



Ebola Virus Disease

**resources and
guidance from
the Centers for
Disease Control
and Prevention**

Created by CDC microbiologist Cynthia Goldsmith, this colorized transmission electron micrograph (TEM) revealed some of the ultrastructural morphology displayed by an Ebola virus virion.

CDC/CYNTHIA GOLDSMITH.



Since the current Ebola Virus Disease (also referred to as Ebola Hemorrhagic Fever) outbreak began in Guinea in December of 2013, the outbreak now involves transmission in Guinea, Liberia, Nigeria, and Sierra Leone.¹ The World Health Organization (WHO) reports that this is the largest Ebola Virus Disease (EVD) outbreak ever recorded.¹ WHO, the Centers for Disease Control and Prevention (CDC), and numerous other public health organizations are working together in an effort to control and stop the current outbreak of EVD.

U.S. healthcare professionals—including infection preventionists—have had many questions regarding preparation for Ebola since three American EVD patients were brought back to the United States from West Africa for treatment. CDC has released numerous resources and tools to help U.S. healthcare facilities prepare for EVD. For your convenience, here we present four of these resources from the CDC:

1. **Frequently asked questions: Safe management of patients with Ebola Virus Disease (EVD) in U.S. hospitals (page 58)**
2. **Infection prevention and control recommendations for hospitalized patients with known or suspected Ebola Hemorrhagic Fever in U.S. hospitals (page 60)**
3. **Case definition for Ebola Virus Disease (EVD) (page 63)**
4. **Interim guidance for environmental infection control in hospitals for Ebola Virus (page 64)**

These and other helpful EVD resources are available on the CDC website at www.cdc.gov/ebola. Please visit this website often for additional resources and updates.

REFERENCE

1. WHO Statement on the Meeting of the International Health Regulations Emergency Committee Regarding the 2014 Ebola Outbreak in West Africa, August 8, 2014. Accessed on 8/12/14. Available at: www.who.int/mediacentre/news/statements/2014/ebola-20140808/en.

Frequently asked questions

Safe management of patients with Ebola Virus Disease (EVD) in U.S. hospitals

The recent EVD outbreak in West Africa has increased the possibility of patients traveling from the impacted countries to the United States. The following are answers to frequently asked questions about the necessary infection control procedures to protect patients and healthcare providers in U.S. hospitals.

Q: Are U.S. hospitals ready to care for patients with Ebola virus disease (EVD)?

Yes – any U.S. hospital that is following CDC's infection control recommendations and can isolate a patient in a private room is capable of safely managing a patient with EVD. CDC recommends that U.S. hospitals isolate the patient in a private room and implement standard, contact, and droplet precautions.

Q: What should U.S. hospitals do if they have a patient with suspected EVD?

Early recognition is critical for infection control. Healthcare providers should be alert for and evaluate any patients suspected of having EVD who have (see EVD case definition on page 63):

1. A fever of greater than 38.6 degrees Celsius or 101.5 degrees Fahrenheit, and additional symptoms such as severe headache, muscle

pain, vomiting, diarrhea, abdominal pain, or unexplained hemorrhage; AND

2. Risk factors within the past 3 weeks before the onset of symptoms, such as contact with blood or other body fluids of a patient known to have or suspected to have EVD; residence in—or travel to—an area where EVD transmission is active; or direct handling of bats, rodents, or primates from disease-endemic areas. Malaria diagnostics should also be a part of initial testing because it is the most common cause of febrile illness in persons with a travel history to the affected countries.

Q: When should patients with suspected EVD in U.S. hospitals be tested?

CDC recommends testing for all persons with onset of fever within 21 days of having a high-risk exposure such as (See CDC's laboratory testing guidance (www.cdc.gov/ebola):

- Percutaneous or mucous membrane exposure or direct skin contact with body fluids of a person with a confirmed or suspected case of EVD without appropriate personal protective equipment (PPE),
- Laboratory processing of body fluids of suspected or confirmed EVD cases without

appropriate PPE or standard biosafety precautions, or

- Participation in funeral rites or other direct exposure to human remains in the geographic area where the outbreak is occurring without appropriate PPE.

