**Handling of Human Remains Infected**

**With Viral Hemorrhagic Fevers**

***A Quick Reference Guide For:***

Health Care Workers   
Medical Examiners  
Funeral Services

Developed in coordination with the Florida Medical Examiners Commission, the Florida Emergency Mortuary Operations Response System and the Florida Department of Health

|  |  |  |
| --- | --- | --- |
|  |  |  |

**Contents**

1. **Introduction to Safe Handling of Human Remains**
   1. Handling of Infected Human Remains
   2. State Authority of Disposition of Infected Human Remains
   3. At Risk Responders and Service Providers
   4. Personal Protective Equipment (PPE)
2. **Scene Response and Transport**

**2.1** Preparation for Transport

**2.2** Scene Decontamination

**2.3** Transport Drivers

1. **Mortuary Care**

**3.1** General Guidelines

**3.2** Key Points

1. **Disposition of Infected Human Remains**

**4.1** General Guidelines  
**4.2** Cremation **4.3** Burial

**4.4** Interstate and International Transport of Infected Human Remains

1. **References**

**Appendix A:** [Florida Department of Health Guidance Personal Protective Equipment (PPE) for Health Care Workers: Ebola Virus Disease (EVD)](http://www.floridahealth.gov/diseases-and-conditions/ebola/_documents/ebola-personal-protective-equipment-guidance.pdf)

1. ***Introduction to Safe Handling of Human Remains***

**1.1 Handling of Infected Human Remains:**

Note: Suspected Ebola Virus Disease or other Viral Hemorrhagic Fever cases are immediately reportable to DOH according to Florida Law (Chapter 64D-3, F.A.C.).

This document provides guidance for professionals involved with the postmortem care in hospitals, medical examiner offices and funeral homes regarding the appropriate handling of human remains infected with pathogens responsible for viral hemorrhagic fevers (VHF), such as Ebola Virus Disease (EVD). Providers and responders who must physically handle deceased victims of hemorrhagic fevers must be equipped with accurate and detailed information to assist with their mission as safely as possible, while preserving as much dignity as possible for the deceased.

Funeral homes, funeral directors, embalmers, and multiple other death care industry businesses potentially involved in removal and final disposition of remains of Ebola decedents, are regulated under Chapter 497, Florida Statutes, by the Division of Funeral, Cemetery, and Consumer Services (FCCS Division), in the Florida Department of Financial Services. The FCCS Division works in concert with the Florida Board of Funeral, Cemetery, and Consumer Services, licenses death care professionals and businesses under Chapter 497, Florida Statutes (F.S.); the Board is contacted through the FCCS Division.

The following categories of Chapter 497 licensees would be legally authorized to conduct a removal of a decedent from place of death:

* A funeral establishment licensed under Chapter 497 (a funeral establishment may take remains to conduct a burial or a cremation).
* A direct disposal establishment licensed under Chapter 497 (direct disposal establishments are only authorized to take remains for direct cremation).
* A removal service licensed under Chapter 497, acting at the request of a funeral establishment or direct disposal establishment. Removal services subcontract with funeral establishments and direct disposal establishments to perform removals from place of death and bring the remains to the funeral establishment, direct disposal establishment, or cinerator facility. Removal services do not deal directly with the public. The use of removal services by funeral establishments and direct disposal establishments is common.

This document is designed to illustrate the basic steps required to minimize risk to all responders when handling victims of EVD or other VHF. Considerations for at-risk responders and service providers include at least the following:

