

Prevention of Ebola Virus Disease (EVD) Transmission in Healthcare Settings

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November 4, 2014





Topics

- **Guidance and recommendations**
 - Infection control
 - Personal protective equipment (PPE)
 - Environmental infection control
 - Waste disposal
 - Hemodialysis
- **Traveler evaluation and patient triage**
- **Laboratory**
- **EMS and 9-1-1**



CDC Infection Prevention and Control Recommendations for Hospitalized Patients with Known or Suspected Ebola Virus Disease (EVD) in U.S. Hospitals

<http://www.cdc.gov/vhf/ebola/hcp/infection-prevention-and-control-recommendations.html>



EVD Infection Control

Standard precautions
Contact precautions
Droplet precautions



Patient Placement

- **Private room with private bath**
- **Door closed**
- **Maintain log of persons entering and exiting room**

Log of Individuals Entering Rooms Housing Patients with Suspect/Confirmed Ebola Virus Disease

Visitors and staff should be limited to only those necessary for the patient's care and well-being.

Visits should be scheduled to allow for:

- screening the visitor for symptoms of ebola virus disease.
- training the visitor regarding proper use of PPE, hand hygiene and other infection control measures.

Instruct visitors to limit movement in the facility to only the patient care area and the adjacent waiting area.

Patient Name _____ MR# _____

Date of Admission _____ Unit _____ Room Number _____

Return this form to the Infection Prevention Department when completed.

Date	Time In	Name of individual entering room	Relationship to Patient (e.g., HCW, spouse, sibling)	Name of Person Screening/Training Visitor	Time Out



Guidance on Personal Protective Equipment To Be Used by Healthcare Workers During Management of Patients with Ebola Virus Disease in U.S. Hospitals, Including Procedures for Putting On (Donning) and Removing (Doffing)

<http://www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html>



PPE

- **Ensure a site manager is present in the patient care area at all times.**
- **Provide extensive training for placing and removing PPE.**
- **Assign trained observers to assist with PPE procedures.**
- **Use disposable items when possible.**



Aerosol-Generating Procedures

Avoid

- Bilevel positive airway pressure
- Bronchoscopy
- Sputum induction
- Intubation and extubation
- Open suctioning of airways



Aerosol-Generating Procedures

Respiratory protection

- Minimum: *NIOSH-certified fit-tested N95 filtering face piece
- Powered air purifying respirator (PAPR)
- Disposable respiratory protective equipment is recommended.
- Staff processing re-usable respirators must be trained and use PPE described for patient care.

*National Institute of Occupational Safety and Health

Note: As of October 20, respiratory protection is recommended for all patient care activities, not just during aerosol-generating procedures.



Aerosol-Generating Procedures

Administrative and engineering controls

- Do not allow visitors in the room.
- Limit number of healthcare personnel in room.
- Use private room and ideally an airborne infection isolation room (AIIR).
- Minimize entry and exit during and shortly after procedure.



Hand Hygiene

Alcohol hand sanitizers are effective against Ebola virus.



Safe Injection Practices

- **Minimize use of needles and other sharps.**
- **All injection equipment and parenteral medication vials that enter the patient care area should be dedicated to that patient and discarded at point of use.**



Duration of Precautions

Duration of infection control precautions will be determined on a case-by-case basis collaboratively among local, state and federal health authorities.



Management of Healthcare Personnel (HCP)

Terms

- **Active monitoring:** individual records temperature and symptoms twice daily and is assessed daily by hospital or local health department.
- **Direct active monitoring:** hospital or local health department directly observes individual at least once per day.



Management of Healthcare Personnel (HCP)

- **No known unprotected exposure**
 - Monitor (direct active) HCP caring for Ebola patients for fever and other symptoms twice daily during care of patient and for 21 days after last contact with patient or patient's environment.
 - Remove symptomatic HCP from work or keep from coming to work. Notify local and state health departments.
 - Asymptomatic HCP may continue to work.