For persons with a high-risk exposure but without a fever, testing is recommended only if there are other compatible clinical symptoms present and blood work findings are abnormal (i.e., thrombocytopenia <150,000 cells/μL and/or elevated transaminases).

Q: If a patient in a U.S. hospital is identified to have suspected or confirmed EVD, what infection control precautions should be put into place?

If a patient in a U.S. hospital is suspected or known to have Ebola virus disease, healthcare teams should follow standard, contact, and droplet precautions, including the following recommendations:

- **Isolate the patient:** Patients should be isolated in a single patient room (containing a private bathroom) with the door closed.
- **Wear appropriate PPE:** Healthcare providers entering the patient's room should wear: gloves, gown (fluid resistant or impermeable), eye protection (goggles or face shield), and a facemask. Additional

protective equipment might be required in certain situations (e.g., copious amounts of blood, other body fluids, vomit, or feces present in the environment), including but not limited to double gloving, disposable shoe covers, and leg coverings.

- **Restrict visitors:** Avoid entry of visitors into the patient's room. Exceptions may be considered on a case by case basis for those who are essential for the patient's wellbeing. A logbook should be kept to document all persons entering the patient's room. See CDC's infection control guidance (page 61) on procedures for monitoring, managing, and training of visitors.
- **Avoid aerosol-generating procedures:** Avoid aerosol-generating procedures. If performing these procedures, PPE should include respiratory protection (N-95 or higher filtering facepiece respirator) and the procedure should be performed in an airborne infection isolation room.
- **Implement environmental infection control measures:** Diligent environmental cleaning and disinfection and safe handling of potentially contaminated materials is of paramount importance, as blood, sweat, vomit, feces, urine, and other body

secretions represent potentially infectious materials should be done following hospital protocols.

Q: Why do responders in Africa wear so much personal protective equipment (that can include full body suits) for this Ebola outbreak when CDC says hospitals here could safely manage the care of an Ebola patient without a full body suit?

There are important differences between providing care or performing public health tasks in Africa versus in a U.S. hospital.

In field medical settings, additional PPE may be necessary to protect healthcare workers. In some places in Africa, workers may not have the ability to prepare for potential exposures. For example, in some places, care may be provided in clinics with limited resources (e.g., no running water, no climate control, no floors, inadequate medical supplies), and workers could be in those areas for several hours with a number of Ebola infected patients. Additionally, certain job responsibilities and tasks, such as attending to dead bodies, may also require different PPE than what is used when providing care for infected patients in a hospital. ¹³