* Handling of infected human remains, or a body bag containing infected human remains, should be kept to an absolute minimum.
* Only trained personnel wearing appropriate personal protective equipment (PPE) should touch or move any infected remains or associated contaminated materials. Personnel must be medically cleared, trained and fit tested, to the specific models of respirators they may use, per OSHA respiratory protection program requirements.
* Autopsies of infected human remains should be avoided. If it is deemed an autopsy is necessary, the Florida Department of Health (DOH) and the Centers for Disease Control and Prevention (CDC) should be consulted for additional safety precautions.
* In those instances where a hospital, clinic, or Medical Examiner's Office (MEO) is holding human remains believed to have been infected or possibly infected with Ebola virus, the hospital, clinic or MEO shall assure that any funeral establishment or other removal staff who arrive at that location to remove the remains of that decedent are advised, prior to being given access to the remains, that the remains are or may be infected by the Ebola virus.
* If cause of death is known to be EVD or other VHF, then an autopsy is not required and the body will not be transported to the MEO. However, in accordance with state law, the Medical Examiner (ME) has jurisdiction of the body and must sign the death certificate.
  + A death from EVD or other VHF in the U.S. is most likely to occur in the hospital setting, where the diagnosis has been established, as infected individuals develop significant and debilitating symptoms typically 8-10 days after infection.
  + The body would be retrieved and transported directly from the hospital by an appropriate Chapter 497 licensee (see above), following the guidance in this document and from CDC’s Guidance for Safe Handling of Human Remains of Ebola Patients in U. S. Hospitals and Mortuaries found at:<http://www.cdc.gov/vhf/ebola/hcp/guidance-safe-handling-human-remains-ebola-patients-us-hospitals-mortuaries.html>.
  + The right of the legally authorized person under section 497.005(39), F.S., of the Ebola decedent (typically the spouse or child of the decedent) to choose the funeral establishment that will handle final disposition, remains in effect as regards an Ebola decedent. [However, see also section 1.2, State Authority of Disposition of Infected Human Remains.]
  + In the case of indigents whose final disposition is handled and paid for by a county under a county contract with a local funeral establishment, cremation shall be an acceptable and preferred method of final disposition, notwithstanding the terms of the contract. If the disposition is by burial, the requirement for a hermetically-sealed casket shall be complied with.
  + In the rare event of next-of-kin being unable to find a funeral establishment or direct disposal establishment that will accept the body in a timely manner, contact the Florida Cemetery, Cremation and Funeral Association (FCCFA) for assistance. Also, there should be at least one Funeral Home on contract with the MEO to provide services in such cases.
* If the cause of death is suspected EVD or other VHF, the body should be kept on site (e.g., patient’s hospital room) while awaiting confirmatory test results. Once the diagnosis is confirmed, the body is handled as for a known case of EVD or other VHF. If testing rules out EVD or other VHF, then the body is handled in accordance with section 406.11, F.S.
* If cause of death is unknown but the history and findings are not compatible with EVD or other VHF as defined by CDC (see below), then the body will be handled in accordance with section 406.11, F.S.
* If the death occurs outside the medical care setting, and EVD or other VHF is suspected as the cause of death due to travel or contact history, and a history of compatible symptoms and findings (e.g., fever, vomiting, diarrhea, hemorrhage), then DOH and MEO will work together to provide guidance for testing. Remains would be stored at a secure, temporary predetermined refrigerated location until cause of death diagnosis is established.
* If the death occurs outside the medical care setting and, pursuant to a call from the decedent’s family or relatives, funeral establishment staff or other Chapter 497 removal staff arrive to conduct a removal of the remains, such staff should be wearing disposable gloves upon initial entry into the premises where death occurred, even if at that time there is no reason to believe that EVD may be involved. Such removal staff shall, prior to touching the remains, be alert for indications that the decedent was afflicted by fever, vomiting, diarrhea, or hemorrhage at or near to time of death. Removal staff would be authorized to ask any persons present at the place of death whether there was any indication of fever, vomiting, diarrhea, or hemorrhage at or near to time of death. If there is any indication that there was vomiting, diarrhea, or hemorrhage at or near to time of death, the removal staff should immediately terminate removal efforts and withdraw from the premises and immediately contact the local MEO for guidance. Upon such withdrawal from the premises, the removal staff shall immediately conduct a thorough decontamination procedure of their body and clothing (e.g., wash hands, shower, change clothes and shoes and assure that clothes and shoes are segregated and washed/decontaminated).