Management of Healthcare Personnel (HCP)

- **Known unprotected exposure**

Notify local and state health departments. Public health response may include:

- Direct active monitoring
- Exclusion from workplace
- Exclusion from long distance and local public transit
- Exclusion from public gatherings

DPH telephone numbers

608-267-9003 or after hours 608-258-0099



Management of Healthcare Personnel (HCP)

DPH will evaluate HCP on a case-by-case basis to determine level of exposure risk and subsequent steps for monitoring and implementing appropriate restrictions.



Healthcare Employees Returning from West Africa

- **DPH receives notification following airport screening, notifies local health department (LHD).**
- **LHD actively monitors for 21 days after return.**
- **Type of monitoring, work and travel restrictions will be based on level of exposure risk during travel to EVD-affected countries.**



Visitors

- **Visitors exposed to persons with EVD before and during hospitalization are a possible source of infection for other patients, visitors and staff.**
 - Limit visitors to only those needed for patient's well-being.
 - Schedule visits, screen for fever and symptoms, train on use of PPE, hand hygiene, restrict movement in the facility.
- **Work with local and state health departments to determine who will be allowed to visit.**



CDC Interim Guidance for Environmental Infection Control in Hospitals for Ebola Virus

<http://www.cdc.gov/vhf/ebola/hcp/environmental-infection-control-in-hospitals.html>



Role of Environment in EVD Transmission

- **Role of environment in Ebola virus transmission not clearly established.**
- **Laboratory studies indicate Ebola virus can remain viable on solid surfaces for several days.**
- **Items and surfaces with no visible blood are less likely to be contaminated with viable Ebola virus.**
- **No epidemiologic evidence of transmission via patient care environment or fomites.**



PPE

- **Environmental Services (EVS) staff should wear same PPE as patient care staff when cleaning and disinfecting patient care areas.**
- **Administrative control preferred: nursing staff should perform EVS duties.**
- **Re-usable items (e.g., utility gloves) should be disinfected after use.**



Disinfectants

Use U.S. Environmental Protection Agency (EPA)-registered hospital disinfectants with a label claim for non-enveloped viruses such as norovirus, rotavirus. These include bleach-based and hydrogen peroxide-based products.

http://www.epa.gov/oppad001/list_g_norovirus.pdf



Environmental Cleaning and Disinfection

- **Clean and disinfect patient rooms daily.**
- **Use disposable cleaning cloths, mops and wipes.**
- **Note the Emory protocol for terminal cleaning and disinfection: multiple rounds over the course of several days.**



Waste Disposal

- **42 CFR 73.3(d)(1) exemption from Category A regulation: Any *HHS select agent or toxin that is in its naturally occurring environment provided the select agent or toxin has not been intentionally introduced, cultivated, collected, or otherwise extracted from its natural source.**
- **Dispose of used PPE, linens, cleaning cloths, wipes, privacy curtains, etc. as infectious waste.**

*U.S. Department of Health and Human Services



Waste Transportation

Waste generated during care of EVD patients is subject to U.S. Department of Transportation (DOT) Hazardous Materials Regulations.

- All waste generated from a suspected/confirmed patient should be treated as Category A waste as follows:
 1. Place soft waste or sealed sharps containers into a primary medical waste bag (1.5ml – ASTM tested; can be provided by Stericycle).
 2. Apply bleach or other virocidal disinfectant into the primary bag to sufficiently cover the surface of materials contained within the bag; securely tie the bag.



3. Treat the exterior surface of the primary container with bleach or other virocidal disinfectant.
4. Place the primary bag into a secondary bag and securely tie the outer bag.
5. Treat the exterior surface of the secondary bag with bleach or other virocidal disinfectant.
6. The double bagged waste should then be placed into special Category A packaging provided by Stericycle with the liner tied securely and container closed per the packaging instructions provided.
7. Store the Category A waste containers separate from other regulated medical waste and in a secure area preferably isolated and with limited access.