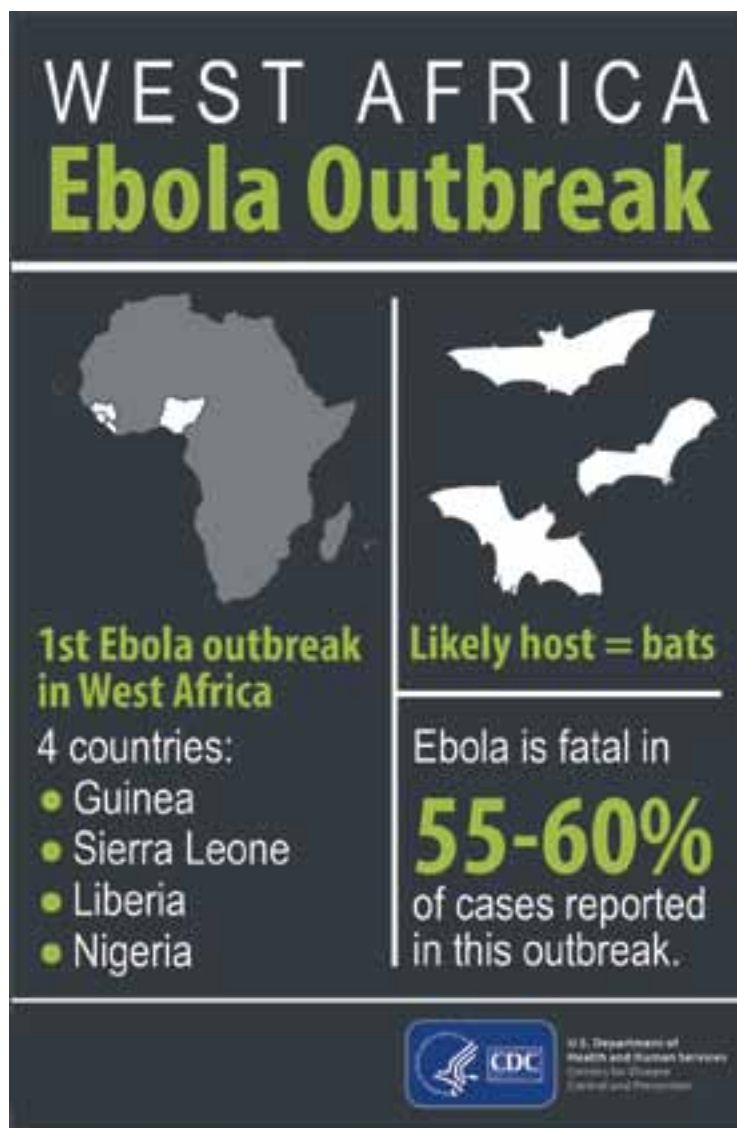
This CDC infographic provides a basic overview of the steps involved in combating an Ebola outbreak.



Infection prevention and control recommendations

for hospitalized patients with known or suspected Ebola Hemorrhagic

Fever in U.S. hospitals



This CDC infographic provides the viewer with a basic understanding as to the geographic distribution of the Ebola virus, which includes the African countries of Guinea, northern Liberia, Sierra Leone, and Nigeria.

Standard, contact, and droplet precautions are recommended for management of hospitalized patients with known or suspected Ebola hemorrhagic fever (Ebola HF), also referred to as Ebola Viral Disease (EVD) (see table on facing page). Note that this guidance outlines only those measures that are specific for Ebola HF; additional infection control measures might be warranted if an Ebola HF patient has other conditions or illnesses for which other measures are indicated (e.g., tuberculosis, multidrug-resistant organisms, etc.).

Though these recommendations focus on the hospital setting, the recommendations for personal protective equipment (PPE) and environmental infection control measures are applicable to any healthcare setting. In this guidance healthcare personnel (HCP) refers all persons, paid and unpaid, working in healthcare settings who have the potential for exposure to patients and/or to infectious materials, including body substances, contaminated medical supplies and equipment, contaminated environmental surfaces, or aerosols generated during certain medical procedures. HCP include, but are not limited to, physicians, nurses, nursing assistants, therapists, technicians, emergency medical service personnel, dental personnel, pharmacists, laboratory personnel, autopsy personnel, students and trainees, contractual personnel, home healthcare personnel, and persons not directly involved in patient care (e.g., clerical, dietary, house-keeping, laundry, security, maintenance, billing, chaplains, and volunteers) but potentially exposed to infectious agents that can be transmitted to and from HCP and patients. **This guidance is not intended to apply to persons outside of healthcare settings.**

As information becomes available, these recommendations will be re-evaluated and updated as needed. These recommendations are based upon available information (as of July 30, 2014) and the following considerations:

- High rate of morbidity and mortality among infected patients
- Risk of human-to-human transmission
- Lack of FDA-approved vaccine and therapeutics

For full details of standard, contact, and droplet precautions see 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Setting.

