North Carolina Department of Health and Human Services
Division of Public Health

Pat McCrory
Governor

Aldona Z. Wos, M.D.
Ambassador (Ret.)
Secretary DHHS

Penelope Slade-Sawyer
Division Director

October 23, 2014 *(replaces version dated October 15, 2014)*

To: North Carolina Health Care Providers and Laboratories
From: Megan Davies, MD, State Epidemiologist
Scott Zimmerman, DrPH, MPH, HCLD (ABB), State Laboratory of Public Health
Re: **Ebola Virus Disease (4 pages)**

This memo is intended to provide updated information to all North Carolina health care providers and laboratories regarding Ebola virus disease (EVD) and management of suspected cases.

This version has been updated to include new infection control guidance; removal of high- and low-exposure risk criteria when considering Ebola testing; and updated laboratory guidance.

Summary
National and international health authorities are currently working to control a large, ongoing outbreak of Ebola involving areas in West Africa. A map of affected areas is available at http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/. The first travel-associated case of Ebola to be diagnosed in the United States was confirmed on September 30, 2014 and the first case acquired in the United States was confirmed on October 12, 2014.

Clinical and Epidemiologic Features

Ebola can spread from person to person by direct contact with a sick person's blood or body fluids or by contact with contaminated objects (such as needles).

The incubation period for Ebola is usually 8–10 days, but can range from 2–21 days. The risk for person-to-person transmission is greatest during the later stages of illness when viral loads are highest. Ebola is not transmissible during the incubation period (i.e., before onset of fever).

Initial symptoms include fever, headache, joint and muscle aches, sore throat, and weakness, followed by diarrhea, vomiting, and stomach pain. Skin rash, red eyes, and internal and external bleeding may be seen in some patients.

Case Investigation and Risk Assessment

- **Any patient with fever OR a clinically compatible illness who has been in a country with widespread Ebola transmission within 3 weeks before illness onset should be placed in appropriate isolation precautions (see below) as soon as possible. Precautions should be maintained while a more thorough evaluation is completed.**
- Clinicians caring for patients meeting these criteria should immediately contact their local health department or the state Communicable Disease Branch (919-733-3419; available 24/7) to discuss laboratory testing and control measures.
- An algorithm to assist providers in the evaluation of ill patients who report recent travel is available at http://epi.publichealth.nc.gov/cd/docs/NCDPHEbolaRiskAlgorithm.pdf.

- Even following travel to areas where Ebola has occurred, persons with fever are more likely to have infectious diseases other than Ebola (e.g., common respiratory viruses, endemic infections such as malaria or typhoid fever). Lassa fever should also be considered if Ebola is suspected, since there is overlap in terms of clinical features and geographic areas where exposures could occur.
- Clinicians should assess and treat patients' other medical conditions as indicated even if Ebola is being considered, but should minimize sample collection, laboratory testing, and diagnostic imaging (e.g., blood draws, X-rays) to those procedures necessary to provide acute care.

Ebola Virus Testing:

- **Testing Employed at the North Carolina State Laboratory of Public Health (NCSLPH):** Specimens **will not** be accepted without prior consultation. The NCSLPH utilizes the CDC/USAMRIID Ebola Zaire rRT-PCR assay that has been granted FDA Emergency Use Authorization. The estimated turn-round-time for presumptive results is 6 hours for a single specimen and up to 24 hours for multiple specimens. It is important to note that it may take up to 3 days after symptoms appear for the virus to reach detectable levels. Therefore, if specimens are collected <3 days after onset, a later specimen may be needed to completely rule-out Ebola. Since specimens tested at the NCSLPH may be forwarded to the CDC for more extensive laboratory testing, we are requiring 2 purple top tubes for submission (see table). CDC testing will include rRT-PCR with multiple primer probe sets for Ebola to confirm the initial results, tests for other hemorrhagic fever viruses, virus isolation, and serology when indicated by the clinical or epidemiological presentation.

- **USE APPROPRIATE PRECAUTIONS WHEN COLLECTING SPECIMENS FOR EBOLA TESTING**. Guidance is available at: http://www.cdc.gov/vhf/ebola/hcp/interim-guidance-specimen-collection-submission-patients-suspected-infection-ebola.html.

