

MEDICAL UNIVERSITY OF SOUTH CAROLINA (MUSC)
INFECTIOUS/BIOLOGICAL WASTE MANAGEMENT

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The Medical University of South Carolina contracts with an outside vendor to provide for incineration of infectious/pathogenic waste. The direction and coordination of this effort has been assigned to the Occupational Safety and Health Director.

Implementation

Infectious Waste is segregated from solid and hazardous waste at the point of generation, placed in red biohazardous waste bags of appropriate size, and deposited into large red infectious waste storage/transportation carts. When full, the carts are transported to one of three loading docks at MUSC. The loading docks are located at Children's Research Institute, at the Strom Thurmond/Gazes Building and at Sabin Street Autoclave Facility behind the Medical University Hospital. Although some of the infectious waste is then transported to an approved facility for incineration or autoclaving, OSHP staff is treating much of the non-pathogenic waste.

The following procedures will be employed to ensure that all infectious waste is stored and disposed of properly:

- A. Generators of infectious/biological waste will place the waste in a red three- (3) mil (1/1000 inch) polyethylene equivalent bag and seal it. The red bags are provided by OSHP at extension 2-3604. When bagging, the top of the bag should be twisted tightly, doubled over and cinched tightly with tape. Needles will not be bagged, but will be placed in needle disposal boxes, which may be purchased from Central Supply. Glassware must be placed in puncture proof containers before being placed in bags. The bagged waste and needle disposal boxes will then be placed into an infectious/biohazards waste disposal cart. The carts will be delivered to one of the three loading docks by Environmental Services, University Housekeeping and Comparative Medicine personnel. There the waste will be checked for radioactivity, loaded onto trailers, and manifested by Occupational Safety and Health employees for final shipment to the incinerator. Waste delivered to the trailer at the CRI Loading dock should be loaded directly onto the trailer by DLAR staff. All other generators of infectious waste should place bagged waste in one of the containers in the infectious waste storage room near the BSB service elevators.

B. The above procedures apply to all infectious/biohazardous waste:

1. Cultures and stocks of etiologic agents
2. Blood and blood products
3. Pathological wastes
4. Other wastes from surgery and autopsy
5. Contaminated laboratory wastes
6. Sharps
7. Dialysis unit wastes
8. Animal carcasses and body parts
9. Discarded biologicals
10. Contaminated equipment

C. Excluded and Special Wastes

1. Nuclear wastes are regulated by the Nuclear Regulatory Commission (NRC) and the Department of Transportation (DOT) and are specifically excluded.
2. Hazardous, infectious and biomedical wastes which also exhibit characteristics of, or contain, listed Resource Conservation and Recovery Act of 1976 (RCRA) waste must be treated as hazardous wastes under RCRA regulations.
3. A number of drugs, narcotics and other pharmaceuticals are subject to the Food and Drug Administration (FDA), the Drug Enforcement Administration (DEA), Environmental Protection Agency (EPA) and other regulatory and enforcement agencies. In case of disposal of these materials, custody and witnessed destruction by personnel from these agencies is mandatory.

INFECTIOUS WASTE PROTOCOL

1. Introduction

A. Definition

MUSC defines regulated medical waste to mean liquid or semi-liquid blood or potentially infectious materials; contaminated items that would release blood or potentially infectious materials in a liquid or semi-liquid state if compressed. Items that are caked with dry blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological waste containing blood or other potentially infectious material. EPA lists 12 types of infectious waste, all of which (Draft Manual for Infectious Waste Management SW--957, Sept. 1982) are amenable to incineration. The following 11 types of infectious waste are encountered at the Medical University of South Carolina.

CULTURES AND STOCKS OF ETIOLOGIC AGENTS

All cultures and stocks of etiologic agents constitute infectious wastes with a particular hazard because the pathogenic organisms are present at high concentration in these materials. Included in this category are cultures of specimens from medical and pathological laboratories, cultures and stocks of etiologic agents from research laboratories and pharmaceutical preparations, and wastes from the production of biologicals and antibiotics.

BLOOD AND BLOOD PRODUCTS

The principal hazard in blood products (e.g., plasma, serum) is the possible presence of the hepatitis B, hepatitis C and the HIV agent. Less common are the pathogens of other diseases (malaria, yellow fever, Colorado tick fever) in which the etiologic

agent circulates in the blood. The Center for Disease Control and Prevention and the OSHA Bloodborne Pathogen Standard 1910.1030 requires that standard precautions be taken with hospitalized patients “to prevent acquisition of infection from contact with blood or items contaminated with blood.” Even though blood samples are often tested in the laboratory, it is impractical to test for the presence of all infectious agents. In addition, a negative hepatitis virus test, by current technology, only demonstrates that the viral concentration is below the limits of detection. Therefore, all waste blood and blood products should be managed as infectious waste regardless of test results.