Non Fluid-Resistant Items

- **Avoid contamination of reusable porous items that cannot be made single use.**
- **Use only mattresses and pillows with plastic or other impervious coverings.**
- **Do not place suspected EVD patients in carpeted rooms. Remove all upholstered furniture and decorative curtains.**



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Damaged or Worn Covers for Medical Bed Mattresses Pose Risk of Contamination and Patient Infection: FDA Safety Communication

Date Issued: April 19, 2013

Audience: Nurses, Caregivers, Infection Control Professional Staff, Risk Managers, Materials Managers, Housekeepers, Biomedical Engineers, Directors of Purchasing, and other health care providers and staff responsible for the purchase, inspection, use, or maintenance of medical bed mattress covers

Medical Areas: Any patient care setting where medical bed mattress covers are used. These include Intensive Care, Diagnostic Care, Emergent or Urgent Care, Ambulatory Care, Specialty Care, General Care, Long Term Care, and Home Care.

Purpose: The Food and Drug Administration (FDA) is alerting health care providers, health care facility staff, and caregivers that damaged or worn covers for medical bed mattresses can allow blood and body fluids to penetrate medical bed mattresses, posing a risk of infection to patients. The FDA is providing recommendations for reducing



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American Journal of Infection Control
[Volume 42, Issue 4](#), Pages 421–422, April 2014

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Potential bloodborne pathogen exposure from occult mattress damage

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EVD Patient Waste

Per CDC: Sanitary sewers may be used for the safe disposal of patient waste. Additionally, sewage handling processes (e.g., anaerobic digestion, composting, and disinfection) in the United States are designed to inactivate infectious agents.



EVD Patient Waste

DPH Interim Guidance on the Safe Disposal of Ebola Patient Waste in Sanitary Sewers

- Wastewater utility workers should continue to practice sound hygiene when handling sewage.
- Healthcare facilities should pre-treat patient waste in a toilet bowl with 1 cup full-strength bleach for at least 5 minutes before flushing.
- Pre-treatment should be performed only by HCP wearing appropriate PPE.

<http://www.dhs.wisconsin.gov/communicable/DiseasePages/docs/DHSInterimGuidanceSafeDisposal.pdf>



Recommendations for Safely Performing Acute Hemodialysis in Patients with Ebola Virus Disease in U.S. Hospitals

<http://www.cdc.gov/vhf/ebola/hcp/guidance-dialysis.html>



Hemodialysis of the EVD Patient

- **Perform only in the patient's isolation room.**
- **Designate a highly competent individual to perform catheter access.**
- **Avoid subclavian site for catheter access.**
- **Use ultrasound guidance to reduce cannulation attempts.**
- **Attach closed needleless connector devices.**



Traveler Evaluation and Patient Triage

<http://www.cdc.gov/vhf/ebola/pdf/ebola-algorithm.pdf>

<http://www.cdc.gov/vhf/ebola/pdf/checklist-patients-evaluated-us-evd.pdf>

<http://www.cdc.gov/vhf/ebola/hcp/ed-management-patients-possible-ebola.html>

<http://www.cdc.gov/vhf/ebola/pdf/ed-algorithm-management-patients-possible-ebola.pdf>

<http://www.cdc.gov/vhf/ebola/pdf/ambulatory-care-evaluation-of-patients-with-possible-ebola.pdf>

Ebola Virus Disease (Ebola)

Algorithm for Evaluation of the Returned Traveler



FEVER (subjective or $\geq 100.4^{\circ}\text{F}$ or 38.0°C) or compatible Ebola symptoms* in a patient who has resided in or traveled to a country with wide-spread Ebola transmission** in the 21 days before illness onset

* headache, weakness, muscle pain, vomiting, diarrhea, abdominal pain, or hemorrhage

NO

Report asymptomatic patients with high- or low-risk exposures (see below) in the past 21 days to the health department

