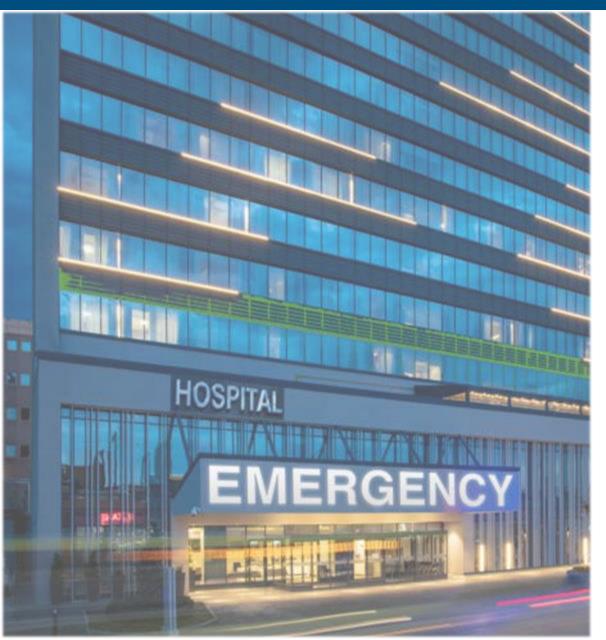
# Frontline Hospital Ebola Readiness

Dena Bushman, MSN, MPH Medical Epidemiologist Maine Center for Disease Control and Prevention

November 4, 2022



# **Outline of Presentation**



- 2022 Ebola Virus Disease (EVD) Outbreak in Uganda: Epidemiology
- EVD overview
- Border health & passenger screening
- What is a frontline hospital?
- Ebola frontline hospital readiness
  - Infection prevention & control
  - Laboratory capacity
  - Waste management
  - Patient movement & transportation
- Tools for assessing readiness



#### **Infection Prevention and Control**

- Carrie Rice
- Healthcare Epidemiology Improvement Coordinator, Maine CDC

#### **Laboratory Capacity**

- Nick Matluk
- Microbiology Supervisor, CLIA Technical Supervisor, Bioterrorism Coordinator, Select Agent Responsible Official, Maine CDC

