Environmental Infection Control

Although risk factors for environmental transmission of Ebola virus are not well understood, there is limited evidence from laboratory studies that Ebola virus can remain viable on solid surfaces under certain environmental conditions for several days. According to the CDC, there is no epidemiologic evidence of environmental Ebola virus transmission via fomites (e.g., bed rails, door knobs, laundry, etc.). However, environmental infection control measures are prudent given the low infectious dose, the potential of high virus titers in blood (and other bodily fluids like vomitus and stool) of ill patients, and the severity of EVD.

There is likely to be considerable amounts of medical waste generated during the course of providing care for a patient with EVD and other waste generated during environmental cleaning and disinfection in health care settings and in community settings.

The U.S. Department of Transportation (DOT) has classified Ebola virus as a Category A infectious substance per its Hazardous Materials Regulations (HMR, 49 C.F.R., Parts 171-180). Any item transported offsite for disposal that is contaminated or suspected of being contaminated with a Category A infectious substance must be packaged and transported in accordance with the HMR. This includes medical equipment, sharps, linens, and used health care products (such as soiled absorbent pads or dressings, kidney-shaped emesis pans, portable toilets, used personal protection equipment (gowns, masks, gloves, goggles, face shields, respirators, booties, etc.) or byproducts of cleaning) contaminated or suspected of being contaminated with a Category A infectious substance.

On 06 October 2014, KDHE issued a written policy pursuant to K.S.A. 65-3430(e)(1)(B) and K.S.A. 65-101(a)(2) and (5) that defines Ebola virus and other hemorrhagic fever viruses as hazardous waste.

KDHE is basing this guidance regarding the treatment, storage, and disposal of Ebola waste based upon guidance and requirements established by KDHE and the World Health Organization, the CDC, and the DOT.

For the purposes of this document, Ebola waste means any untreated medical waste generated in the care of patients with known or suspected Ebola virus disease (EVD) including, but not limited to, medical equipment, sharps, linens, and used health care products, used PPE, and all absorbent or uncleanable items contaminated or potentially contaminated by a suspected EVD patient. Ebola waste is a Category A infectious substance and a Resource Conservation and Recovery Act (RCRA) hazardous waste in the State of Kansas. A RCRA hazardous waste must be transported by a registered hazardous waste transporter and disposed of at a permitted hazardous waste facility (an incinerator).

Ebola waste that has been treated (sterilized) by the generator using effective (autoclaving) procedures may be managed as other Category B Regulated Medical Waste (RMW) in accordance with state and federal transportation and disposal requirements. Such waste may be treated in permitted medical waste disposal facilities. Chemical treatment alone does not remove

the Ebola waste (Category A) designation, nor does it eliminate the hazardous waste classification.

Hospitals and Other Medical Facilities

Hospitals or other medical facilities that have the capability to sterilize Ebola waste in an on-site autoclave should do so as waste is generated to avoid the accumulation of large volumes of untreated Ebola waste on-site. Prior to sterilization in an autoclave, any confirmed or suspect Ebola waste must be properly packaged and labeled while held in temporary storage (see storage requirements below).

Hospitals or other medical facilities without autoclaving capabilities should package the waste following DOT requirements (Title 49, Part 173.196, and other associated DOT guidance). The packaged waste should be properly labeled and placed into secure storage. As soon as such waste handling processes are initiated, the facility should contact KDHE to obtain assistance in identifying and selecting a waste transporter and disposal facility.

Human body fluids from a patient in isolation should be collected for disposal as Ebola waste or collected and treated with 1 part of household bleach to 9 parts water for at least 10 minutes or longer prior to discharge to the sanitary sewer. Facilities should discuss preferred concentrations and treatment time for bodily fluid wastes utilizing this method with their Public Waste Water Treatment facility director and local emergency manager.

Toilet bowls should be primed with a 9:1 (water:bleach) solution prior to introduction of any wastes (i.e., prior to patient use) to ensure wastes voided during toilet equilibrium actions are appropriately treated. Body fluids expelled directly from the patient into a toilet must be treated again with 1 part of household bleach to 9 parts water for at least 10 minutes prior to discharge to the sanitary sewer; this will require consideration of the toilet bowl water volume to ensure a 9:1 (water:bleach) solution is achieved during treatment.

Onsite Storage of Ebola Waste - The DOT shipping packaging adequately satisfies the hazardous waste packaging requirement for untreated Ebola waste. It is recommended that the outer packaging be rigid plastic 55-gallon drums or larger over-pack plastic drums. These containers are capable of being incinerated with the contained waste. All DOT labeling requirements can be included on the “Hazardous Waste” label which must also include the date that the container was placed into storage (there is a 90-day storage time limit). The DOT “Infectious Substance” label should also be adhered to the outer package. The labeling information includes the following: DOT shipping name - "Infectious substances, affecting humans (Ebola Hazardous Waste)", hazardous class/division 6.2 (DOT), DOT ID # UN2814. The hazardous waste code is “EBOLA” to be put into the waste code section of the uniform hazardous waste manifest.

