubende

Total infections among HCWs: 10 (4 deaths)

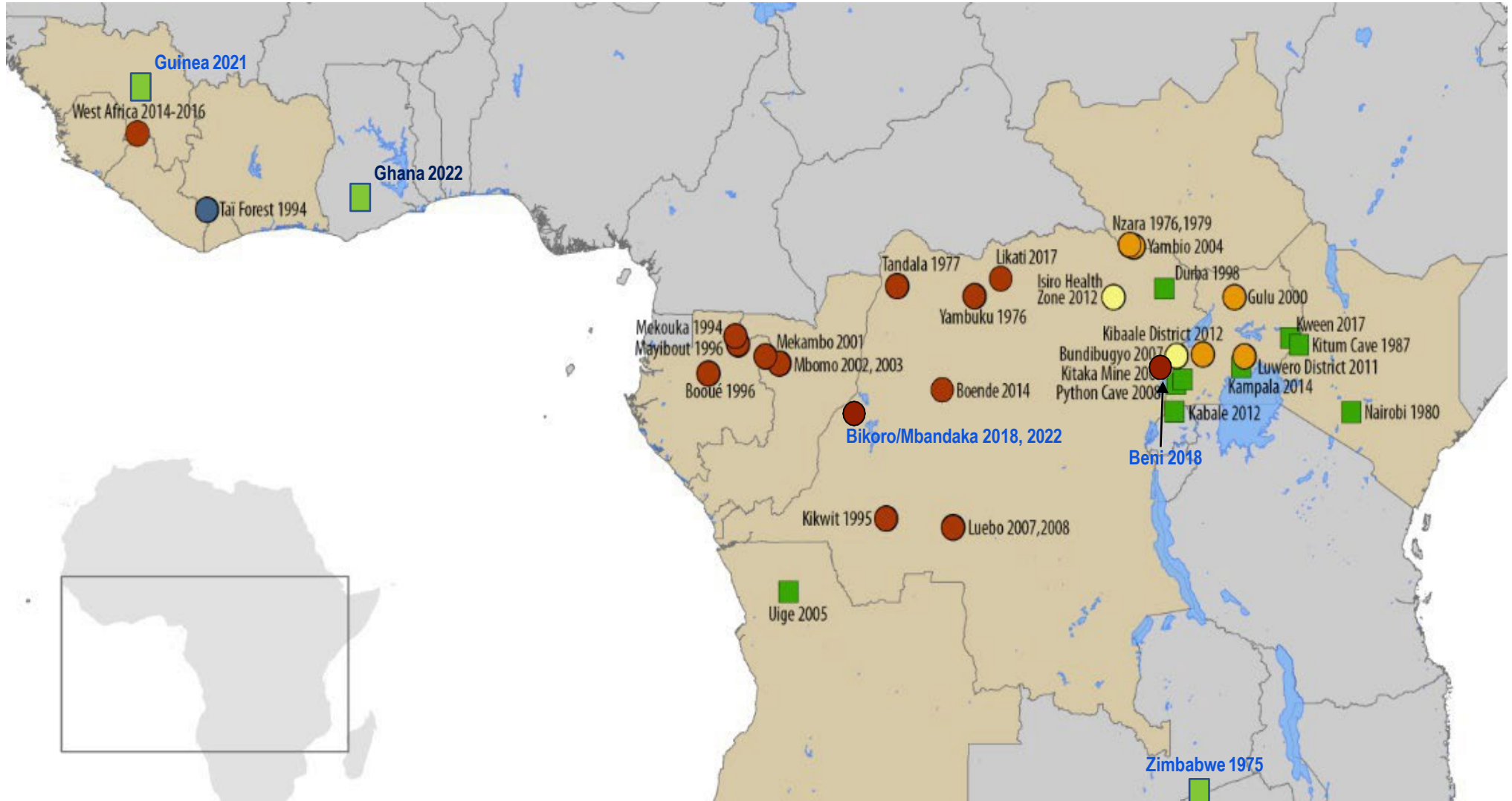


About Ebola Virus Disease (EVD)

Ebola virus disease in humans is caused by infection with one of 4 viruses within the genus *Ebolavirus*, family *Filoviridae*