YES

1. Isolate patient in single room with a private bathroom and with the door to hallway closed
2. Implement standard, contact, and droplet precautions
3. Notify the hospital Infection Control Program and other appropriate staff
4. Evaluate for any risk exposures for Ebola
5. **IMMEDIATELY** report to the health department

HIGH-RISK EXPOSURE

Percutaneous (e.g., needle stick) or mucous membrane contact with blood or body fluids from an Ebola patient

OR

Direct skin contact with, or exposure to blood or body fluids of, an Ebola patient

OR

Processing blood or body fluids from an Ebola patient without appropriate personal protective equipment (PPE) or biosafety precautions

OR

Direct contact with a dead body (including during funeral rites) in a country with wide-spread Ebola transmission** without

LOW-RISK EXPOSURE

Household members of an Ebola patient and others who had brief direct contact (e.g., shaking hands) with an Ebola patient without appropriate PPE

OR

Healthcare personnel in facilities with confirmed or probable Ebola patients who have been in the care area for a prolonged period of time while not wearing recommended PPE

NO KNOWN EXPOSURE

Residence in or travel to a country with wide-spread Ebola transmission** without HIGH- or LOW-risk exposure

Review Case with Health Department Including:

- Severity of illness
- Laboratory findings (e.g., platelet counts)
- Alternative diagnoses



Checklist for Patients Being Evaluated for Ebola Virus Disease (EVD) in the United States

Upon arrival to clinical setting/triage

- Assess the patient for a fever (subjective or $\geq 100.4^{\circ}\text{F}$ / 38.0°C)
- Determine if the patient has symptoms compatible EVD such as headache, weakness, muscle pain, vomiting, diarrhea, abdominal pain or hemorrhage
- Assess if the patient has a potential exposure from traveling to a country with widespread Ebola transmission* or having contact with an Ebola patient in the 21 days before illness onset

Suspect Ebola if fever or compatible Ebola symptoms and an exposure are present

See next steps in this checklist and the Algorithm for Evaluation of the Returned Traveler for Ebola at <http://www.cdc.gov/vhf/ebola/pdf/ebola-algorithm.pdf>

Upon initial assessment

- Isolate patient in single room with a private bathroom and with the door to hallway closed
- Implement standard, contact, & droplet precautions
- Notify the hospital Infection Control Program at _____
- Report to the health department at _____

Conduct a risk assessment for: High-risk exposures

- Percutaneous (e.g., needle stick) or mucous membrane exposure to blood or body fluids from an EVD patient
- Direct skin contact with skin, blood or body fluids from an EVD patient
- Processing blood or body fluids from an EVD patient without appropriate PPE
- Direct contact with a dead body in an Ebola-affected area without appropriate PPE

Low-risk exposures

- Household members of an EVD patient or others who had brief direct contact (e.g., shaking hands) with an EVD patient without appropriate PPE
- Healthcare personnel in facilities with EVD patients who have been in care areas of EVD patients without recommended PPE

Refer to [Guidance on Personal Protective Equipment To Be Used by Healthcare Workers During Management of Patients with Ebola Virus Disease in U.S. Hospitals, Including Procedures for Putting On \(Donning\) and Removing \(Doffing\)](http://www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html) (hyperlink: <http://www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html>)

During aerosol-generating procedures

- Limit number of personnel present
- Conduct in an airborne infection isolation room
- Don PPE as described in the *Guidance on Personal Protective Equipment To Be Used by Healthcare Workers During Management of Patients with Ebola Virus Disease in U.S. Hospitals, Including Procedures for Putting On (Donning) and Removing (Doffing)* (hyperlink: <http://www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html>)

Patient placement and care considerations

- Maintain log of all persons entering patient's room
- Use dedicated disposable medical equipment (if possible)
- Limit the use of needles and other sharps
- Limit phlebotomy and laboratory testing to those procedures essential for diagnostics and medical care
- Carefully dispose of all needles and sharps in puncture-proof sealed containers
- Avoid aerosol-generating procedures if possible
- Wear PPE (detailed in center box) during environmental cleaning and use an EPA-registered hospital disinfectant with a label claim for non-enveloped viruses**