#### Waste Management

- William Jenkins
- PHEP Director, Maine CDC

#### Patient Movement & Transport

- J. Sam Hurley
- Director, Maine EMS

#### **Assessment Tools**

- Rita Owsiak
- HAI Coordinator, Maine CDC

# 2022 Ebola Virus Disease (EVD) Outbreak in Uganda: Epidemiology

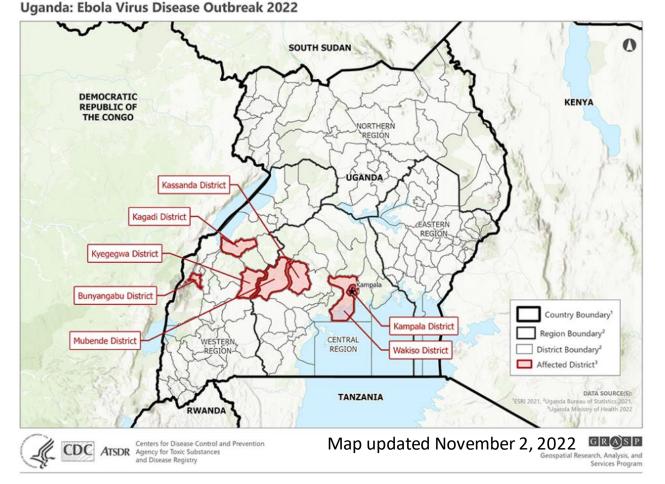
Dena Bushman

Medical Epidemiologist, Maine CDC

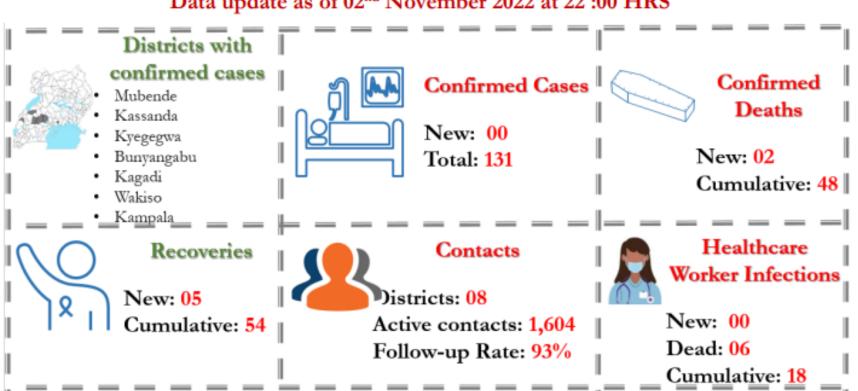


# 2022 EVD Outbreak in Uganda: Epidemiology

- September 19, 2022: The first confirmed case of EVD was a 25-year-old man who lived in Mubende District
- September 20, 2022: EVD outbreak due to Sudan virus (species *Sudan ebolavirus*) declared by the Uganda MOH
- Investigations identified suspicious cases and clusters of deaths occurring in Mubende district up to 1 month earlier

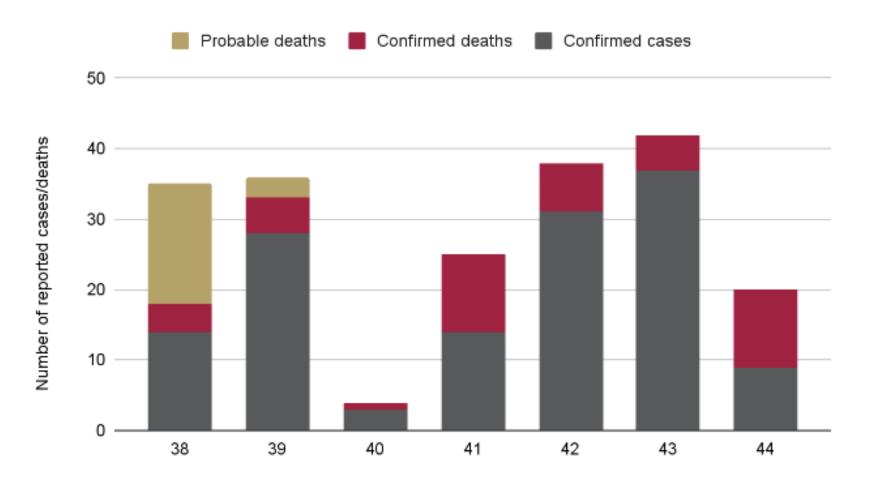


# 2022 EVD Outbreak in Uganda: Epidemiology



#### Data update as of 02nd November 2022 at 22:00 HRS

# 2022 EVD Outbreak in Uganda: Epidemiology



Epidemiological week Figure: EVD cases and deaths by epidemiological week reported for weeks 38-44 (September 19- November 2, 2022)

Dena Bushman

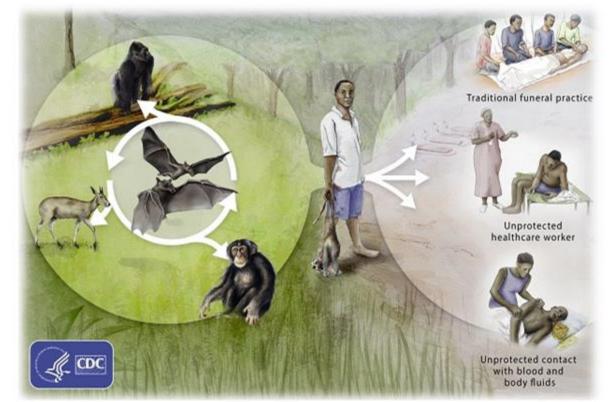
Medical Epidemiologist, Maine CDC



### EVD in humans is caused by infection with one of 4 viruses within the genus *Ebolavirus*

- 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
- Taï Forest virus (species Taï Forest ebolavirus)
  - One human case (survived)
- Sudan virus (species Sudan ebolavirus)
  - Multiple outbreaks (Sudan, Uganda)
  - ~50% fatality