- Ebola virus (species *Zaire ebolavirus*)
 - Multiple outbreaks (Zaire/DRC, Gabon, Republic of the Congo, Guinea)
 - 70-90% fatality
- Bundibugyo virus (species *Bundibugyo ebolavirus*)
 - 2007 Uganda and 2012 DRC outbreaks
 - 40% fatality
- Tai Forest virus (species *Tai Forest ebolavirus*)
 - One human case (survived)
- Sudan virus (species *Sudan ebolavirus*)
 - Multiple outbreaks (Sudan, Uganda)
 - ~50% fatality

Filovirus Outbreaks in Africa — 1976-2022



● Ebola virus ● Sudan virus ● Tai Forest ● Bundibugyo virus ■ Marburg virus



Prior outbreaks of Sudan Virus

1976 Sudan: Nzara, Maridi, and surrounding areas

- 284 cases, 151 deaths (CFR=53%)

1979 Sudan: Nzara and Yambio

- 34 cases, 25 deaths (CFR=65%)

2000 Uganda: Gulu

- 425 cases, 224 deaths (CFR=53%)

2004 Sudan: Yambio

- 17 cases, 7 deaths (CFR=41%)

2011 Uganda: Nakisimata, Luwero District

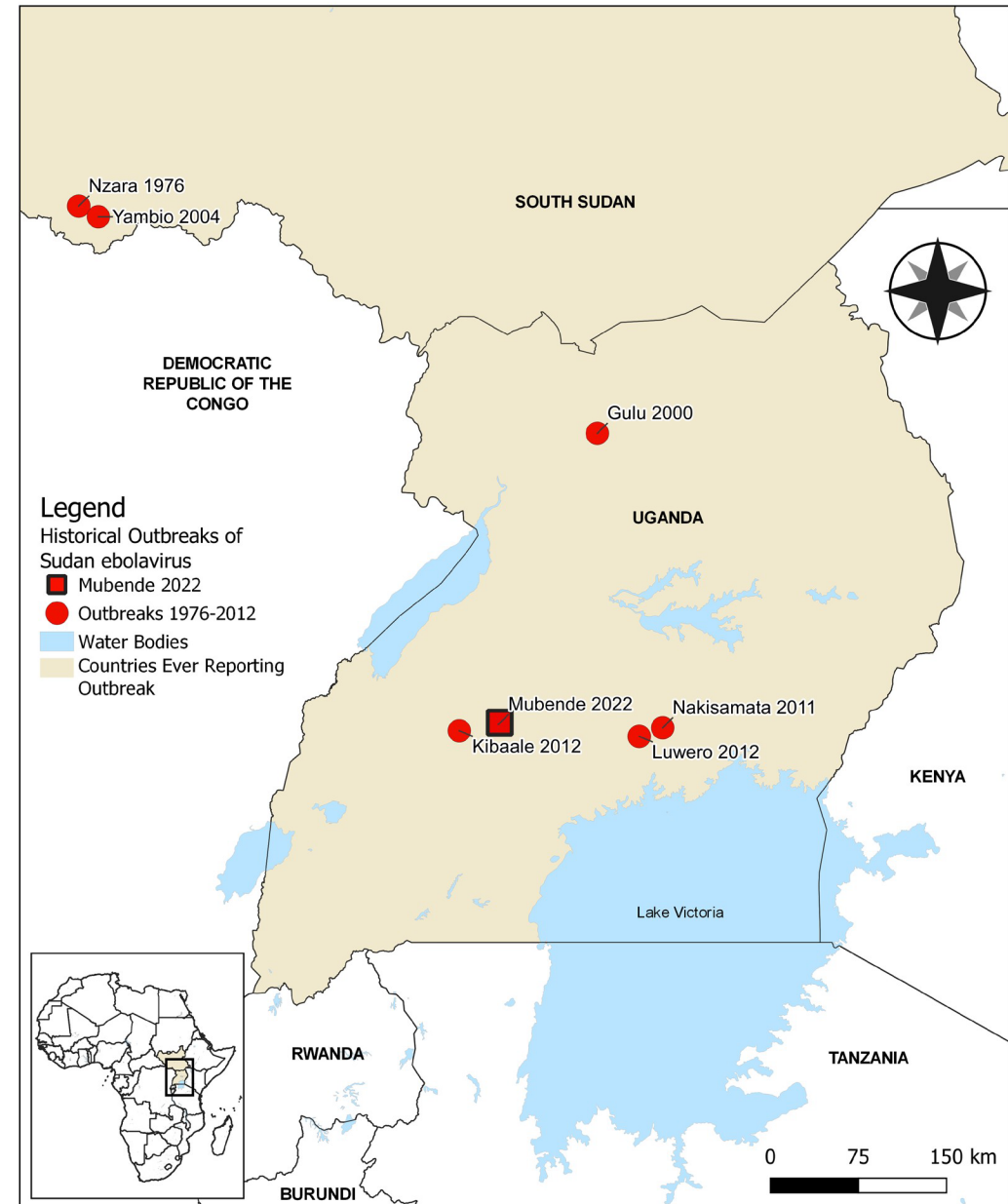
- 1 cases, 1 death (CFR=100%)