- All specimen submissions must be accompanied by a completed **Bioterrorism and Emerging Pathogens (BTEP) Specimen Submission Form** (http://slph.ncpublichealth.com/Forms/DHHS-5010-BTEmergingPathogens-0313.pdf), a **CDC 50.34 DASH Form** (http://slph.state.nc.us/Forms/CDC-Dash-NCSLPH-013114.pdf) and a **Viral Special Pathogens Branch Diagnostic Specimen Submission Form** (http://www.cdc.gov/ncezid/dhcpp/vspb/pdf/specimen-submission.pdf).

- The NCSLPH **highly recommends** that individuals packaging and shipping specimens for Ebola testing use packing instruction 620, IATA guidelines for Category A, which utilizes a triple packaging system. A trained and certified individual is required to package specimens using Category A guidelines. Web-based recertification can be accomplished using one of the following links: http://www.cdc.gov/labtraining/course_listing/1043824.html or http://www.saftpak.com/training/InternetTraining.aspx. We anticipate active discussion with all entities requesting diagnostic testing for Ebola and we will provide more specific guidance on a case-by-case basis.

Appropriate Specimens for Ebola rRT-PCR Testing at NCSLPH			
Specimen Type	Quantity	Testing	Transport
Whole blood with EDTA anticoagulant (purple top tube) in non-glass collection tube	≥ 4ml X 2	rRT-PCR	Refrigerated (4°C), placed on cold packs. Package specimens using Category A guidelines.
Appropriate Specimens for Ebola Testing Conducted at the CDC			
Uncoagulated whole blood (purple, yellow, or blue top) in non-glass collection tube	≥ 4ml	Culture, PCR	Refrigerated (4°C), placed on cold packs if shipment is to be received within 72 hrs. For delays exceeding 72 hrs freeze serum at-70°C & ship on dry ice.
Serum (red top, collected in non-glass tube)	≥ 4ml	Culture, PCR, Serology	
Formalin-fixed or paraffin-embedded tissues	As Appropriate	Immuno-histochemistry	Ship at room temperature. Note: An autopsy or surgical report must accompany the specimen.
Fresh frozen tissue	1 cm^3 (except for biopsies)	Culture, PCR	Ship specimen frozen on dry ice in a plastic container.

- **CONTACT THE BTEP UNIT (919-807-8600) PRIOR TO ANY SHIPMENT OR IF YOU HAVE QUESTIONS.**
  Address all specimen shipments as follows: Attention: Bioterrorism & Emerging Pathogens Unit
  North Carolina State Laboratory of Public Health
  4312 District Drive
  Raleigh, NC 27607-5490

Routine Laboratory Testing on Suspect EVD Cases

- Clinicians should ensure that laboratory staff are aware if a diagnosis of EVD is being considered so that appropriate precautions can be taken in the laboratory when handling routine or diagnostic specimens.
- The NCSLPH encourages institutions to conduct an internal risk assessment to review all handling and testing procedures that are associated with specimens from a suspect Ebola case. The NCSLPH highly recommends the use of professional judgment to determine the need for enhanced safety precautions.
- The NCSLPH strongly recommends that laboratories consider the following guidelines for handling of routine laboratory specimens from persons under investigation for Ebola:
  - CDC laboratory guidelines:http://www.cdc.gov/vhf/ebola/hcp/interim-guidance-specimen-collection-submission-patients-suspected-infection-ebola.html
  - NYSDH/NYCH laboratory guidelines: http://www.health.ny.gov/diseases/communicable/ebola/docs/lab_guidelines.pdf.