- EVD is believed to be animal-borne (zoonotic); bats are the most likely reservoir
- Serious illness, often fatal in humans
- Without treatment EVD has a high mortality rate
- Since 1976, there have been 33 outbreaks due to Ebola virus (species *Zaire ebolavirus*)
- Prior to 2022, there have been 7 outbreaks due to Sudan virus (Uganda and Sudan)
- Most of our knowledge of EVD comes from outbreaks caused by Ebola Zaire; we anticipate lessons learned from Ebola Zaire outbreaks to be applicable to this outbreak.



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Key differences between Ebola virus (species Zaire ebolavirus)

& Sudan virus (species Sudan ebolavirus):

- 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
- There is no FDA-licensed vaccine for Sudan virus
  - Two experimental vaccine candidates undergoing evaluation

### **Transmission can occur through:**

- Contact (*through broken skin or mucous membranes*) with body fluids of a person that is sick or has died from EVD
- Objects (such as clothes, bedding, needles, and medical equipment) contaminated with body fluids from a person who is sick with or has died from EVD
- No documented cases of airborne transmission, however healthcare workers should try to limit aerosolgenerating procedures
- In infected individuals, the virus can be found in all body fluids, including:
  - Blood
  - Feces/Vomit
  - Urine
  - Tears
  - Saliva

- Breast milk
- Amniotic fluid
- Vaginal secretions
- Sweat
- Semen

INFECTION	INCUBATION PERIOD	DRY PHASE	WET	PHASE
Infection occurs after exposure to a person who is sick or has died of Ebola.	<ul> <li>It can last from 2-21 days (usually 4-17 days)</li> <li>Person feels well and has no symptoms</li> <li>The person cannot transmit the virus</li> </ul>	Common signs and symptoms are • Fev er • Fatigue • Headache • Joint pain • Muscle pain • Back pain • Sore throat	Common signs and symptoms are • Diarrhea • Nausea/vomiting • Bleeding occurs in some cases • Hiccups • Eye redness	<ul> <li>The patient becomes more contagious as the disease progresses.</li> <li>In fatal cases, death occurs on average 7 to 10 days after the onset of symptoms.</li> <li>The amount of Ebola virus is highest at the time of death.</li> </ul>
•	NOT CONTAGIOUS	CONTAGIOUS	EVEN MORE CONTAGIOUS	O THE MOST CONTAGIOUS
EXPOSURE TO THE VIRUS	DAY OF T	O THE DISEASE		DISEASE 24

https://emergency.cdc.gov/coca/ppt/2022/101222\_slides.pdf

# Border Health & Passenger Screening

Dena Bushman

Medical Epidemiologist, Maine CDC



# Screening of incoming passengers from Uganda

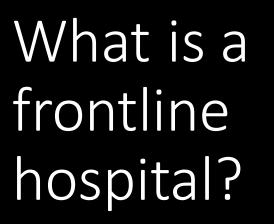
- Approximately 140 passengers arriving in the U.S. from Uganda per day
- No direct flights
- International travelers arriving in U.S. after leaving Uganda arrive at one of five airports:

   ATL (Atlanta)
   ORD (Chicago)
   JFK (New York City)
   EWR (Newark, New Jersey)
  - IAD (Dulles, Virginia)
- Public health entry screening of passengers upon arrival
   Asks travelers to watch for symptoms of EVD and provides information on what to do if
  - they feel sick
- Per the World Health Organization, as of September 21, 2022, the risk assessment was very high at the national level, high at the regional level, and **low at the global level**.