2012 Uganda: Kagadi, Kibaale

- 24 cases, 17 deaths (CFR=70.8%)

2012 Uganda: Bombo, Luwero District

- 7 cases, 4 deaths (CFR=54.1%)



Outbreaks of Ebola Virus Disease

- Since 1976, there have been 33 outbreaks due to Ebola virus (species *Zaire ebolavirus*)
 - >31,000 infected; >12,000 deaths
- Prior to 2022, there have been 7 outbreaks due to Sudan virus (Uganda and Sudan)
 - 792 cases, 426 deaths
- Most of our knowledge of EVD comes from outbreaks caused by the Ebola Zaire, we anticipate lessons learned from recent Ebola Zaire outbreaks to be applicable to this outbreak

Risk of Ebola Virus Disease Spread

- Currently, at regional and global levels, the risk of EVD spread has been assessed as low by the World Health Organization
- Risk of importation into the U.S. 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 virus disease including outbreaks of Sudan virus

Domestic Preparedness Activities

- CDC has activated its emergency response structure
- Stand up multi-disciplinary CDC Ebola Response Teams (CERT)
- Updating guidance on the management of patients with suspected EVD
- Outlining a process to access experimental Sudan virus therapeutic

Domestic Preparedness Activities

- Coordinating with the 10 Regional Special Pathogens Treatment Centers
 - Specialized high-level isolation units equipped with infrastructure, laboratory capabilities, staff to care for patients with highly hazardous communicable diseases
- Expanding testing capabilities to:
 - 28 Laboratory Response Network laboratories
 - 10 Regional Emerging Special Pathogens Treatment Centers
- Outreach to public health departments, public health laboratories, healthcare workers
 - Health alert network (HAN) health advisory released October 6, 2022

Traveler Monitoring

Traveler Monitoring in Maine

- In response to the current Ebola outbreak in Uganda, U.S. CDC has directed states to begin actively monitoring travelers arriving from Uganda for Ebola Virus Disease (EVD)
- The goal of traveler monitoring is to evaluate travelers and provide guidance to travelers who develop EVD-compatible symptoms
- Maine CDC is notified about travelers by U.S. CDC's Division of Global Migration and Quarantine (DGMQ)
- All travelers are evaluated by a Maine CDC epidemiologist
 - Travelers being evaluated for EVD are referred to as a Person Under Monitoring (PUM)
 - The traveler evaluation includes a risk assessment, health education, and a review of the monitoring plan
 - Travelers with high-risk exposures (i.e., close contact to an EVD case) have movement restrictions and are not permitted to travel
- Travelers are monitored for up to 21 days post-arrival
 - Some travelers may be followed up with daily while others may be contacted once per week
 - The frequency of contact depends on a traveler's risk level (as defined by DGMQ)

Traveler Monitoring in Maine

Post-Arrival Management Recommendations for ASYMPTOMATIC Travelers			
	<i>High-Risk Exposure</i>	<i>Present in Outbreak Area</i>	<i>Present in Country</i>
Initial Risk Assessment	Yes	Yes	Yes
Health Education	Yes	Yes	Yes
Symptom Monitoring	Daily	Twice per week	Once per week
Movement Restrictions	Quarantine	None	None
Travel	Not permitted	Advance notification	Advance notification