For information on symptoms of Ebola Hemorrhagic Fever infection and modes of transmission, see the CDC Ebola Hemorrhagic Fever website (www.cdc.gov/ebola). **P**

KEY COMPONENTS OF STANDARD, CONTACT, AND DROPLET PRECAUTIONS RECOMMENDED FOR PREVENTION OF EBOLA HEMORRHAGIC FEVER TRANSMISSION IN U.S. HOSPITALS

COMPONENT	RECOMMENDATION	COMMENTS
Patient Placement	- Single patient room (containing a private bathroom) with the door closed. - Facilities should maintain a log of all persons entering the patient's room.	Consider posting personnel at the patient's door to ensure appropriate and consistent use of PPE by all persons entering the patient room.
Personal Protective Equipment (PPE)	- All persons entering the patient room should wear at least: - Gloves - Gown (fluid resistant or impermeable) - Eye protection (goggles or face shield) - Facemask - Additional PPE might be required in certain situations (e.g., copious amounts of blood, other body fluids, vomit, or feces present in the environment), including but not limited to: - Double gloving - Disposable shoe covers - Leg coverings	- Recommended PPE should be worn by HCP upon entry into patient rooms or care areas. Upon exit from the patient room or care area, PPE should be carefully removed without contaminating one's eyes, mucous membranes, or clothing with potentially infectious materials, and either - Discarded, or - For re-useable PPE, cleaned and disinfected according to the manufacturer's reprocessing instructions and hospital policies. - Instructions for donning and removing PPE have been published on the CDC website. - Hand hygiene should be performed immediately after removal of PPE.
Patient Care Equipment	- Dedicated medical equipment (preferably disposable, when possible) should be used for the provision of patient care. - All non-dedicated, non-disposable medical equipment used for patient care should be cleaned and disinfected according to manufacturer's instructions and hospital policies.	
Patient Care Considerations	- Limit the use of needles and other sharps as much as possible. - Phlebotomy, procedures, and laboratory testing should be limited to the minimum necessary for essential diagnostic evaluation and medical care. - All needles and sharps should be handled with extreme care and disposed in puncture-proof, sealed containers.	
Aerosol Generating Procedures (AGPs)	- Avoid AGPs for Ebola HF patients. - If performing AGPs, use a combination of measures to reduce exposures from aerosol-generating procedures when performed on Ebola HF patients. - Visitors should not be present during aerosol-generating procedures. - Limiting the number of HCP present during the procedure to only those essential for patient-care and support. - Conduct the procedures in a private room and ideally in an Airborne Infection Isolation Room (AIIR) when feasible. Room doors should be kept closed during the procedure except when entering or leaving the room, and entry and exit should be minimized during and shortly after the procedure. - HCP should wear gloves, a gown, disposable shoe covers, and either a face shield that fully covers the front and sides of the face or goggles, and respiratory protection that is at least as protective as a NIOSH certified fit-tested N95 filtering facepiece respirator or higher (e.g., powered air purifying respirator or elastomeric respirator) during aerosol generating procedures. - Conduct environmental surface cleaning following procedures (see section below on environmental infection control). - If re-usable equipment or PPE (e.g. Powered air purifying respirator, elastomeric respirator, etc.) are used, they should be cleaned and disinfected according to manufacturer instructions and hospital policies. - Collection and handling of soiled re-usable respirators must be done by trained individuals using PPE as described above for routine patient care.	- Although there are limited data available to definitively define a list of AGPs, procedures that are usually included are Bilevel Positive Airway Pressure (BiPAP), bronchoscopy, sputum induction, intubation and extubation, and open suctioning of airways. - Because of the potential risk to individuals reprocessing reusable respirators, disposable filtering face piece respirators are preferred.
Hand Hygiene	- HCP should perform hand hygiene frequently, including before and after all patient contact, contact with potentially infectious material, and before putting on and upon removal of PPE, including gloves. - Healthcare facilities should ensure that supplies for performing hand hygiene are available.	Hand hygiene in healthcare settings can be performed by washing with soap and water or using alcohol-based hand rubs. If hands are visibly soiled, use soap and water, not alcohol-based hand rubs.
Environmental Infection Control	- Diligent environmental cleaning and disinfection and safe handling of potentially contaminated materials is paramount, as blood, sweat, emesis, feces and other body secretions represent potentially infectious materials. - HCP performing environmental cleaning and disinfection should wear recommended PPE (described above) and consider use of additional barriers (shoe and leg coverings, etc.) if needed. - Face protection (face shield or facemask with goggles) should be worn when performing tasks such as liquid waste disposal that can generate splashes. - Follow standard procedures, per hospital policy and manufacturers' instructions, for cleaning and/or disinfection of: - Environmental surfaces and equipment - Textiles and laundry - Food utensils and dishware	- Use EPA-registered hospital disinfectants to disinfect hard non-porous surfaces. - Follow label instructions for use - Searchable EPA website of registered products on the EPA website. - For additional information on Environmental Infection Control, see the Guideline for Environmental Infection Control in Healthcare Facilities on the CDC website.

