NYS/NYC Laboratory Guidelines for Handling Specimens from Patients with Suspected or Confirmed Ebola Virus Disease

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Purpose

The following guidelines are provided for New York State (NYS) and New York City (NYC) laboratories that may receive and test specimens from patients who are either:

- **Suspected (meet the criteria for a Person Under Investigation (PUI)) of having Ebola Virus Disease (EVD) because they report consistent symptoms and epidemiological risk factors or**
- **Confirmed as having EVD with a laboratory test.**

In the hospital setting, where policies and procedures should be in place to safeguard health care workers, consideration of Ebola should not delay diagnostic assessments, laboratory testing, and appropriate care for other more likely medical conditions. The likelihood of EVD is low even among symptomatic travelers returning from affected countries. Additional guidance on testing of routine clinical specimens when EVD is a concern is available at https://www.cdc.gov/vhf/ebola/laboratory-personnel/safe-specimen-management.html.

Previous experience with confirmed cases of EVD and Lassa Fever in United States (US) hospitals have provided evidence of the low risk to laboratory personnel when conducting routine testing in the core laboratory. Subject matter expert consultation on laboratory safety when EVD is a concern are available by contacting Wadsworth Center Division of Infectious Diseases at 518-474-4177.

For patients without identifiable risk factors for EVD (individuals who have traveled to Uganda and are symptomatic but do not meet PUI criteria) or who are asymptomatic, specimens should be received, processed, and tested in accordance with usual and standard procedures for laboratory testing and not using the guidelines below.

Clinical Testing Considerations

For these guidelines, a suspected EVD patient who reports epidemiological risk factors and symptoms consistent with EVD and a definitive diagnosis has not yet been determined, should be tested for Ebola virus after public health approval. **Contact your local health department before collecting samples for testing to obtain the required prior approval for testing and assistance with specimen submission and transportation**.

- Molecular diagnosis for EVD is available at both the NYC and NYS public health laboratories (PHLs) using the BioFire NGDS Warrior panel.
- There are several Food and Drug Administration (FDA) EUA EVD tests that are commercially available but not all can detect the presence of *Sudan ebolavirus* (the causative agent of the current EVD outbreak in Uganda). As of October 31, 2022, there is only one FDA 510k cleared assay that can detect *Sudan ebolavirus:* BioFire NGDS Warrior panel. This can only be performed in certain authorized laboratories including NYC and NYS PHLs.
- For negative results on specimens collected less than 3 days post onset of symptoms, and if the patient is still symptomatic, repeat testing is recommended unless EVD is no longer in the differential diagnosis.

EVD transmission and decontamination

Please note the following points regarding EVD:

- A person infected with Ebola virus is not contagious before symptoms appear.
- EVD is transmitted through direct contact (via broken skin or mucous membranes) with blood or body fluids (urine, saliva, sweat, feces, vomit, breast milk, amniotic fluid, and semen) from an EVD patient or through contact with objects (such as clothes, bedding, needles, and medical equipment) contaminated with blood or body fluids from an EVD patient. There is no evidence of airborne transmission.
- Ebola virus is readily inactivated by standard chemical decontamination procedures used in laboratories and hospitals (detailed recommendations below).

Biosafety classification

Information provided by the CDC (http://www.cdc.gov/vhf/ebola/hcp/safe-specimen-management.html) has verified that:

- While Ebola virus culture is only performed in a biosafety level 4 laboratory, the handling of primary clinical specimens from EVD patients can be conducted safely in a biosafety level 2 laboratory.
- Specimens from suspected EVD patients are **not** classified as select agents. For patients with confirmed EVD, select agent classification of specimens will be dependent on viral isolation at the CDC.

CDC guidance

Guidance from the CDC recommends that suspected EVD patients or confirmed cases be managed in US hospitals with standard, contact, and droplet precautions. Laboratory personnel are advised to adhere strictly to safety procedures for the prevention of transmission of blood borne pathogens when handling specimens from these patients. See the following site for more information: https://www.cdc.gov/vhf/ebola/laboratory-personnel/index.html

Recommendations include the following for testing of suspect PUIs EVD patients:

- Specimen collection and storage
    - Recommended PPE is two pairs of single use gloves; single use impermeable gowns; single use full face shield; and a single use face mask. Additional PPE may be required in certain situations. For additional information, please see: https://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance.html
    - For adults, collect a minimum volume of 4 mL whole blood in tubes containing EDTA. For pediatric samples, collect a minimum of 1 mL whole blood in pediatric-sized collection tubes containing EDTA . Blood must be collected in plastic collection tubes. 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.
    - If necessary, specimens can be kept at 4°C for 7 days or less before shipping.
- Laboratory testing
    - Gloves, fluid-resistant or impermeable gowns, masks to cover all of nose and mouth, and eye protection such as full-face shield or goggles are recommended.
    - Use a certified Class II Biosafety cabinet (BSC) or Plexiglass splash guard with appropriate PPE if a BSC2 is not available.
    - If neither a BSC nor Plexiglass splash guard are available, laboratorians should wear all the PPE recommended above.
    - Manufacturer-installed safety features for instruments that reduce the likelihood of exposure should also be used.

- Packing and shipping
    - Specimens collected from suspected or confirmed EVD patients should be packaged and shipped as Category A infectious substances and should following the basic triple packaging system: (1) a primary container (a sealable specimen container) wrapped with absorbent material, (2) a secondary container (watertight, leak-proof), and (3) an outer shipping package. Details can be found at https://www.cdc.gov/vhf/ebola/laboratory-personnel/shipping-specimens.html.
    - All persons packing and shipping infectious substances must be trained and certified in compliance with US Department of Transportation (DOT) or the International Air Transport Association (IATA) requirements every two years.