- Any PUI who develops EVD-compatible symptoms is considered a Person Under Investigation (PUI)
 - PUI is a classification made by the health department
- Any traveler classified as an EVD PUI must isolate **immediately**
 - If the traveler is in a healthcare facility, standard, contact, and droplet precautions should be instituted immediately

Clinical Manifestations

Ebola Virus Disease

- Serious illness, often fatal in humans
- Without treatment EVD has a high mortality rate
- Based on evidence and the nature of other similar viruses, we believe that Ebola is animal-borne (zoonotic) and that bats are the most likely reservoir

Signs and Symptoms

- Signs and symptoms of EVD include:
 - Fever
 - Headache
 - Fatigue
 - Muscle pain/Joint pain
 - Anorexia
 - Sore throat
 - Abdominal pain
 - Rash
 - Diarrhea
 - Vomiting
 - Conjunctivitis
 - Unexplained bleeding/bruising*
- 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

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 (through broken skin or mucous membranes) with the body fluids of a person that is sick or has died of EVD
- EVD is not spread through airborne transmission

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**



DRY PHASE

Common signs and symptoms are

- 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



- 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.



NOT
CONTAGIOUS

CONTAGIOUS

EVEN MORE
CONTAGIOUS

THE MOST
CONTAGIOUS

EXPOSURE TO
THE VIRUS

DAY 0
OF THE DISEASE

DAY 4
OF THE DISEASE

DAY 7-10
OF THE DISEASE

Testing, Treatment, Prophylaxis

Minimum Laboratory Testing Requirements for Assessment Hospitals:

- CBC, including platelet and differential
 - Chemistry (glucose, sodium, potassium, bicarbonate, BUN, creatinine)
 - Liver Function Tests
 - PT/INR
 - Urine Dipstick
 - Influenza PCR
 - Malaria PCR
 - Blood Cultures
- Available at HETL**

Diagnostic Testing: Sudan Virus

- Biofire FilmArray NGDS Warrior Panel is an FDA 510(k)-cleared assay
- Panel can detect the following:
 - Sudan virus
 - Ebola virus
 - Tai forest virus
 - Bundibugyo virus
 - Reston virus
- Currently, 9 laboratories within the Laboratory Response Network (LRN) are able to test under CLIA using the Warrior Panel

Requests for Diagnostic Testing

- Prior consultation with CDC is required prior to shipping a specimen to CDC for Sudan virus testing
- All specimens collected from patients with suspected EVD must be shipped Category A as a non-select agent

Diagnostic Testing Considerations

- A negative RT-PCR test result from a blood specimen collected **less than 72 hours** after onset of symptoms does not rule out Ebola virus infection
- A negative RT-PCR test result from a blood specimen collected from a symptomatic patient **more than 72 hours after symptom onset** rules out EVD
- Positive RT-PCR results are considered preliminary until confirmatory testing at CDC

Treatment: Sudan Virus

- There is no FDA-licensed treatment for 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
- Two experimental vaccine candidates undergoing evaluation
- Based on available evidence, Ervebo — the FDA-licensed vaccine against the Zaire strain — 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
- For ill travelers recently arrived from Uganda:
 - Where did they travel ? Were they in the districts currently affected by the outbreak?
 - Why did they travel? For work? To visit family?
 - What activities did they take part in during the 21 days before illness onset? Attend or participate in a funeral? Care for anyone who was sick or died?
 - Did they travel with others? If yes, are their travel companions ill?
 - Did they have contact with anyone who was diagnosed with Ebola? Anyone suspected of having Ebola?