COMPONENT	RECOMMENDATION	COMMENTS
Safe Injection Practices	Facilities should follow safe injection practices as specified under Standard Precautions.	Any injection equipment or parenteral medication container that enters the patient treatment area should be dedicated to that patient and disposed of at the point of use.
Duration of Infection Control Precautions	Duration of precautions should be determined on a case-by-case basis, in conjunction with local, state, and federal health authorities.	Factors that should be considered include, but are not limited to: presence of symptoms related to Ebola HF, date symptoms resolved, other conditions that would require specific precautions (e.g., tuberculosis, <i>Clostridium difficile</i>) and available laboratory information.
Monitoring and Management of Potentially Exposed Personnel	- Facilities should develop policies for monitoring and management of potentially exposed HCP. - Facilities should develop sick leave policies for HCP that are non-punitive, flexible and consistent with public health guidance. - Ensure that all HCP, including staff who are not directly employed by the healthcare facility but provide essential daily services, are aware of the sick leave policies. - Persons with percutaneous or mucocutaneous exposures to blood, body fluids, secretions, or excretions from a patient with suspected Ebola HF should: - Stop working and immediately wash the affected skin surfaces with soap and water. Mucous membranes (e.g., conjunctiva) should be irrigated with copious amounts of water or eyewash solution. - Immediately contact occupational health/supervisor for assessment and access to postexposure management services for all appropriate pathogens (e.g., Human Immunodeficiency Virus, Hepatitis C, etc.). - HCP who develop sudden onset of fever, intense weakness or muscle pains, vomiting, diarrhea, or any signs of hemorrhage after an unprotected exposure (i.e. not wearing recommended PPE at the time of patient contact or through direct contact to blood or body fluids) to a patient with Ebola HF should: - Not report to work or should immediately stop working. - Notify their supervisor. - Seek prompt medical evaluation and testing. - Notify local and state health departments. - Comply with work exclusion until they are deemed no longer infectious to others. - For asymptomatic HCP who had an unprotected exposure (i.e. not wearing recommended PPE at the time of patient contact or through direct contact to blood or body fluids) to a patient with Ebola HF. - Should receive medical evaluation and follow-up care including fever monitoring twice daily for 21 days after the last known exposure. - Hospitals should consider policies ensuring twice daily contact with exposed personnel to discuss potential symptoms and document fever checks. - May continue to work while receiving twice daily fever checks, based upon hospital policy and discussion with local, state, and federal public health authorities.	
Monitoring, Management, and Training of Visitors	- Avoid entry of visitors into the patient's room. - Exceptions may be considered on a case by case basis for those who are essential for the patient's wellbeing. - Establish procedures for monitoring managing and training visitors. - Visits should be scheduled and controlled to allow for: - Screening for Ebola HF (e.g., fever and other symptoms) before entering or upon arrival to the hospital. - Evaluating risk to the health of the visitor and ability to comply with precautions. - Providing instruction, before entry into the patient care area on hand hygiene, limiting surfaces touched, and use of PPE according to the current facility policy while in the patient's room. - Visitor movement within the facility should be restricted to the patient care area and an immediately adjacent waiting area.	Visitors who have been in contact with the Ebola HF patient before and during hospitalization are a possible source of EHF for other patients, visitors, and staff.