**1.2 State Authority of Disposition of Infected Human Remains:**

Under the emergency management powers of the Office of the Governor and specifically the authority in section 252.36, Florida Statutes, the Governor may issue Executive Orders that have the full force and effect of law. The Governor may direct the Florida Department of Health to take certain actions necessary to protect the health and welfare of the citizens of the State of Florida. An Executive Order may suspend the provisions of any regulatory statute regarding the disposal of human remains and grant the Department of Health disposition powers for human remains, including mandatory cremation.

In the event of a declared state of emergency, the Governor will issue an Executive Order that will likely contain clear direction as to the proper disposal methods for infected human remains. The Executive Order will also likely suspend the application of several state laws in conflict with the direction as to proper disposal methods for infected human remains.

If the Governor declares a state of emergency, modifications to traditional funeral practices may be recommended. In doing so, the Executive Order would clearly define what constitutes “infected human remains." Other considerations for an Executive Order declaring a state of emergency include:

* The Executive Order may require the cremation of all infected human remains and suspend any state laws related that would affect the ability of public health officials to take custody and control of the remains and direct proper disposal.
* The Executive Order may suspend the provisions of section 872.03, Florida Statutes, requiring a 48 hour waiting period prior to the cremation of any human remains.
* The Executive Order may suspend the application of provisions of chapter 406, Florida Statutes, requiring certain activities by Medical Examiners.
* The Executive Order may set conditions on the transport of human remains infected by Ebola.

**1.3 At-Risk Responders and Service Providers:**

In patients who die of EVD or other VHF, infectious pathogen may be found throughout the body, including tissues and fluids, and may survive up to several days at room temperature. Thus, the virus can be transmitted in postmortem care settings by incisions, lacerations, and punctures with instruments used during autopsy and embalming procedures. Additionally, transmission can occur through direct handling of human remains without appropriate PPE, and through splashes of blood or other body fluids (e.g., urine, feces) to unprotected skin and mucosa (e.g., eyes, nose, mouth), which occur during routine body handling and transport.

Many deaths may occur outside of traditional medical treatment facilities, such as clinics and hospitals. Local police, fire and/or EMS are typically involved in the investigations of these deaths to verify that death has actually occurred, and to ensure the death is from a natural disease and not a result of suspicious or violent activity. This potentially exposes a large number of responders to potential risk of exposure to communicable diseases. Responders and providers exposed to potentially infected human remains include:

* Health care providers when:
  + attempting to triage patients (EMT and EMS units responding to calls of sick and possibly infected patients),
  + treating patients (hospital emergency departments and in-patient care),
  + and/or providing outpatient care when the diagnosis is being established*.*
* Medical Examiner personnel exposed to communicable diseases during their investigation of potential cases.
* Funeral service personnel who may respond to a home death without a prior diagnosis, or who must transport the remains.

**1.4 PPE for Health Care Workers, Medical Examiners, and Funeral Service Workers:**

For confirmed or suspected EVD or other VHF, standard, contact and droplet infection prevention/control precautions must be applied, with every attempt to avoid exposure to infected blood, fluids or contaminated environmental surfaces, clothes, linens or other objects. DOH guidance on appropriate PPE selection, donning/doffing procedures, and disinfection of reusable PPE, is found in Appendix A. This includes a link to two training videos for high and low risk patient encounter settings.

It is critical that all PPE be properly fitted and worn before entering the environment containing the body. DOH considers as high risk exposures, working in environments that may expose responders/workers to direct or potential direct contact with the infected decedent’s blood or bodily fluids (e.g., sweat, vomit, feces, urine); processing of infected laboratory specimens; and/or contact with linens, objects and environmental surfaces contaminated with the decedent’s blood or bodily fluids. In these higher risk work environments, at minimum, use DOH PPE guidance for high risk patient encounters at all times while in contact with the body.

When death occurs at a hospital or medical clinic, the responsibility for compliance with CDC guidance to shroud wrap and double bag the remains, and to decontaminate the exterior of the outer body bag, is on the hospital and clinic staff. See sections 2.1-2.2 of this document and CDC guidance at <http://www.cdc.gov/vhf/ebola/hcp/guidance-safe-handling-human-remains-ebola-patients-us-hospitals-mortuaries.html>. Hospital staff may need to coordinate with the transporting agent for provision of the correct body bags, cremation container, and casket.