Initial patient management

- Consult with health department about diagnostic EVD RT-PCR testing***
- Consider, test for, and treat (when appropriate) other possible infectious causes of symptoms (e.g., malaria, bacterial infections)
- Provide aggressive supportive care including aggressive IV fluid resuscitation if warranted
- Assess for electrolyte abnormalities and replete
- Evaluate for evidence of bleeding and assess hematologic and coagulation parameters
- Symptomatic management of fever, nausea, vomiting, diarrhea, and abdominal pain
- Consult health department regarding other treatment options

This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

* See 2014 Ebola Outbreak in West Africa—Case Counts or <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html> to determine if a country has widespread Ebola transmission

** See Interim Guidance for Environmental Infection Control in Hospitals for Ebola Virus or <http://www.cdc.gov/vhf/ebola/hcp/environmental-infection-control-in-hospitals.html>

*** See Interim Guidance for Specimen Collection, Transport, Testing, and Submission for Persons Under Investigation for Ebola Virus Disease in the United States or <http://www.cdc.gov/vhf/ebola/hcp/interim-guidance-specimen-collection-submission-patients-suspected-infection-ebola.html>

Identify, Isolate, Inform: Emergency Department Evaluation and Management of Patients with Possible Ebola Virus Disease



1 Identify exposure history:

Has patient lived in or traveled to a country with widespread Ebola transmission or had contact with an individual with confirmed Ebola Virus Disease within the previous 21 days?

NO

Continue with usual triage and assessment

YES

2 Identify signs and symptoms:

Fever (subjective or $>100.4^{\circ}\text{F}$ or 38.0°C) or Ebola-compatible symptoms: headache, weakness, muscle pain, vomiting, diarrhea, abdominal pain, or hemorrhage

NO

- A. Continue with usual triage and assessment
- B. Notify relevant health department
- C. Monitor for fever and symptoms for 21 days after last exposure in consultation with the relevant health department

3**Isolate and determine personal protective equipment (PPE) needed**

Place patient in private room or separate enclosed area with private bathroom or covered, bedside commode. Only essential personnel with designated roles should evaluate patient and provide care to minimize transmission risk. The use of PPE should be determined based on the patient's clinical status:

- Is the patient exhibiting obvious bleeding, vomiting, copious diarrhea or a clinical condition that warrants invasive or aerosol-generating procedures (e.g., intubation, suctioning, active resuscitation)?

4**Inform**

- IMMEDIATELY** notify the hospital infection control program and other appropriate staff
- IMMEDIATELY** report to the health department

NO

For clinically stable patients, healthcare worker should at a minimum wear:

- Face shield & surgical face mask
- Impermeable gown
- 2 pairs of gloves

If patient's condition changes, reevaluate PPE

YES

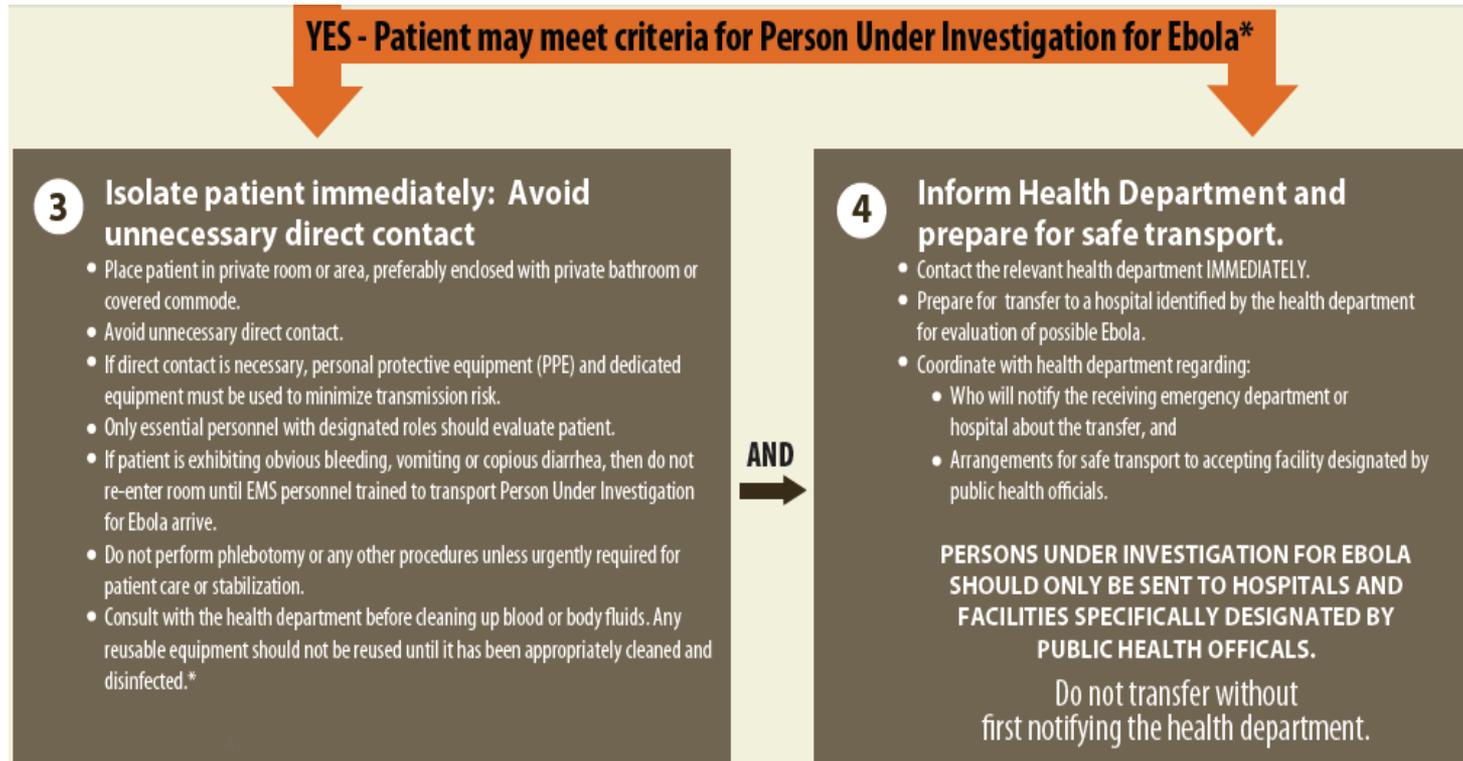
- Use PPE designated for the care of hospitalized patients
<http://www.cdc.gov/vhf/ebola/hcp/procedures-for-ppe.html>
- If the patient requires active resuscitation, this should be done in a pre-designated area using pre-designated equipment.

5**Further evaluation and management**

- Complete history and physical examination; decision to test for Ebola should be made in consultation with relevant health department
- Perform routine interventions (e.g. placement of peripheral IV, phlebotomy for diagnosis) as indicated by clinical status
- Evaluate patient with dedicated equipment (e.g. stethoscope)

Ambulatory Care Guidance

<http://www.cdc.gov/vhf/ebola/pdf/ambulatory-care-evaluation-of-patients-with-possible-ebola.pdf>



Minimum PPE: face shield, surgical mask, impermeable isolation gown, 2 pairs of gloves



Interim Guidance for Specimen Collection, Transport, Testing, and Submission for Persons Under Investigation for Ebola Virus Disease in the United States

<http://www.cdc.gov/vhf/ebola/hcp/interim-guidance-specimen-collection-submission-patients-suspected-infection-ebola.html>



Laboratory Testing

- **Conduct point of care testing or maintain chain of custody when transporting specimens to the laboratory (no use of pneumatic tubes).**
- **Use only plastic vials.**
- **Disinfect outside of specimen vials before placing in durable, leak-proof secondary containers.**
- **Alert laboratory of specimens collected from potential or known Ebola cases.**



Laboratory Testing

Recommendations for specimen collection by staff: Any person collecting specimens from a patient with a case of suspected Ebola virus disease should wear gloves, water-resistant gowns, full face shield or goggles, and masks to cover all of nose and mouth. Additional PPE may be required in certain situations.