Note, the above guidance refers to all laboratory work including the routine hematology and clinical chemistry testing that is essential for care and treatment of patients.

All laboratory directors should review their circumstances, facilities, resources, and procedures, as well as the training and experience of their staff to perform a thorough biohazard risk assessment and implement appropriate procedures for risk mitigation. However, any additional precautions or procedures should not interfere with the ability to provide appropriate medical care for suspected or confirmed EVD patients.

The following additional guidance is provided for consideration for the handling of laboratory specimens from suspected or confirmed EVD cases.

General laboratory guidelines

- Laboratory testing should be limited to those tests essential to patient care. However, patient care and well-being should not be compromised.
- Specimens should be labeled to indicate that they have originated from a suspected or confirmed EVD patient.
- Facilities should maintain a log of personnel handling specimens from these cases.
- Laboratories should review their protocols for occupational exposure and consult with their hospital epidemiologist and the local or state health department immediately if a potential exposure occurs.
- If available, the use of point-of-care (POC) instruments and methods inside or nearby the patient's isolation room may be a preferred option, to provide reduced specimen transport and limit the need for testing in routine laboratories. If a POC instrument will be used, the laboratory must review the intended use, as approved by the FDA to determine if the instrument is approved for use on critically ill patients. This information is specified in the "Intended Use" section of the Product Insert.

- For testing that requires transport of samples to the hospital laboratory, specimens should be double-bagged, placed in a biohazard transportation container, and **hand-carried** to the laboratory. **DO NOT** use a pneumatic tube system.

Comments on specific laboratory procedures for testing of specimens from PUIs or confirmed EVD

Procedure	**Recommendation**
Centrifugation	Should be performed with biohazard sealed buckets or sealed rotor and only opened inside a Class II BSC.
Homogenization	Procedures requiring homogenization of any specimen type should be avoided or performed with extreme care due to the risk of spray or splash.
Clinical chemistry and hematology	Numerous issues pertaining to routine testing in these areas need to be considered and are highly variable depending on the type of equipment used, volume of testing performed, laboratory workflow and layout, and many other factors. A full risk assessment should be made at each site, including options for decontamination. For automated instruments, decontamination procedures should be those advised by the manufacturer or vendor for enveloped viruses.
Malaria testing	Malaria antigen detection kits may assist with initial urgent assessment but must be recognized as being inherently less sensitive than smear microscopy or PCR, at least one of which must be performed as soon as possible. Thin blood smears should be fixed in methanol for 15-30 minutes and dried prior to staining. The use of additional heat inactivation is not considered necessary for Ebola decontamination and has been found by some parasitologists to cause disruption to the parasite morphology. Thick blood films should not be hemolysed with water but should be stained with Giemsa stain that includes Triton X-100 to inactivate Ebola virus. Validated malaria PCR assays that have been approved by the Clinical Laboratory Evaluation Program for clinical use may be used to detect malarial parasites. For more detailed guidance, see the CDC recommendations on Malaria testing for suspected Ebola patients at: http://www.cdc.gov/malaria/new_info/2014/malaria_ebola.htm
Blood Cultures	Systems using plastic blood culture bottles are preferred. Blood culture in glass bottles should be avoided.
Other specimens for bacterial culture	“Pan-cultures” should not be performed. Procedures essential for patient management should be performed in a BSC with PPE as described above. Identification or characterization of subsequently cultured bacteria or fungi can be performed with standard precautions.
Wet preps	Should be avoided.

Viral cultures	**DO NOT perform viral culture**, including any rapid culture systems on any specimen.
Pre-transfusion testing	Please refer to the American Association of Blood Banks' Ebola information sheet at https://www.aabb.org/news-resources/resources/clinical-resources/infection-control-for-handling-blood-specimens-from-suspected-ebola-patients
Post-mortem examinations	Should **only** be performed under the explicit recommendation of the CDC and with its guidance. In the event of a fatality in a suspected or confirmed EVD patient in NYC, the NYC Office of the Chief Medical Examiner (OCME) must be contacted immediately. The OCME will take custody of the decedent and make the final determination about disposition of the remains. Facilities outside of NYC should contact their coroner or medical examiner for further guidance on the procedure in their locality.
Specimen storage	Except for circumstances where retention is required by regulations, long-term storage of specimens is discouraged. It is recommended that specimens collected from suspected or confirmed EVD cases be isolated from other specimens in the laboratory. As soon as is practical after testing has been completed and it has been confirmed by the CDC or PHL that the samples are not needed for further evaluations, they should be disposed of in an appropriate manner (see below). **Note**: details of specimen decontamination and disposal should be documented for any samples from a confirmed EVD patient, or a PUI of unknown status. While the relevant division at CDC has agreed to not classify these as select agent samples, that classification being reserved for positive cultures, they do reserve the right to request information and confirmation of destruction/disposal.
Specimen decontamination and disposal	The outside of the specimen container should be disinfected with a US Environmental Protection Agency (EPA)-registered hospital disinfectant with a label claim for a non-enveloped virus (e.g., norovirus, rotavirus, adenovirus, poliovirus) and wipe the outside of the specimen container. The disinfected specimen container and associated material should then be placed in a plastic bag and packaged with other contaminated waste for appropriate disposal or autoclaving. A list of EPA-registered disinfectants can be found at https://www.epa.gov/pesticide-registration/list-l-disinfectants-use-against-ebola-virus **Note**: Bleach or acidic chemicals **must NOT be mixed with TRIzol or any other reagent containing guanidine isothiocyanate, nor should they be disposed of together** in the same container as reactive compounds and toxic gases are formed if they interact.
Handling of regulated medical waste (RMW)	RMW guidance can be found at https://www.health.ny.gov/diseases/communicable/ebola/providers/