## Screening of incoming passengers from Uganda

**U.S. CDC notifies Maine CDC** about travelers All travelers are evaluated by a Maine CDC epidemiologist

Travelers are monitored for up to 21 days post-arrival

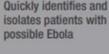


Frontline Healthcare Facility



Quickly identifies and







Notifies facility infection control and state and local public nealth officials

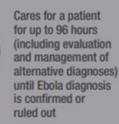


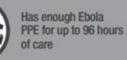
Has enough Ebola personal protective equipment (PPE) for at least 12-24 hours of care

Ebola Assessment Hospital Safely receives and isolates a patient with possible Ebola

96 hours







Transfers a patient with confirmed Ebola to an Ebola treatment center in consultation with public health officials

All of the hospitals will be prepared to do the following:

Ensure staff are appropriately trained and have documented competency in safe PPE practices

Prepares for patient

transfer, if needed

Have systems in place to safely manage waste disposal, cleaning and disinfection

Adhere to infection control protocols

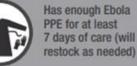
Ebola Treatment Center



Safely receives and isolates a patient with confirmed Ebola



Cares for patients with Ebola for duration of illness



restock as needed) Has sustainable

staffing plan to manage several weeks of care

CDC experts are ready to deploy to CDC provide assistance as needed

#### MAINE

#### **Frontline Hospitals:**

- **Every Acute Care Hospital**
- **Every Critical Access Hospital**

#### **Assessment Hospitals:**

- Maine Medical Center (MMC)
- Eastern Maine Medical Center (EMMC)

#### **Treatment Hospital:**

Mass General Hospital (Boston)

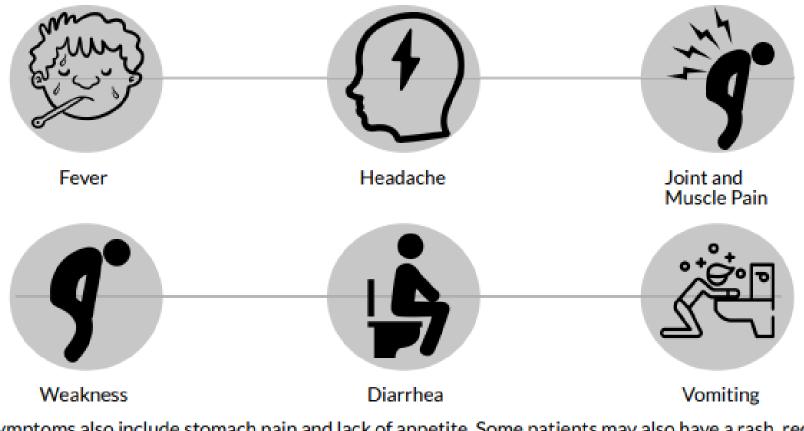
# Identify

- Know points of entry into the facility
- Post signage around your facility to help individuals self-identify
- Screen all patients:
  - $\circ~$  Obtain a relevant exposure history:
    - Have you been to an area with <u>an active Ebola virus outbreak</u> in the past 21 days?
       Specifically ask about travel to Uganda.
    - Have you been in close contact with someone confirmed or suspected to have EVD?
    - While traveling abroad, did you attend a funeral?
    - While traveling abroad, did you care for someone who was sick?
    - While traveling abroad, did you have any contact with animals, domestic or wild?
  - Please be aware of and avoid using stigmatizing language





## Review signs or symptoms compatible with EVD



Symptoms also include stomach pain and lack of appetite. Some patients may also have a rash, red eyes, hiccups, cough, sore throat, chest pain, difficulty breathing, difficulty swallowing, and bleeding inside and outside the body. Symptoms usually start 2 to 21 days after exposure.