Case definition for Ebola Virus Disease (EVD)

Updated September 4, 2014

Early recognition is critical for infection control. Health care providers should be alert for and evaluate any patients suspected of having Ebola Virus Disease (EVD).

PERSON UNDER INVESTIGATION (PUI)

A person who has both consistent symptoms and risk factors as follows: 1) Clinical criteria, which includes fever of greater than 38.6 degrees Celsius or 101.5 degrees Fahrenheit, and additional symptoms such as severe headache, muscle pain, vomiting, diarrhea, abdominal pain, or unexplained hemorrhage; AND 2) Epidemiologic risk factors within the past 21 days before the onset of symptoms, such as contact with blood or other body fluids or human remains of a patient known to have or suspected to have EVD; residence in—or travel to—an area where EVD transmission is active*; or direct handling of bats or non-human primates from disease-endemic areas.

PROBABLE CASE

A PUI whose epidemiologic risk factors include high or low risk exposure.

CONFIRMED CASE

A case with laboratory-confirmed diagnostic evidence of Ebola virus infection.

EXPOSURE RISK LEVELS

Levels of exposure risk are defined as follows:

HIGH-RISK EXPOSURES

A high-risk exposure includes any of the following:

- Percutaneous (e.g., needle stick) or mucous membrane exposure to blood or body fluids of EVD patient
- Direct skin contact with, or exposure to blood or body fluids of, an EVD patient without appropriate personal protective equipment (PPE)
- Processing blood or body fluids of a confirmed EVD patient without appropriate PPE or standard biosafety precautions
- Direct contact with a dead body without appropriate PPE in a country where an EVD outbreak is occurring*

LOW-RISK EXPOSURES

A low-risk exposure includes any of the following:

- Household contact with an EVD patient
- Other close contact with EVD patients in health care facilities or community settings. Close contact is defined as:
 - Being within approximately 3 feet (1 meter) of an EVD patient or within the patient's room or care area for a prolonged period of time (e.g., health care personnel, household members) while not wearing recommended personal protective equipment (i.e., standard, droplet, and contact precautions; see Infection Prevention and Control Recommendations)



- Having direct brief contact (e.g., shaking hands) with an EVD patient while not wearing recommended personal protective equipment
- Brief interactions, such as walking by a person or moving through a hospital, do not constitute close contact

NO KNOWN EXPOSURE

Having been in a country in which an EVD outbreak occurred

within the past 21 days and having had no high or low risk exposures. ¹

¹ For purposes of monitoring and movement restrictions of persons with Ebola virus exposure, low risk is interpreted as some risk.

* As of 30 August 2014, EVD outbreaks are affecting countries in West Africa

Interim guidance for environmental infection control in hospitals for Ebola Virus

The role of the environment in Ebola transmission has not been established. Limited laboratory studies under favorable conditions indicate that Ebola virus can remain viable on solid surfaces, with concentrations falling slowly over several days.^{1,2} In the only study to assess contamination of the patient care environment during an outbreak, virus was not detected in any of 33 samples collected from sites that were not visibly bloody. However, virus was detected on a blood-stained glove and bloody intravenous insertion site.³ There is no epidemiologic evidence of Ebola virus transmission via either the environment or fomites that could become contaminated during patient care (e.g., bed rails, door knobs, laundry). However, given the apparent low infectious dose, potential of high virus titers in the blood of ill patients, and disease severity, higher levels of precaution are warranted to reduce the potential risk posed by contaminated surfaces in the patient care environment.

As part of the care of patients who are persons under investigation, or with probable or confirmed Ebola virus infections, hospitals are recommended to:

- **Be sure environmental services staff wear recommended personal protective equipment including, at a minimum, disposable gloves, gown (fluid resistant/impermeable), eye protection (goggles or face shield), and face-mask to protect against direct skin and mucous membrane exposure of cleaning chemicals, contamination, and splashes or spatters during environmental cleaning and disinfection activities.** Additional barriers (e.g., leg covers, shoe covers) should be used as needed. If reusable heavy-duty gloves are used for cleaning and disinfecting, they should be disinfected and kept in the room or anteroom. Be sure staff are instructed in the proper use of personal

protective equipment including safe removal to prevent contaminating themselves or others in the process, and that contaminated equipment is disposed of as regulated medical waste.

