



## Management and Control of Ebola Contaminated Waste

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The emergence of the Ebola virus disease, or EVD, outbreak in West Africa and its continuing threat to the United States has created the need to address proper handling, treatment, and disposal of Ebola-contaminated waste. The following information is to serve as basic guidance for those working with or around waste that is or could have become contaminated with Ebola virus. Links to resources and guidance issued by federal regulatory and oversight agencies have been provided for anyone seeking additional information.

### How is EVD transmitted?

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Ebola virus disease (EVD), formerly known as Ebola hemorrhagic fever is a severe and often fatal illness in humans that is thought to have been initially transmitted to people from wild animals ([1](#)). At this time, only a few species of mammals (e.g., humans, bats, monkeys and apes) have shown the ability to become infected with and spread EVD ([2](#)). In its current state EVD is not spread through the air, water, or, in general, by food ([2](#)). EVD spreads among the human population through human-to-human transmission by:

- Direct, unprotected contact (i.e., with broken skin, eyes, nose or mouth) with blood or other body fluids (e.g. feces, vomit, urine, saliva, sweat, breast milk, tears, vaginal fluid, and semen) of an infected patient who is actively ill.
- Needle-stick injuries from needles and syringes that have been contaminated with infected blood or other body fluids and tissue from an infected patient who is actively ill.
- Unprotected contact with medical equipment or surfaces contaminated with blood or body fluids from an infected patient who is actively ill.
- Direct, unprotected contact with the body of someone who has died from EVD ([2](#)).

Proper isolation and treatment of EVD patients and the appropriate handling and decontamination of materials and surfaces that have come in contact with their bodily fluids are necessary to prevent further virus transmission.

## How are EVD-contaminated materials classified?

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Waste contaminated, or suspected to be contaminated, with Ebola virus is considered a Category A infectious substance regulated as a hazardous material under the U.S. Department of Transportation (DOT) Hazardous Materials Regulations (HMR; 49 C.F.R., Parts 171-180).

EVD-contaminated materials may include medical equipment, sharps, linens, used healthcare products, used personal protective equipment (gowns, masks, gloves, booties, etc.) and other materials that have been in contact with the bodily fluids of an infected patient. These materials may harbor the virus and pose a serious threat to human health if not properly managed and disposed of.

The Kentucky Energy and Environment Cabinet (EEC) requires that any material suspected of, or that is known to have come into contact with bodily fluids of an EVD-infected person, be classified as infectious medical waste and shall require deactivation prior to being placed into a contained landfill. Ebola-associated waste that has been incinerated, autoclaved, or otherwise inactivated is not considered infectious, does not pose a health risk, and is not considered to be regulated medical waste or a hazardous material under Federal law. Therefore, such waste no longer is considered a Category A infectious substance and is not subject to the requirements of the HMR or to additional requirements by EEC for disposal.

## Protecting Employees from Ebola Contaminated Waste

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Infection control is a key strategy in preventing the spread of EVD (3). This includes use of appropriate personal protective equipment (PPE) for those tasked with handling and disposing of waste generated during the treatment of EVD patients. The Occupational Safety and Health Administration (OSHA) require employers to select personal protective equipment (PPE) that will protect workers against Ebola virus and other hazards to which they may be exposed in the workplace. OSHA and CDC have issued guidance to assist employers in the selection of appropriate PPE for a variety of work settings, including health and non-healthcare locations. This guidance includes PPE recommendations for workers handling solid and liquid waste that has or may have been contaminated by the bodily fluids of an EVD patient (4, 5).

## Proper Management of Ebola Contaminated Waste

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CDC and OSHA have issued guidance for cleaning and decontamination in healthcare (6), and non-healthcare settings (7, 8). Most acute care hospitals have contracts in place with approved vendors to handle their medical waste. Hospitals should check with their medical waste vendor to determine if they are authorized and willing to accept Category A Infectious waste generated during the care of EVD patients. This should include provisions for the packaging, transport and disposal of all waste materials,

including used linens, etc. All EVD waste is considered hazardous material until inactivated or incinerated (9) and should be segregated from other hospital medical waste and stored in a secure location until it can be removed or inactivated. Currently, the CDC recommends incineration or autoclaving for inactivation as the preferred methods of treatment of EVD waste (9). Other methods of inactivation (e.g., chemical inactivation) have not been standardized and would need to consider worker safety issues, as well as the potential for triggering other Federal safety regulations; therefore, they are not recommended. Waste material that has been inactivated or incinerated is no longer considered infectious medical waste and therefore no longer subject to hazardous waste restrictions. In cases where a hospital receiving or treating an EVD patient does not have a medical waste vendor that is approved to handle Category A waste, they should notify DPH immediately for assistance.

CDC has released guidance for the evaluation and decontamination of residential and other non-health care settings for patients confirmed or suspected of having EVD (8). In residences where the person with Ebola exhibited any gastrointestinal (e.g., diarrhea, vomiting) or hemorrhagic (bleeding) symptoms while in the home, the waste collection, packaging, transport and disposal shall be completed by qualified contractors with experience in biohazard and blood borne pathogen removal. All waste collection, packaging and transport shall be conducted in accordance with the current U.S. Occupational Health and Safety (OHS), U.S. Department of Transportation (U.S. DOT), and U.S. Environmental Protection Agency (U.S. EPA) rules and regulations (8).