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# **Isolate**

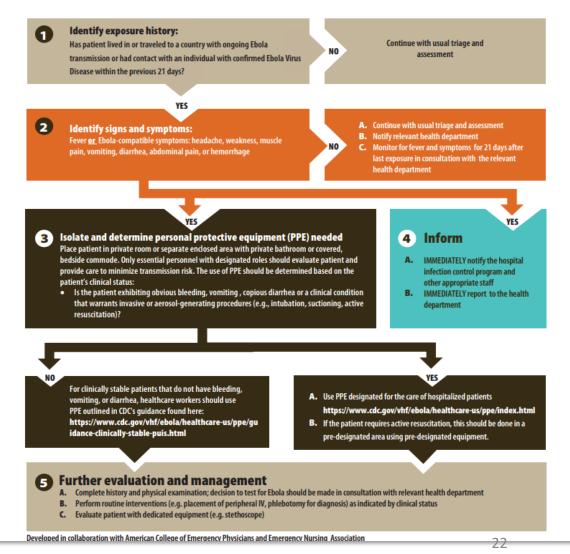
## If a relevant exposure history is reported AND signs or symptoms are consistent with EVD:

- Isolate the patient in a single room with a private bathroom or covered, bedside commode
- Adhere to <u>infection prevention and control procedures</u> to prevent transmission through direct or indirect contact, including wearing <u>appropriate PPE</u> and using dedicated equipment
- Use only essential healthcare workers trained in their designated roles for patient care and keep a log of everyone who enters and leaves the patient's room
- Perform only necessary tests and procedures and avoid aerosol-generating procedures

# ••• Inform

- •Inform the patient of the process
- •Notify your facility's Infection Prevention and Control Program or designee of a suspected EVD case (*per facility policy*).
- •Contact Maine CDC at our 24-hour Disease Reporting and Consultation Line at 1-800-821-5821

Identify, Isolate, Inform: Emergency Department Evaluation and Management of Patients Under Investigation for Ebola Virus Disease



# Infection Prevention & Control

Carrie Rice

Healthcare Epidemiology Improvement Coordinator, Maine CDC



#### Minimum PPE for the 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

For droplet and source protection only. Does not provide respiratory protection



### Single-use (disposable) gloves (two pairs). At a minimum, outer gloves should have extended cuffs

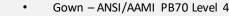
• Non-sterile medical exam gloves

See website for donning/doffing procedure guidance:

https://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance-clinically-stable-puis.html

#### Notes:

- AAMI PB70 Level 1-3 have increasing levels of resistance to fluids; Level 4 tested for viral transfer
- Blood and viral penetration resistance:



Coverall – ASTM F1671 or EN14126

### PPE for clinically unstable and/or potential body fluid exposures

- Single-use (disposable) impermeable gown extending to at least mid-calf OR Single-use (disposable) impermeable coverall.
  - Coveralls without integrated hoods are preferred; coveralls with or without integrated socks are acceptable. Scissors should never be used to remove tape or any other part of PPE.
- Respiratory, Head, and Face Protection: Either a PAPR or disposable, NIOSH-certified N95 respirator (singleuse) should be worn in case a potentially aerosol-generating procedure needs to performed emergently.
- Single-use (disposable) examination gloves with extended cuffs.
  - Two pairs of gloves should be worn so that a heavily soiled outer glove can be safely removed and replaced during care. At a minimum, outer gloves should have extended cuffs.
- Single-use (disposable) boot covers that extend to at least mid-calf.
  - In addition, single-use (disposable) ankle-high shoe covers ("surgical booties") worn over boot covers may be considered to
    facilitate the doffing process, reducing contamination of the floor in the doffing area thereby reducing contamination of
    underlying shoes.
  - Single-use (disposable) shoe covers are acceptable only if they will be used in combination with a coverall with integrated socks.
- **Single-use (disposable) apron** that covers the torso to the level of the mid-calf should be used over the gown or coveralls if patients with Ebola are vomiting or have diarrhea and should be used **routinely if** the facility is using a coverall that has an exposed, unprotected zipper in the front.