Whenever funeral establishment staff, direct disposal establishment staff, removal service staff, cinerator facility staff, or other Chapter 497 licensee staff touch or handle a properly sealed and disinfected body bag containing an Ebola decedent's remains, that staff should be wearing the following PPE appropriate for DOH defined lower risk settings (see Appendix A):

* Fluid impermeable single-use head-to-toe coverall
* Single-use nitrile gloves (double glove with smaller size as base layer and larger size as outer layer)
* Single-use impermeable shoe/boot covers
* Eye protection (tight fitting goggles or face shield)
* Fluid resistant facemask or N-95 respirator (in combination with eye protection above)
* PPE ensemble must ensure no skin or mucous membrane exposure
* Any potential contact with the decedent’s blood, tissues, bodily fluids, contaminated clothing or linens, and/or exposure to aerosol generating procedures, requires PPE appropriate for DOH defined higher risk settings (see Appendix A)

1. ***Scene Response and Transport***

**2.1 Preparation for Transport:**

At the death scene, any medical intervention devices should remain in place. Do not attempt to remove anything from the body. Do not wash or clean the body. As soon as possible, wrap the body in a plastic shroud being careful to avoid contamination of the outside surfaces of the shroud with any bodily fluids. Once wrapped, the body and shroud should be placed in a leak-proof disaster pouch or body bag not less than 150 μm (0.15 millimeters) thick. “Zipper-less seal” sealing containment bags or containment systems are preferred over “zipper-seal” body bags or disaster pouches. Once the body is sealed within the pouch or body bag, the remains should be placed in a second body bag not less than 150 μm thick (0.15 millimeters), and sealed for transport. Soiled gloves should be changed immediately, if necessary, to prevent contamination of the second (outer) disaster pouch or body bag.

**2.2 Scene Decontamination:**

Prior to transport, conduct a surface inspection and decontamination of the outer bag by removing visible soil and other contaminates on the external surfaces with EPA-registered disinfectants which can kill a wide range of non-enveloped viruses (such as a 0.5% chlorine solution). Follow the product’s label instructions. If using chlorine solution, it must be prepared fresh. Once all of the visible soil has been removed, reapply the disinfectant to the entire bag surface and allow to air dry before transport.   
  
Following the removal of the body, the surfaces in contact with the body and in the immediate area should be cleaned and disinfected by trained biohazards waste cleaning and removal companies. All reusable equipment should be cleaned and disinfected according to standard procedures. For more information on environmental infection control, please refer to *Interim Guidance for Environmental Infection Control in Hospitals for Ebola Virus, found at:* <http://www.cdc.gov/vhf/ebola/hcp/environmental-infection-control-in-hospitals.html>

**2.3 Transport Drivers:**

Provided the procedures outlined in this document are followed, PPE is not required for individuals driving or riding in a vehicle transporting human remains. However, drivers and riders should not handle bags containing infected human remains without appropriate PPE.

1. ***Mortuary Care***

**3.1 General Guidelines:**

Funeral establishments, direct disposal establishments, removal services, and cinerator facilities should decline to take an engagement regarding the remains of an Ebola decedent, if such licensee is not confident they have the facilities and resources to fully comply with CDC and DOH guidelines regarding handling, processing, and final disposition of Ebola decedents.

When contacted to make a removal of Ebola decedent's remains from a hospital, the funeral establishment, direct disposal establishment or removal service should, where feasible, and in coordination with the decedent's family and the hospital, take a hermetically-sealable casket or leak-proof alternative cremation container (depending on whether final disposition is to be by burial or cremation) to the hospital when the removal crew initially does the removal; and then place the double bagged remains directly into the casket or alternative container. Hospitals should facilitate such procedure, if feasible. This will significantly reduce subsequent handling of the bagged remains.

The responsible funeral establishment should attempt, where feasible, to arrange with the family to take the remains directly from the hospital to the cemetery and conduct interment; or take the remains directly from the hospital to the cinerator facility and that facility's cooler, and make arrangements for the cinerator facility to conduct cremation, as soon as ME approval is obtained and the 48 hour statutory waiting period (if still applicable at that time) has elapsed.