Infection Control

- Every North Carolina hospital must be prepared to assess and provide initial management to a patient with suspected or confirmed EVD.
- Key safe work practices include, but are not limited to, the following:
  - Identify and isolate the suspected Ebola patient in a single patient room with a closed door and a private bathroom or bedside commode (if available) as soon as possible.
  - Limit the number of healthcare workers who come into contact with the Ebola patient (e.g., avoid short shifts), and restrict non-essential personnel and visitors from the patient care area.
  - Use dedicated patient care equipment, preferably disposable.
  - Perform regular cleaning and disinfection of patient care area surfaces, even absent visible contamination. This should be performed only by nurses or physicians as part of patient care activities in order to limit the number of additional persons who enter the room.
  - Disinfect immediately any visibly contaminated personal protective equipment (PPE) surfaces, equipment, or patient care area surfaces using an EPA-registered disinfectant wipe.
- Tightened infection control guidance for healthcare workers caring for patients with Ebola is available at http://www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html. The enhanced guidance is centered on three principles:
  - All healthcare workers undergo rigorous training and are practiced and competent with PPE, including putting it on and taking it off in a systematic manner
  - No skin exposure when PPE is worn
  - All workers are supervised by a trained monitor who watches each worker putting PPE on and taking it off.
- CDC now recommends facilities use of a powered air-purifying respirator (PAPR) or an N95 or higher respirator in the event of unexpected aerosols.
- Education and training resources for those healthcare personnel who might provide care in a designated isolation area/unit are being developed by DPH and partners and will be available at http://www.ncdhhs.gov/ebola.
- PPE recommendations differ for the hospital vs. non-hospital setting and the corresponding level of anticipated patient care. Facilities that do not have access to PPE recommended for hospital settings or are not specifically trained and competent in its use should ensure that all persons entering the patient room use *at least* the following: Impervious gown, booties, hair cover, surgical mask, face shield (or goggles if not available) and double gloves. Guidance for non-hospital settings will be available at http://www.ncdhhs.gov/ebola.

- If a patient with suspected EVD requires transport to another facility, the transport staff and the receiving facility should be notified before transport so that appropriate precautions can be taken. Private transport is not recommended for patients in whom Ebola infection is being considered.

Assessment and Monitoring of Asymptomatic Persons with Ebola Exposure

- All persons arriving in North Carolina who travelled to or resided in a country with widespread Ebola transmission within the past 21 days should contact their local health department or the Communicable Disease Branch epidemiologist on call to undergo a thorough risk assessment.
- Control measures will be recommended by the local health department based on findings of the risk assessment.
- CDC guidance is available at: http://www.cdc.gov/vhf/ebola/hcp/monitoring-and-movement-of-persons-with-exposure.html.

Treatment

- Supportive care only; no antivirals are currently available for treatment of Ebola.
- Key interventions include:
    - Providing intravenous fluids and balancing electrolytes (body salts)
    - Maintaining oxygen status and blood pressure
    - Treating other infections if they occur
- Clinical observations shared through the Infectious Disease Society of America by physicians who provided care to Ebola cases at Emory University include the following:
    - Despite weight gains of 15–20 kg, the patients were profoundly hypovolemic due to their low serum albumin and vascular leak with third spacing. Fluid losses in their patients were 5–10 L/day.
    - Electrolyte losses were significant and included profound hyponatremia, hypokalemia and hypocalcemia. Arrhythmias were noted, and both intravenous and oral electrolyte repletion was necessary.
    - Nutritional depletion was evident as well.
    - Ebola virus RNA was detected in blood, urine, vomitus, stool, endotracheal suctioning, and semen and on skin. It was not detected in dialysate. Environmental testing in the patient rooms had no detection of viral RNA and included many high touch surfaces such as bed rails and surfaces in the bathroom.
    - Intensive 1:1 nursing care was necessary around the clock. Patients were monitored continuously and this level of nursing care allowed for rapid responses to clinical changes. Nursing and other team members provided emotional support, and as the patients improved, help with self-care and physical therapy.

Reporting

- Physicians are required to contact their local health department or the state Communicable Disease Branch (919-733-3419) as soon as Ebola infection is reasonably suspected.

This is an evolving situation and recommendations are likely to change as new information becomes available. Updated information and guidance are available from the CDC at http://www.cdc.gov/vhf/ebola and from North Carolina Public Health at http://epi.publichealth.nc.gov/cd/diseases/hemorrhagic.html.