#### Notes:

- AAMI PB70 Level 1-3 have increasing levels of resistance to fluids; Level 4 tested for viral transfer
- Blood and viral penetration resistance:
  - Gown ANSI/AAMI PB70 Level 4
    - Coverall ASTM F1671 or EN14126

See website for donning/doffing procedure guidance: https://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance.html

### Trained Observer / Doffing Assistant PPE



- Single-use (disposable) fluid-resistant gown that extends to at least mid-calf or single-use (disposable) fluid-resistant coverall without integrated hood.
- Single-use (disposable) full face shield.
- Single-use (disposable) surgical mask.
- Single-use (disposable) gloves with extended cuffs.
  - $\circ$   $\,$  Two pairs of gloves should be worn.
  - At a minimum, outer gloves should have extended cuffs.
- Single-use (disposable) ankle-high shoe covers. Shoe covers should allow for ease of movement and not present a slip hazard to the wearer.

See website for donning/doffing procedure guidance: <u>https://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance.html</u>

## **PPE Considerations:**

#### PPE selection

- Staff must be aware of PPE protective qualities and limitations. Remember to check expiration dates on PPE supplies
- Consider tasks to be performed. How close or prolonged contact will be, potential exposures to blood or any body fluids, and contaminated items and surfaces?
  - Note: patient condition may change rapidly. The sudden presence of body fluid risk should be anticipated.

#### • PPE Training:

- Training must be interactive allowing HCWs to practice donning, adjusting, using, and doffing the specific PPE that the employee will use.
  - Training guidelines: <u>https://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance.html</u> & <u>https://www.cdc.gov/vhf/ebola/healthcare-us/ppe/training.html</u>

#### PPE Donning/Doffing:

- Designated areas, clean vs. contaminated
  - Storage, donning area, and doffing area (e.g., for doffing anteroom or adjacent vacant patient room that is separate from the clean area)
- Use a Trained Observer Contamination of PPE, skin, or clothing may not be visible. Trained observers should monitor for inadvertent contamination during use and doffing of PPE; consider all doffed PPE contaminated.
- Review Donning & Doffing procedure guidelines (see links above)
  - Donning complex ensembles takes time

## Infection Prevention & Control: Training Resources

## U.S. CDC: <a href="https://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance.html">https://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance.html</a>

Guidance for Donning and Doffing Personal Protective Equipment (PPE) During Management of Patients with Ebola Virus Disease in U.S. Hospitals

Select Your PPE Combination



**Personal Protective Equipment Module** 

Estimates minimum personal protective equipment (PPE) needed by hospital personnel managing patients suspected or known to be infected with a special pathogen. <u>https://dashtool.org/</u>



AVAILABLE SUPPLIES

PPE Guidance for Viral Hemorrhagic Fevers: <u>https://repository.netecweb.org/items/show/1693</u> Space Recommendations for PPE Donning/Doffing: <u>https://repository.netecweb.org/items/show/1708</u>

# Infection Prevention & Control: Cleaning/Disinfection

- PPE: Staff should wear recommended personal protective equipment (PPE)
- **Disinfectants:** Use an U.S. Environmental Protection Agency (EPA)-registered hospital disinfectant from <u>List L</u> or <u>List Q</u> to disinfect environmental surfaces in rooms of PUIs, patients with confirmed EVD, & in PPE doffing area.
- Environmental Considerations:
  - Avoid contamination of reusable porous surfaces that cannot be made single use:
    - Use only a mattress and pillow with plastic or other covering that fluids cannot get through.
    - Do not place PUIs or patients with confirmed EVD in carpeted rooms.
    - Remove all upholstered furniture and decorative curtains from patient rooms before use.
  - $\circ$   $\,$  Routine cleaning and disinfection of the PPE doffing area
- Laundering: discard all linens, non-fluid-impermeable pillows or mattresses, and textile privacy curtains into the waste stream and dispose of appropriately.
- EVD is Category A infectious substances (see waste section)
  - Includes medical equipment, sharps, linens, used healthcare products such as soiled absorbent pads or dressings, kidneyshaped emesis pans, portable toilets; and used PPE (gowns, masks, gloves, goggles, face shields, respirators, booties, etc.) or byproducts of cleaning contaminated or suspected of being contaminated with a Category A infectious substance