Autoclave Guidelines for Sterilization of Ebola Waste – If the facility uses an autoclave to sterilize the Ebola waste; they should include the following in their procedure to ensure effectiveness:

- All waste should be in biohazard autoclave bags and should be no more than three-fourths full.

- Bags should be tied loosely and about 50 mL of water added to each bag.
- Tape a biological indicator ampoule to the outside of the bag and place bag in a metal autoclave pan or tray. (Note that effectiveness is increased with metal trays.)
- A chemical indicator strip may also be used near the mouth of the bag.
- Autoclave contents for a minimum of 60 min, at 121°C, and 15psi, with slow exhaust.
- The Autoclave log should document the contents, duration, time, pressure, and temperature for the autoclave cycle.
- Document that the chemical indicator strip indicates a successful run. If the chemical indicator fails, then the sterilization should be repeated with fresh indicator. (The chemical indicator provides an initial evaluation of run success. The biological indicator provides confirmation and should be included in every run of the autoclave.)
- Label the bag with the date and time of run or other tracking system that corresponds with the biological indicator ampoule, autoclave log and chemical indicator for that run.
- Hold labeled autoclaved waste until the biological ampoule indicates successful sterilization. (NOTE: The biological indicator must be incubated according to manufacturer's directions for 48 hours to confirm effectiveness of the autoclave to inactivate organisms.)
- Once successful sterilization has been confirmed with the biological indicator, document that bags associated with that run are ready for storage and disposal as Category B Regulated Medical Waste.

NOTES:

Sterilization indicator tape is not equivalent to the biological indicator and chemical strip indicator described above.

The chemical indicators and biological indicators should be used with every autoclave run and their location within the autoclave varied to ensure uniform sterilization throughout the autoclave.

Do not overfill the bags, the secondary containers, or the autoclave itself. Steam must be able to penetrate all areas of the waste material to ensure effectiveness of the sterilization.

Disposal of Ebola Waste – If the facility does not already have a hazardous waste generator ID, KDHE can provide a special ID to allow the waste to be shipped off-site using a uniform hazardous waste manifest. This manifest satisfies both the hazardous waste and DOT shipping paper requirements. KDHE will work with the facility to identify a waste transporter and permitted incineration facility.

Other Generators of Ebola Waste

All other generators of Ebola waste should follow the same packaging and labeling procedures as hospitals that do not have treatment (sterilization) capabilities. Clean-up contractors should coordinate storage and disposal procedures with KDHE. Movement to a temporary secure storage area may be approved by KDHE, if necessary, pending the selection of a permitted disposal facility. Direct loading and transfer to a disposal facility is preferred if this can be pre-arranged.

Handling of Bulky Contaminated Items

Some contaminated or potentially contaminated items that cannot be appropriately cleaned and disinfected may be large and unable to be treated in an autoclave or packed into the approved DOT shipping containers without size reduction. Items may include things such as bedding, chairs, mattresses, etc. It will be necessary to reduce the size of such items using mechanical procedures. The surfaces of these items must first be treated with 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) or a 9:1 (water:bleach) solution). Note: 9:1 (water:bleach) solution is caustic. Avoid direct contact with skin and eyes. Prepare the bleach solutions in a well-ventilated area. Care must be taken to avoid exposures and the additional spread of contamination during these steps.

All items being prepared for delayed on-site treatment or off-site shipments must be placed in rigid containers that are no larger than 55-gallon drums or larger over-pack containers.

Special DOT Permits

If a disposal facility requires outer packaging that differs from the DOT requirements in Part 173.196, a Special Permit may be requested.

Community Environmental / Decontamination Issues

Local health departments and other local agencies are advised to discuss and plan for how local resources will be identified and utilized to address any potential needs for environmental decontamination of a confirmed case-patient's residence or other structures. Such resources might include local or regional hazardous materials response teams or private contractors. These units are primarily present to isolate a threat and monitor the environmental decontamination and not for clean-up. KDHE is working to develop a resource guide to environmental clean-up organizations familiar with proper PPE and handling of potentially infected blood and fluids. Refer to Environmental Infection Control section above for information on management of waste generated from cleanup activities.

A one-page waste management guide is available in Appendix 7.

Handling of Human Remains of Ebola Virus Disease Patients

The CDC has issued "Guidance for Safe Handling of Human Remains of Ebola Patients in U. S. Hospitals and Mortuaries" (available at http://www.cdc.gov/vhf/ebola/hcp/guidance-safe-handling-human-remains-ebola-patients-us-hospitals-mortuaries.html). KDHE has reviewed the CDC guidance and is adopting it by reference.