Recommendations for Clinicians: Differential Diagnosis

- Include EVD 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 the signs and symptoms of EVD 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 the possibility of malaria
- Test for malaria in any febrile traveler recently arrived from Uganda

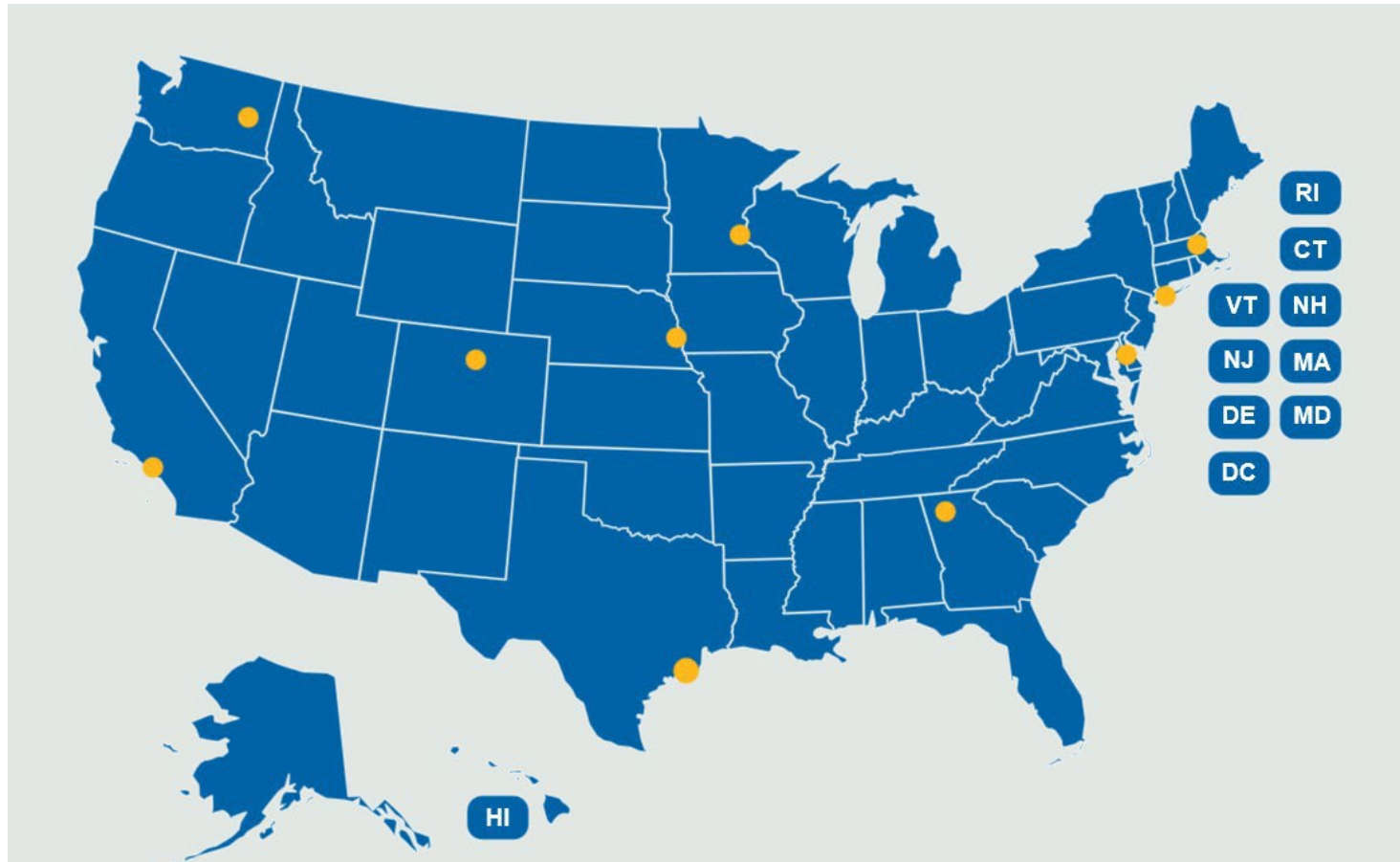
Recommendations for Clinicians: Notification

- If you are concerned your patient may have EVD, first contact Maine CDC and follow state protocols for patient assessment
 - **Maine CDC: 800-821-5821**
- Maine CDC will collect information and provide guidance, and follow-up consultation with U.S. CDC as appropriate

Initial U.S. CDC Consultation

- Connected with SMEs 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
- Work with the hospital/state health department to arrange for shipment and testing of the specimen

Regional Special Pathogens Treatment Centers



Healthcare Infection Control

Healthcare Infection Control

Identify

- **Travel assessment / Triage**
 - Collect travel history for ill patients presenting with a clinical picture suggestive of an infectious etiology.
 - Example – “Have you been outside of Maine in the last 30 days?”
 - Do staff asking the question understand what answer should elicit a facility action?
 - How is the answer documented and a concerning answer communicated?