- **Use a U.S. Environmental Protection Agency (EPA)-registered hospital disinfectant with a label claim for a non-enveloped virus (e.g., norovirus, rotavirus, adenovirus, poliovirus) to disinfect environmental surfaces in rooms of patients with suspected or confirmed Ebola virus infection.**

Although there are no products with specific label claims against the Ebola virus, enveloped viruses such as Ebola are susceptible to a broad range of hospital disinfectants used to disinfect hard, non-porous surfaces. In contrast, non-enveloped viruses are more resistant to disinfectants. As a precaution, selection of a disinfectant product with a higher potency than what is normally required for an enveloped virus is being recommended at this time. EPA-registered hospital disinfectants with label claims against non-enveloped viruses (e.g., norovirus, rotavirus, adenovirus, poliovirus) are broadly antiviral and capable of inactivating both enveloped and non-enveloped viruses.

- **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 patients with suspected or confirmed Ebola virus infection in carpeted rooms and remove all upholstered furniture and decorative curtains from patient rooms before use.
- **To reduce exposure among staff to potentially contaminated textiles (cloth products) while laundering, discard all linens, non-fluid-impermeable pillows or mattresses, and textile privacy curtains as a regulated medical waste.** P

FREQUENTLY ASKED QUESTIONS

Q ■ How can I determine whether a particular EPA-registered hospital disinfectant is appropriate for use in the room of a patient with suspected or confirmed Ebola virus infection?

Begin by looking at the product label or product insert or, if these are not available, search the EPA search engine for this information. Users should be aware that an 'enveloped' or 'non-enveloped virus' designation may not be included on the container label. Instead check the disinfectant's label for at least one of the common non-enveloped viruses (e.g., norovirus, rotavirus, adenovirus, poliovirus).

Q ■ Are there special instructions for cleaning and disinfecting the room of a patient with suspected or confirmed Ebola virus infection?

Daily cleaning and disinfection of hard, non-porous surfaces (e.g., high-touch surfaces such as bed rails and over bed tables, housekeeping surfaces such as floors and counters) should be done.³ Before disinfecting a surface, cleaning should be performed. In contrast to disinfection where products with specific claims are used, any cleaning product can be used for cleaning tasks. Use cleaning and disinfecting products according to label instructions. Check the disinfectant's label for specific instructions for inactivation of any of the non-enveloped viruses (e.g., norovirus, rotavirus, adenovirus, and poliovirus) follow label instructions for use of the product that are specific for inactivation of that virus. Use disposable cleaning cloths, mop cloths, and wipes and dispose of these in leak-proof bags. Use a rigid waste receptacle designed to support the bag to help minimize contamination of the bag's exterior.

Q ■ How should spills of blood or other body substances be managed?

The basic principles for blood or body substance spill management are outlined in the United States Occupational Safety and Health Administration (OSHA) Bloodborne Pathogen Standards (29 CFR 1910.1030).⁴ CDC guidelines recommend removal of bulk spill matter, cleaning the site, and then disinfecting the site.³ For large

spills, a chemical disinfectant with sufficient potency is needed to overcome the tendency of proteins in blood and other body substances to neutralize the disinfectant's active ingredient. An EPA-registered hospital disinfectant with label claims for non-enveloped viruses (e.g., norovirus, rotavirus, adenovirus, poliovirus) and instructions for cleaning and decontaminating surfaces or objects soiled with blood or body fluids should be used according to those instructions.

Q ■ How should disposable materials (e.g., any single-use PPE, cleaning cloths, wipes, single-use microfiber cloths, linens, food service) and linens, privacy curtains, and other textiles be managed after their use in the patient room?