Nick Matluk

Microbiology Supervisor, CLIA Technical Supervisor, Bioterrorism Coordinator, Select Agent Responsible Official, Maine CDC



### For context:

- Biofire FilmArray NGDS Warrior Panel (Warrior Panel) is an FDA 510(k)-cleared assay, can detect:
  - Sudan virus, Ebola virus, Taï forest virus, Bundibugyo virus, Reston virus
- As of October 27:
  - 24 Laboratory Response Network (LRN) laboratories & 4 Regional Emerging Special Pathogen Treatment Centers can test for *Sudan ebolavirus* under CLIA using the Warrior Panel.
    - Closest laboratories to Maine:
      - Massachusetts State Public Health Laboratory
      - Wadsworth Center, New York State Department of Health
  - CDC has in-house diagnostic assays and will provide confirmatory testing in case of a presumptive positive result



### As a reminder:

- A negative RT-PCR test result from a blood specimen collected less than 72 hours after onset of symptoms does not rule out EVD
- 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

## **Considerations for your facility:**

- What testing can your facility do?
- What POC testing is available at your facility?
- What risks are involved with using this instrument?
- How many instruments do you have?
  - Can one be dedicated to a patient for a period of time?
- Where will you do the testing?
- Do you have trained staff?
- How will you clean and disinfect your instrument(s)?

## Ideally, a frontline hospital can test for:

- POC Malaria
- POC COVID-19
- POC Influenza
- POC Strep
- Urine dip
- Chest x-ray

## In addition, do you have the capacity for:

- CBC: Manual WBC & Platelet estimate and Differential or full CBC by POC
- Blood chemistries: Glucose, BUN, Creatinine, Electrolytes by POC (e.g., ISTAT)
- Stool culture



## Laboratory Capacity: Testing available at HETL & other PHLs

Test	Specimen Source	Volume	Specimen Container	Storage Conditions	Sample Stability	Turn Around Time	Shipping
Influenza Real-Time PCR	Preferred: Nasopharyngeal swab/Throat swab in viral transport media, Nasal wash. Other Acceptable specimens: Lower respiratory	Minimum 1.0ml synthetic-tipped swabs with plastic shaft only	viral transport media	2−8 °C	72 hrs	<8hr	IATA Category A
Malaria PCR	Whole Blood	Minimum 0.5 ml	EDTA (purple top) tubes	2 – 8 °C	6 hrs	< 8hr	IATA Category A
Blood Culture	Whole Blood	See mfg protocol	Facility specific Blood Culture Bottle	Room Temperature	6 hrs	Variable, Maximum of 7 days	IATA Category A
Ebola Sudan Biofire FilmArray NGDS Warrior Panel	Whole Blood	Adult: minimum of 4 mL whole blood Pediatric: minimum of 1 mL whole blood	EDTA (purple top) tubes	Room Temperature	24 hours	<mark>Mass PHL (Variable)</mark>	IATA Category A
				2 – 8 °C	7 days	Mass PHL (Variable)	IATA Category A
				Dry ice	n/a	Federal CDC (Variable)	IATA Category A

## Shipping considerations:

- Category A
- Personnel must be trained & certified to ship Category A specimens
  - Online trainings available
  - Communicate with Maine CDC & HETL
- Identify couriers
  - **o** Couriers may have different requirements
- Do you have the correct shipping supplies?
  - Category A box for required shipping condition & appropriate labels
     Appropriate packaging material
- What days can you ship?
  - Is your courier available 7 days a week?
    - HETL hours: Monday-Friday 7:30am-5pm