Signs/Symptoms:

- Fever
- Abdominal
- Headache
- Rash
- Fatigue
- Diarrhea
- Muscle pain/Joint pain
- Vomiting
- Anorexia
- Conjunctivitis
- Sore throat
- Unexplained bleeding/bruising*
- *Fever is not universally present*
- *Bleeding/bruising not universally present**

Isolate

- **Private Room or separate enclosed are with private bathroom or covered bedside commode**
- **Personal Protective Equipment**
 - Use PPE guidance from U.S. CDC clinically stable vs. clinically unstable
 - ✓ Trained observers / doffing assistant (clinically unstable)
 - ✓ Dedicated areas for PPE Donning and Doffing
- **Dedicated (and disposable) equipment – limit use of needles/sharps**
- **Environmental Controls**
- **Cleaning/Disinfection – use an U.S. EPA registered disinfectant from List L**
- **Minimize procedures that can increase environmental contamination**
 - Aerosol Generating Procedures (AGPs) use AIIR when available
- **Limit staff**
- **Waste management – Category A infectious substance**

Clinically Stable PPE:

- Single-use (disposable) fluid-resistant gown or fluid-resistant coveralls without integrated hood
- Single-use (disposable) full face shield
- Single-use (disposable) facemask
- Single-use (disposable) gloves with extended cuffs – wear 2 pairs (at minimum outer gloves should have extended cuffs)

Clinically Unstable PPE (for patient care):

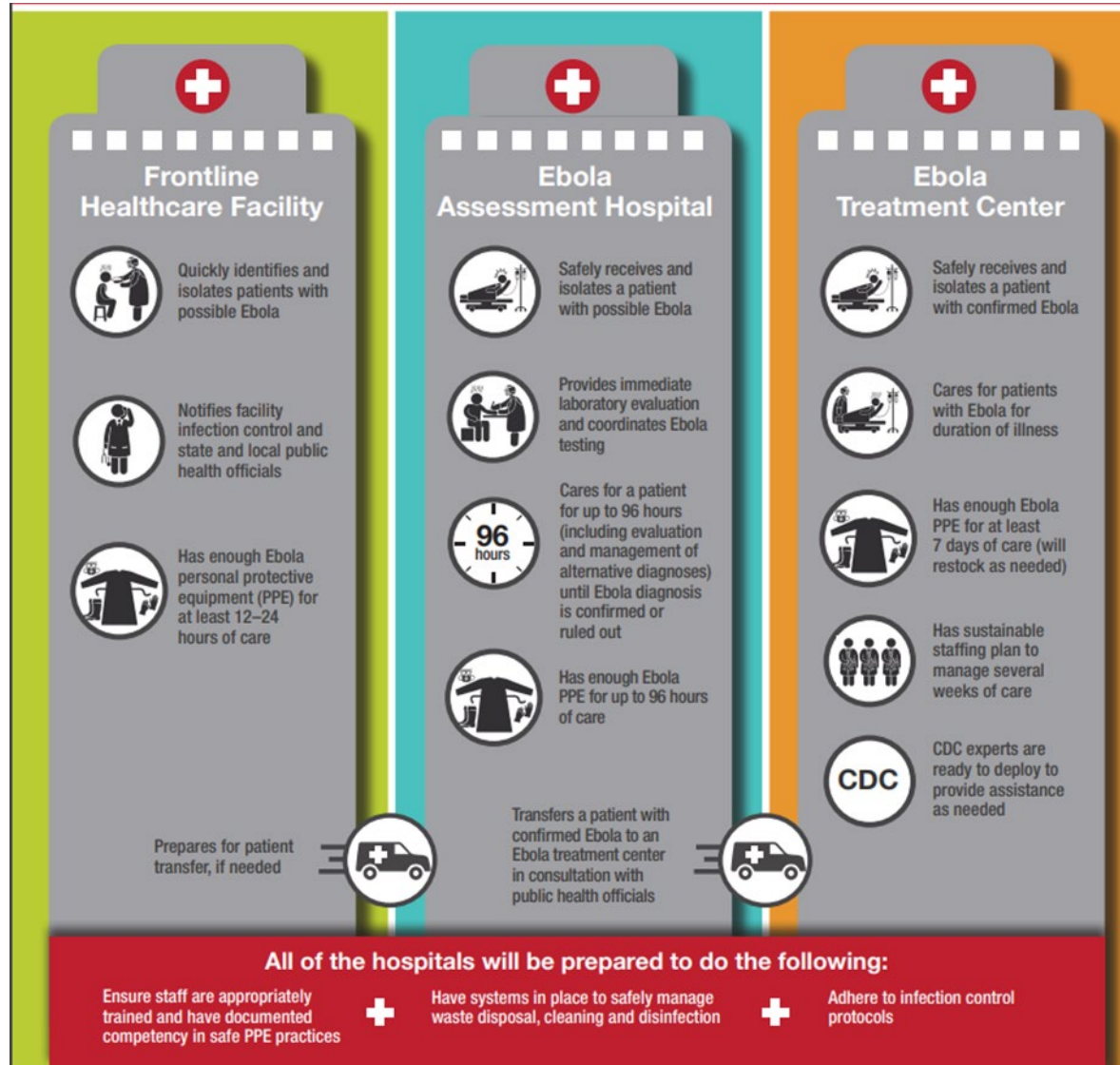
- Single-use (disposable) impermeable gown or impermeable coverall (without integrated hoods preferred; with or without integrated socks acceptable)
- Single-use (disposable) N95 respirator or PAPR
- Single-use (disposable) boot covers
- Single-use (disposable) gloves with extended cuffs – wear 2 pairs (at minimum outer gloves should have extended cuffs)
- Single-use (disposable) apron