These materials should be placed in leak-proof containment and discarded as regulated medical waste. To minimize contamination of the exterior of the waste bag, place this bag in a rigid waste receptacle designed for this use. Incineration as a waste treatment process is effective in eliminating viral infectivity and provides waste minimization. However, check with your state's regulated medical waste program for more guidance and coordinate your waste management activities for the patient's isolation area with your medical waste contractor.⁶

Q ■ Is it safe for Ebola patients to use the bathroom?

Yes. Sanitary sewers may be used for the safe disposal of patient waste. Additionally,

sewage handling processes (e.g., anaerobic digestion, composting, disinfection) in the United States are designed to inactivate infectious agents.

Q ■ How long does Ebola virus persist in indoor environments?

Only one laboratory study, which was done under environmental conditions that favor virus persistence, has been reported. This study found that under these ideal conditions Ebola virus could remain active for up to six days.¹ In a follow up study, Ebola virus was found, relative to other enveloped viruses, to be quite sensitive to inactivation by ultraviolet light and drying; yet sub-populations did persist in organic debris.²

In the only study to assess contamination of the patient care environment during an outbreak, conducted in an African hospital under "real world conditions", virus was not detected by either nucleic acid amplification or culture in any of 33 samples collected from sites that were not visibly bloody. Virus was detected on a blood-stained glove and bloody intravenous insertion site by nucleic acid amplification, which may detect non-viable virus, but not by culture for live, infectious virus.³ Based upon these data and what is known regarding the environmental infection control of other enveloped RNA viruses, the expectation is with consistent daily cleaning and disinfection practices in U.S. hospitals that the persistence of Ebola virus in the patient care environment would

be short—with 24 hours considered a cautious upper limit.

Q ■ Are wastes generated during delivery of care to Ebola virus-infected patients subject to select agent regulations?

As long as facilities treating Ebola virus-infected patients follow the CDC's Infection Prevention and Control Recommendations for Hospitalized Patients with Known or Suspected Ebola Hemorrhagic Fever in U.S. Hospitals, waste generated during delivery of care to Ebola virus-infected patients would not be subject to Federal select agent regulations (See the exclusion provision 42 CFR § 73.3(d)(1)). However, this would not apply to any facility that intentionally collected or otherwise extracted the Ebola virus from waste generated during the delivery of patient care. 

References

1. Sagripanti JL, Rom AM, Holland LE. Persistence in darkness of virulent alphaviruses, Ebola virus, and Lassa virus deposited on solid surfaces. *Arch Virol* 2010; 155:2035-2039.
2. Sagripanti JL, Lytle DC. Sensitivity to ultraviolet radiation of Lassa, vaccinia, and Ebola viruses dried on surfaces. *Arch Virol* 2011; 156:489-494.
3. Bausch DG et al. Assessment of the Risk of Ebola Virus Transmission from Bodily Fluids and Fomites *The J of Infect Dis* 2007; 196:S142-7.
4. CDC Guidelines for Environmental Infection Control in Healthcare Facilities (see: Environmental Surfaces Section at: www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf).
5. OSHA Bloodborne Pathogen Standard (29 CFR 1910.1030) (see: www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051).
6. EPA Where You Live—State Medical Waste Programs and Regulations (see: www.epa.gov/epawaste/nonhaz/industrial/medical/programs.htm).

How do you get the Ebola virus?

Direct contact with:

- 1 Bodily fluids of a person who is sick with or has died from Ebola; (blood, vomit, pee, poop, sweat, semen, spit, other fluids)
- 2 Objects contaminated with the virus (needles, medical equipment)
- 3 Infected animals (by contact with blood or fluids or infected meat)



Early Symptoms:

Ebola can only be spread to others after symptoms begin. Symptoms can appear from 2 to 21 days after exposure.

- Fever
- Headache
- Diarrhea
- Vomiting
- Weakness
- Stomach pain
- Lack of appetite
- Unexplained bleeding
- Joint & muscle aches



When is someone able to spread the disease to others?

Ebola only spreads when people are sick.
A patient must have symptoms to spread the disease to others.



After 21 days, if an exposed person does not develop symptoms, they will not become sick with Ebola.