There must be no embalming or viewing of an Ebola decedent. The family and other loved ones of the decedent should not be left alone in the presence of the Ebola decedent remains; there should always be a Chapter 497 staff member present to prevent contact by the family or loved ones with the body or body bag. The body bag must never be opened. Chapter 497 licensees must refuse a request by a family to open the body bag for an ID or other viewing, or for a final farewell, or for any other purpose. A memorial service with the Ebola decedent remains in a hermetically-sealed closed casket present is permissible, but not recommended.

The requirement that a body ID tag be attached to the body by the Chapter 497 licensee, or that there be a positive visual ID of remains, is NOT APPLICABLE to Chapter 497 licensees regarding Ebola decedents. Chapter 497 licensees should rely on the ID of the decedent as provided by the hospital. The Chapter 497 removal crew picking up the remains should attach an ID tag to the exterior of body bag, identifying the decedent based on information provided by the hospital. If the remains are placed directly into a casket or alternative container at the hospital, an additional ID tag should be attached to the exterior of the casket or alternative container.

Funeral establishments and direct disposal establishments approached to take an engagement regarding an Ebola decedent may, before accepting the engagement, want to conduct such preliminary inquiry as may be possible, concerning whether the decedent has any implanted devices such as a pacemaker or defibrillator. Such devices cannot be removed from an Ebola decedent. Unless the funeral establishment or direct disposal establishment can locate a cinerator facility willing to conduct a cremation with those devices in the body (with possibility of explosion during cremation), it will be necessary to use a hermetically-sealed casket and a burial, and this may result in significantly higher expenses if the family was contemplating cremation.

The casket used for burial of an Ebola decedent shall be a 20 gauge or thicker steel casket, with all seams continuous welded, and a gasketed lid with a built-in system for latching and tightening the lid. The casket must be one represented by the manufacturer to have been vacuum or pressure tested by the manufacturer at the factory and represented not to have leaked pressure during the test at the manufacturer’s test pressure. The funeral director responsible for the final disposition of the Ebola decedent shall certify in the funeral establishment's case file, in a writing signed and dated by the funeral director, that the casket meets the above specifications and that the lid was closed and tightened in accordance with manufacturer's instructions as soon as the Ebola decedent was placed in the casket.

**3.2 Key Points:**

* So long as there is no leakage of body fluids emanating from the body bags, all mortuary care personnel should wear PPE appropriate for lower risk settings, as described in   
  Appendix A of this document, when handling the bagged remains.
* Infected bodies should not be embalmed. The risk of exposure to hemorrhagic fever viral agents is paramount over any possible benefit of embalming.
* Do not open the body bags.
* Do not remove remains from the body bags. Bagged remains must be placed into a rigid cremation box prior to being loaded into the cremation chamber.
* In the event of fluids leaking from the body bag, immediately switch to PPE appropriate for high risk settings. Then, thoroughly clean and decontaminate all soiled areas with EPA-registered disinfectants (such as a 0.5% chlorine solution), which can kill a broad range of non-enveloped viruses in accordance with label instructions. If using chlorine solution, it must be prepared fresh.
* Reusable equipment should be cleaned and disinfected according to standard procedures (and manufacturer recommendations) or as delineated in Appendix A.
* For more information on environmental infection control, refer to CDC’s Interim Guidance for Environmental Infection Control in Hospitals for Ebola Virus, found at <http://www.cdc.gov/vhf/ebola/hcp/environmental-infection-control-in-hospitals.html>.
* Note that any materials contaminated by leaking blood or bodily fluids, or used in the cleaning process must be stored and transported (only by those with special permits) as DOT Category A biohazardous waste. See appropriate DOH guidance and the CDC guidance document *Ebola-Associated Waste Management*, at <http://www.cdc.gov/vhf/ebola/hcp/medical-waste-management.html>.