In instances where the person with EVD had no symptoms or only a fever while in the home, the determination of appropriate clean-up and decontamination necessary shall be made on a case-by-case basis by the state regulatory bodies in consultation with the CDC and/or a qualified bio-waste contractor. Determination regarding clean-up will be based on the location and the likelihood that materials have been in contact with infectious bodily fluids.

Chemical disinfection of hard, non-porous surfaces may be achieved using a U.S. EPA-registered hospital disinfectant with a label claim for a non-enveloped virus such as norovirus, rotavirus, or adenovirus, etc... (7). All disinfection products should be used according to the manufacturer's recommendations and in accordance with applicable OSHA standards. Currently, no EPA-registered products specifically list Ebola on their label; however, a list of effective disinfection products for non-enveloped viruses has been developed by EPA and can be accessed at their website (10).

Liquid waste generated by an EVD-infected person may be discharged to the sanitary sewer system. Sewage treatment processes in the United States are designed to effectively inactivate infectious agents such as the Ebola virus and are considered sufficient to deal with this waste (6, 7). CDC recommends PPE precautions and advance notification for workers who handle liquid waste prior to entry into the sanitary sewer treatment system (11).

Postmortem human remains are highly infectious and should be treated with extreme caution. Human remains of EVD patients must be handled and transported by trained personnel wearing appropriate PPE (12). Remains are to be cremated or promptly buried in a hermetically sealed casket (12).

Cremated remains of an EVD patient are no longer considered infectious and may be disposed of without restriction. Human remains are exempt from US DOT special permitting requirements for transport but must comply with Center for Disease Control (CDC) regulations (42 C.F.R. § 71.55) (13).

## How is EVD waste transported?

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Prior to autoclaving or incineration, waste contaminated (or suspected to be contaminated) with Ebola virus is a Category A infectious substance regulated as a hazardous material under the U.S. Department of Transportation (DOT) Hazardous Materials Regulations (HMR; 49 C.F.R., Parts 171-180). Requirements in the HMR apply to any material DOT determines is capable of posing an unreasonable risk to health, safety, and property when transported in commerce (14). Off-site commercial transport of Ebola-associated waste by air, highway, rail, or water, requires strict compliance with the HMR requirements (13).



The packaging and transport of all EVD contaminated waste must be done in accordance with U.S. DOT Pipeline and Hazardous Materials Safety Administration (PHMSA) requirements for hazardous materials (14).

A listing of companies approved for the U.S. DOT special permit to transport suspected or confirmed EVD-contaminated waste at <http://phmsa.dot.gov/hazmat/question-and-answer>.

## Where can I go for more information?

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Information and guidance for EVD are evolving and being updated as the need arises, so frequent checking of available resources is recommended. The main web pages for guidance materials can be accessed at the links below.

- <http://www.cdc.gov/vhf/ebola/index.html>
- <http://phmsa.dot.gov/hazmat/transporting-infectious-substances>
- <https://www.osha.gov/SLTC/ebola/index.html>
- <http://www.cdc.gov/niosh/topics/ebola/>
- <http://www.who.int/csr/disease/ebola/en/>
- [http://waste.ky.gov/RLA/Pages/medical\\_waste.aspx](http://waste.ky.gov/RLA/Pages/medical_waste.aspx)
- <http://healthalerts.ky.gov/pages/ebolainformationforhealthprofessionals.aspx>

## References

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- (1) <http://www.who.int/mediacentre/factsheets/fs103/en/>
- (2) <http://www.cdc.gov/vhf/ebola/transmission/index.html>
- (3) <http://www.cdc.gov/vhf/ebola/hcp/index.html>
- (4) [http://www.dol.gov/osh/pdfs/OSHA\\_FS-3761\\_PPE\\_Selection\\_Matrix\\_-\\_Ebola\\_\(11-24-14\).pdf](http://www.dol.gov/osh/pdfs/OSHA_FS-3761_PPE_Selection_Matrix_-_Ebola_(11-24-14).pdf)
- (5) <http://www.cdc.gov/vhf/ebola/hcp/procuring-ppe.html>
- (6) <http://www.cdc.gov/vhf/ebola/hcp/environmental-infection-control-in-hospitals.html>
- (7) [https://www.osha.gov/Publications/OSHA\\_FS-3756.pdf](https://www.osha.gov/Publications/OSHA_FS-3756.pdf)
- (8) <http://www.cdc.gov/vhf/ebola/hcp/residential-decontamination.html>
- (9) <http://www.cdc.gov/vhf/ebola/hcp/medical-waste-management.html>
- (10) <http://www.epa.gov/oppad001/list-l-ebola-virus.html>
- (11) <http://www.cdc.gov/vhf/ebola/prevention/handling-sewage.html>
- (12) <http://www.cdc.gov/vhf/ebola/hcp/guidance-safe-handling-human-remains-ebola-patients-us-hospitals-mortuaries.html>
- (13) <http://phmsa.dot.gov/hazmat/packaging-of-ebola-contaminated-waste>
- (14) <http://phmsa.dot.gov/hazmat/transporting-infectious-substances>