Inform

- **Immediately notify the Infection Prevention and Control Program and/or other facility designee per policy**
- **Immediately report to Maine CDC 1-800-821-5821**

Hospital Preparedness

Hospital Preparedness



MAINE

Frontline Hospitals:

- Every Acute Care and Critical Access Hospital

Assessment Hospitals:

- MMC
- EMMC

Treatment Hospital:

- Mass General (Boston)

12 Domains of Hospital Ebola Preparedness Overview

- **Pre-Hospital**

- Receiving patient
- ED Triage

- **Patient Care Team**

- Identify Team
- Training
- Staffing Schedules
- Worker Safety

- **Patient Transport (Internal)**

- PPE
- Traffic Control
- Manage blood/body fluids
- Clean and disinfect transport equipment

- **Patient Placement**

- Private room
- Log of all personnel who enter room
- Remote communication
- Dedicated/Disposable equipment
- PPE donning/doffing areas
- Waste management
- Family involvement

- **PPE**

- Selection of PPE
- OSHA compliance
- Disposable under (PPE) garments
- Staff training
- Staff monitoring
- Trained observers
- PPE inventory management

- **HCW Monitoring**

- Work Exclusion
- Monitoring for 21 days
- Ebola Exposure Plan

- **Lab Safety**

- Protocol for handling/shipping Ebola PCR test
- Minimum menu of testing
- Site-specific risk assessment
- Transport of specimens
- PPE training
- Engineering controls
- Cleaning and disinfection
- Specimen tracking
- Specimen storage

- **Environmental Inf. Control**

- EPA-registered disinfectants
- Trained on cleaning and disinfection of environment
- PPE training
- Monitoring cleaning and disinfection practices
- Spill management
- Post-discharge cleaning and disinfection
- Re-usable equipment cleaning and disinfection
- Linen handling
- Handling of food trays/dishes

- **Waste Management**

- Liquid waste
- Solid waste

- **Communications**

- Staff education
- Update staff on changes
- Media inquiries
- Protect privacy of PUI
- Public Health Depart.

- **Management of Deceased**

- Post-mortem care
- Equipment for preparing deceased for transport
- Hot zone
- Cold zone
- Mortuary

- **Special Populations**

- Pregnant women
- Infants
- Children
- Dialysis
- Handling of family

Questions/Discussion

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