1. ***Disposition of Infected Human Remains***

**4.1 General Guidelines:**

* Infected human remains should be cremated in accordance with usual practice.
* Burial is possible in hermetically-sealed caskets.
* If the body has a pacemaker or implantable defibrillator, burial in a hermetically-sealed casket may be preferable. Such devices have been known to explode in the cremation process.
* Once the bagged body is placed in the sealed casket, no additional cleaning is needed unless leakage has occurred.
* No PPE is needed when handling the cremated remains or the hermetically-sealed closed casket.
  1. **Cremation**
* Properly cremated human remains have no communicable disease risk. Heating for 30-60 minutes at 60°C renders the virus inactive. Cremation temperature and duration far exceeds the physical inactivation limits of the virus (Mwanatambwe et al. 2001). Standard cremation temperatures are 760°C to 982°C (1400°F to 1800°F) for 1 to 2 hours.
* Upon completion of cremation, cremains are placed in an urn and may be returned to the next-of-kin. These ashes may be buried or scattered at the will of the next-of-kin.

**4.3 Burial**

* Burial of infected human remains is possible, but not recommended. Research has shown that the virus can remain active for up to 50 days in human tissue (Piercy et al. 2010)
* If burial occurs, the remains must be contained in a hermetically-sealed casket which is placed into a burial vault.
* Mausoleum interments should not occur.
  1. **Interstate and International Transport of Infected Human Remains:**
* Local transport should be coordinated with relevant local and state public health authorities in advance so that they have knowledge of when and where transport will occur. Public health authorities should be apprised of any transport problems or deviations from planned routes and delivery of remains.
* Interstate transport should be coordinated with the CDC by calling the Emergency Operations Center at (770) 488-7100. If shipping by air is necessary, the remains must be labeled as dangerous goods in accordance with Department of Transportation regulations (49 Code of Federal Regulations 173.196).
* Transportation of remains infected with hemorrhagic viral pathogens outside the United States must comply with the regulations of the country of destination and should be coordinated in advance with relevant authorities.

***5. References***Florida Statues 2014, The Florida Senate. *Emergency management powers of the Governor. Chapter 252, Section 36*. http://www.flsenate.gov/Laws/Statutes/2014/252.36

Mwanatambwe, M., Yamada, N., Arai, S., Shimizu-Suganuma, M., Shichinohe, K., & Asano, G. (2001). Ebola hemorrhagic fever (EHF): mechanism of transmission and pathogenicity. *Journal of Nippon Medical School*. 68(5), 370-375.

Piercy, T.J., Smither, S.J., Steward, J.A., Eastaugh, L., Lever, M.S. (2010) The survival of filoviruses in liquids, on solid substrates and in a dynamic aerosol. *Journal of Applied Microbiology*. 109(5): 1531-9.

[*Guidance for Safe Handling of Human Remains of Ebola Patients in U. S. Hospitals and Mortuaries*.](http://www.cdc.gov/vhf/ebola/hcp/guidance-safe-handling-human-remains-ebola-patients-us-hospitals-mortuaries.html) Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), [Division of High-Consequence Pathogens and Pathology (DHCPP)](http://www.cdc.gov/ncezid/dhcpp/index.html), [Viral Special Pathogens Branch (VSPB)](http://www.cdc.gov/ncezid/dhcpp/vspb/index.html). October, 2014 http://www.cdc.gov/vhf/ebola/hcp/guidance-safe-handling-human-remains-ebola-patients-us-hospitals-mortuaries.html

[*Interim Infection Prevention and Control Guidance for Care of Patients with Suspected or Confirmed Filovirus Haemorrhagic Fever in Health-Care Settings, with Focus on Ebola*](http://apps.who.int/iris/bitstream/10665/130596/1/WHO_HIS_SDS_2014.4_eng.pdf?ua=1&ua=1&ua=1). Global Alert and Response. World Health Organization. August 2014.   
http://www.who.int/csr/resources/publications/ebola/filovirus\_infection\_control/en/

**Appendix A:** [Florida Department of Health Guidance Personal Protective Equipment (PPE) for Health Care Workers: Ebola Virus Disease (EVD)](http://www.floridahealth.gov/diseases-and-conditions/ebola/_documents/ebola-personal-protective-equipment-guidance.pdf)