PATHOLOGICAL WASTES

Pathological wastes consist of tissue, organs, body parts, blood, and body fluids that are removed during surgery and autopsy. Pathological wastes from patients with infectious waste diseases should be managed as infectious waste because of the probability that these wastes contain pathogens. However, it is prudent to handle all pathological wastes as infectious because of the possibility of unknown infection in the patient or corpse - it has been reported that pathogens are consistently removed from the bodies of people who were certified as having died of causes other than infectious diseases. Furthermore, there are also other considerations (such as aesthetics) that affect practices in pathological waste disposal. The best and simplest procedure is to manage all pathological wastes uniformly. Pathological wastes are usually generated in hospital operating rooms, pathology departments, autopsy departments, and laboratories.

CONTAMINATED LABORATORY WASTES

Contaminated laboratory waste refers to the wastes that were in contact with pathogens in any type of laboratory work. The variety of wastes in this category includes culture dishes, devices used to transfer, inoculate, and mix cultures; and paper and disposable items that were in contact with specimens of cultures. Wastes from medical and pathology laboratories that are generated in the process of culturing patient specimens pose a special hazard because of the prevalence of resistant strains of microorganisms that have developed in hospitals and other institutions. The following infectious contaminated wastes are frequently generated by medical laboratories:

Culture dishes

Pipettes

Syringes or other sharps

Tissue culture bottles and flasks

Membrane filters in plastic dishes

Collection bottles, cups and tubes from specimens of blood or bloody bodily secretions.

Micro-titer plates used of hemagglutination testing complement fixation, or antibody titer.

Slides and plates from immunodiffusion testing.

Slides and cover slips from blood specimens or tissue or colony picking.

Disposable rubber gloves, lab coats, and aprons.

Swabs, capillary tubes, and spreaders used to take or transfer samples containing pathogens.

Tubes, cards, tabs, and assemblies used for diagnostic purposes to speciate enteric or other pathogens.

Centrifuge tubes

Contaminated wastes from the culturing and handling of pathogens in research laboratories should also be managed as infectious waste because they are usually contaminated with etiologic agents from pure cultures, often at high concentrations. In addition, there are the wastes that are generated in research applications of various biotechnologies (including recombinant DNA). For example, biotechnologies are utilized in vaccine production, fermentation biology, cell biology and virology, microbiology, and other aspects of applied biology and applied microbiology. At this time, there is divergence of opinion among experts in the field about the extent and degree of the potential hazard posed by these wastes. Therefore, in the interest of safety, all biotechnological wastes from research work should be managed as infectious waste.

SHARPS

Discarded sharps (e.g., hypodermic needles, syringes, pasteur pipettes, broken glass, scalpel blades) present the double hazard of including disease and inflicting injury. The disease potential is great if the sharp was used in the treatment of a patient with an infectious disease; however, even with apparently healthy persons, there is always the possibility of unknown pathogens. Other contaminated sharps are generated in the inoculation of people or animals. Sharps also pose the hazard of physical injury through cuts or puncture wounds. With good management practices, the hazards of disease and injury from sharps can be minimized. All waste sharps should be managed uniformly in accordance with the Bloodborne Pathogen Standard 1910.1030 for infectious sharps. All contaminated sharps must be disposed of in puncture resistant/leak-proof containers, which have been labeled as biohazardous.

Before moving containers, they must be closed to prevent spillage or protrusion of contents. The sharps containers must then be placed in a closeable, leak proof secondary container. Sharps containers are not required to be placed in biohazard bags.

DIALYSIS UNIT WASTES

This category of infectious wastes consists of wastes that were in contact with the blood of patients undergoing hemodialysis. These wastes are classified as infectious because of the high rate of hepatitis among these patients. The waste in this category includes disposable dialysis equipment such as tubing and filters and other wastes such as sheets, towels, gloves, aprons, and lab coats. Sharps from dialysis units should be managed uniformly in accordance with the practices established by the Bloodborne Pathogen Standard 1910.1030.

ANIMAL CARCASSES AND BODY PARTS

This infectious waste category includes the carcasses and body parts of all animals that were exposed to pathogens in research, or were used in the production of biologicals, or in the in vivo testing of pharmaceuticals, as well as those that died of known or suspected infectious disease.

ANIMAL BEDDING AND OTHER WASTES FROM ANIMAL ROOMS

Animal bedding and other wastes that were in contact with diseased and laboratory research animals or their secretions, excretions, carcasses, or body parts probably contain pathogens shed by these animals. For these reasons, these wastes are designated as infectious.