# Laboratory Capacity: Contact Information

#### **HETL Websites**

• Laboratory Submission Information Sheets:

https://www.maine.gov/dhhs/mecd c/public-health-systems/healthand-environmentaltesting/micro/submittingsamples.shtml

#### • Requisition Forms:

https://www.maine.gov/dhhs/mecd c/public-health-systems/healthand-environmentaltesting/micro/download-forms.htm

#### HETL Lab Staff

- Nick Matluk
  - (207) 287-6736
  - (207) 557-2469
- Heather Grieser
  - (207) 287-5769
- Lori Webber
  - (207) 287-1722

#### Uniship

#### (Category A shipping)

 Patrick Murphy (Operations Manager) 207-745-6264 pmurphy@unishipcourier.c om

# Waste management

William Jenkins

PHEP Director, Maine CDC



### Waste Management

### Hazardous Waste Transport Regulatory Overview

- Waste generated in the care of patients with known or suspected EVD are outlined in the US Occupational Safety and Health Administration (OSHA) Blood borne Pathogen standard, 29 C.F.R. 1910.1030. See <u>https://www.osha.gov/SLTC/bloodbornepathogens/index.html</u>
- Waste contaminated (or suspected to be contaminated) with Ebola virus is a Category A infectious substance regulated as a hazardous material under the US Department of Transportation's (DOT's) Hazardous Materials Regulations (HMR; 49 C.F.R., Parts 171-180).
  - FMI see <u>http://phmsa.dot.gov/hazmat/transporting-infectious-substances</u>



### Waste Management

**Hazardous Waste Transport Regulatory Overview** 

- If a HC facility requires a variance to the HMR, the HC facility must apply for a Special Permit. See <u>http://www.phmsa.dot.gov/hazmat/permits-approvals/special-permits</u>
- Additional guidance is available per the U.S. CDC, Ebola-Associated Waste Management <u>http://www.cdc.gov/vhf/ebola/hcp/medical-waste-management.html</u>



## Waste Management

Stericycle has contracts to pick up and transport medical waste from every hospital and most health centers in Maine. Contracts do not include Category A waste.

- With an amendment, Stericycle will send Category A waste packaging instructions
  - Two different containers are available from Stericycle: poly drum (55-gallon) & corrugated container
- Stericycle recommends waiting to order just-in-time (this will save the facility money and storage space).
  - Drums are usually delivered within 3 days
  - $\circ~$  Orders will be expedited if an Ebola case is confirmed



We protect what matters.

- Stericycle will provide a trailer onsite to store full containers at any facility with a confirmed Ebola case.
  - Once the trailer is full, Stericycle will over pack the containers within an additional 95-gallon container for transport and disposal
  - Facilities do not need to purchase the 95-gallon containers
- Stericycle will be incinerating Ebola waste and then transporting the ashes to an identified landfill



We protect what matters.

# Patient Movement & Transportation

J. Sam Hurley Director, Maine EMS



# Out-of-Hospital Patient Movement and Transport

### **Two Scenarios:**

- 911 Activation
  - Ideally coordinated through Maine
     CDC ID EPI Team
  - Activation of 911 Screening Tool Travel to Uganda
- Interfacility Movement
  - Coordination through Maine CDC, Maine EMS, Hospitals, and Transporting Agency



## Out-of-Hospital Patient Movement and Transport

### **Planning:**

- Capitalizing on existing Hazardous Materials Capacity of EMS System
- Regionalized response approach to transport
- Consideration of involvement of hospital-based clinicians to support movement of patients actively receiving treatment



# Tools for Assessing Readiness

Rita Owsiak

HAI Coordinator, Maine CDC



# Frontline Hospital Assessment Tools

#### **NETEC Preparedness Checklists:**

#### **NETEC**

Health Care Facility Special Pathogen Preparedness Checklist

https://repository.netecweb.org/items/show/1724

### Maine CDC Adaptation:



### Ebola Preparedness Mini Drills

(will send copy out to facilities post presentation)



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