Recommendations for laboratory testing by staff: Any person testing specimens from a patient with a suspected case of Ebola virus disease should wear gloves, water-resistant gowns, full face shield or goggles, and masks to cover all of nose and mouth, and as an added precaution use a certified class II Biosafety cabinet or Plexiglass splash guard with PPE to protect skin and mucous membranes. All manufacturer-installed safety features for laboratory instruments should be used.



Wisconsin State Laboratory of Hygiene Ebola Virus Information for Lab Professionals

- **Testing for Ebola virus must be approved by DPH.**
- **Access the WSLH website for most recent information regarding specimen collection, transport and testing.**

<http://www.slh.wisc.edu/clinical/diseases/ebola-virus-information-for-lab-professionals/>



Wisconsin State Laboratory of Hygiene

Ebola Virus Information for Lab Professionals

- **FedEx** will transport **suspect** Ebola specimens directly to the CDC or one of the other testing laboratories. FedEx will transport a suspect specimen as long as the technical name you provide on both the package and the FedEx dangerous goods form is “Suspect Category A Infectious Substance”. Once the CDC performs testing and confirms that the patient has Ebola, FedEx will not transport any known Ebola specimens.
- If you need to ship specimens for further testing to the CDC on a **confirmed** Ebola patient, **World Courier** is the only courier that will transport known Ebola specimens. The closest World Courier office is in the Chicago area. You can set up an account with World Courier by contacting them at 800-221-6600.



Interim Guidance for Emergency Medical Services (EMS) Systems and 9-1-1 Public Safety Answering Points for Management of Patients with Known or Suspected EVD in the U.S.

<http://www.cdc.gov/vhf/ebola/hcp/interim-guidance-emergency-medical-services-systems-911-public-safety-answering-points-management-patients-known-suspected-united-states.html>



EMS and 9-1-1 Guidance

- **Guidance is for pre-hospital EMS personnel, law enforcement and fire service first responders.**
- **In effect when threat of EVD cases is elevated in the community (determined by information from state and local health departments).**

<http://www.cdc.gov/vhf/ebola/pdf/ems-checklist-ebola-preparedness.pdf>



EMS and 9-1-1 Guidance

9-1-1 staff should screen callers and notify first responders.

- Fever, headache, muscle pain, vomiting, diarrhea, abdominal pain, unexplained bleeding
- Within past 3 weeks of symptom onset:
 - Contact with blood or body fluids of a suspected or known EVD case
 - Residence in or travel to EVD affected countries
 - Direct handling of bats or nonhuman primates from EVD endemic areas



Ambulance Disinfection Mission recovery

- Driver compartment isolation and patient compartment barrier drapes
- Decon, disinfection of ambulance, PPE doffing and waste removal ALL SUPERVISED
- Surveillance



http://emergency.cdc.gov/coca/calls/2014/callinfo_101414.asp



Ebola Perioperative Considerations

Association of Perioperative Registered Nurses excerpt from “Clinical Issues”

- Standard, droplet, contact and airborne precautions for perioperative staff
- Same PPE as recommended for other hospital staff, including N-95 filtering face piece, shoe covers, leg covers or boots, **fluid-resistant** head covers
- For sterile processing staff: heavy-duty gloves, impermeable gown, face shield or goggles and mask, leg covers or boots



Ebola Perioperative Considerations

Disinfectants

- A multidisciplinary team should select appropriate agents.
- Cover surfaces of sensitive instruments with protective barriers that can be discarded after procedures.
- Use disposable cleaning materials (mops, cloths) and discard as regulated medical waste.



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