OTHER WASTES FROM SURGERY AND AUTOPSY

The surgery or autopsy of septic (“dirty”) cases or patients with infectious diseases generates waste that may be contaminated with pathogens from the patients, which should be managed as infectious waste. Wastes in this category include soiled dressings, sponges, drapes, carts, lavage, tubes, drainage sets, underpads, and personal protective equipment. The American Hospital Association recommends that all surgical dressings from patients be regarded as contaminated whether or not clinical evidence of infection is present. Because of the possibility of unknown disease, it is necessary to manage all wastes from surgery and autopsy that have been in contact with patients’ tissues, blood, body fluids, secretions, and excretions as infectious waste.

CONTAMINATED EQUIPMENT

Equipment and equipment parts that are contaminated with etiologic agents and are to be discarded constitute a category of infectious waste. These wastes include equipment that was used in patient care, equipment that was used in medical laboratories, equipment that was used in research with etiological agents, and equipment that was used in the production and testing of various pharmaceuticals. Another example is the HEPA filter that is used in biological safety cabinets and in the ventilation systems of biological containment facilities, which should be handled as infectious waste.

EXCLUDED AND SPECIAL WASTES

Due to unique regulatory or handling requirements, several categories of biomedical wastes are either excluded or receive separate consideration.

1. Nuclear wastes, which are generated in medical research, are regulated by the NRC and DOT, and are specifically excluded. However, it should be noted that scintillation cocktails which contain only the isotopes H3 and C14 and have an average value at or below 0.002 microcuries/gram are not regulated as radioactive wastes by NRC, DOT or most state regulatory agencies; they are regulated as RCRA hazardous wastes (Waste Flammable Liquid, N.D.S. - UN 1993-EPA Waste ID F003/F005).
2. Hazardous, infectious and biomedical wastes which also exhibit characteristics of, or contain, listed RCRA wastes must be treated as hazardous wastes under RCRA regulations as well. RCRA requirements will generally be more restrictive in the handling and disposal of these wastes.
3. Finally, a number of drugs, narcotics and other pharmaceuticals are subject to regulation by FDA, DEA, EPA and other regulatory and enforcement agencies. In case of disposal of these materials, custody and witnessed destruction by personnel from these agencies is mandatory.

PROPER DISPOSAL METHODS

In general, the preferred disposal method for some biohazardous/infectious wastes is an incinerator for pathological waste disposal.

OPERATIONAL PROCEDURES

Generators of infectious/biological waste will place the waste in a three- (3) mil (1/1000 inch) polyethylene equivalent bag and seal it. When bagging, the top of the bag should be twisted tightly, doubled over and cinched tightly with tape. The bag should then be placed inside an infectious/biological disposal cart. The carts will then be delivered to the Biological Waste Holding Facilities by Environmental

Services, University Housekeeping and Comparative Medicine personnel. There the waste will be checked for radioactivity, loaded at CRI onto trailers, and manifested by Occupational Safety and Health employees for final shipment to the incinerator. Waste delivered to the trailer at the CRI Loading dock should be loaded directly onto the trailer by DLAR staff. All other generators of infectious waste should place bagged waste in one of the containers in the infectious waste storage room near the BSB service elevators.

LABELS

Each cart will be marked as to the contents therein as required by the contractor i.e., needles, animal bedding, and animal parts. In addition to contractor labeling requirements, all appropriate EPA, DOT or state requirements of the incineration site must be strictly adhered to.

MANIFESTS

The appropriate type of manifest must be completed by the Occupational Safety and Health personnel at the MUSC Biological Waste Holding Unit and signed by the MUSC Occupational Safety and Health Programs Director or his representative. The contractor provides manifests for waste shipment.

TRANSPORTATION

Disposal transporters of pathological/infectious waste generally require special hauling permits, under the jurisdiction of environmental regulatory, public health or public utility agencies or a combination thereof. Vehicle identification requirements will be specified by these agencies. Refrigerated vehicles will be used for these wastes. Manifests will be checked and signed by the driver at the point of loading. Manifests will be checked and signed off at the disposal facility as received.

STORAGE

Storage of infectious waste is regulated differently by each state and by many municipalities, and applies both to the generating facility and the disposal facility. In general, wastes may be stored for up to 96 hours if refrigerated below 48 degrees F and may be stored for longer periods if maintained below 0 degrees F. The contractor will incinerate infectious waste in the most expeditious manner possible. No infectious waste will remain on-site for more than four (14) days from arrival. Time restricted material will be disposed of first. The contractor will incinerate or autoclave all regulated infectious waste as prescribed by the state department of public health regulations.

PERSONNEL PROTECTION

In general, properly packaged wastes present no hazard to personnel. Standard worker uniforms, rubber gloves, and safety glasses are adequate for personal protective equipment. Leaking or damaged containers should be treated with caution. Protective gear used to clean-up infectious waste will, at a minimum, a disposable Tyvek suit, appropriate rubber gloves and eye protection.

INFECTIOUS WASTE MANAGEMENT PLAN

This Infectious Waste Management Plan (Plan) identifies actions to be taken by MUSC to ensure proper treatment, storage, handling, clean up and disposal of the Medical University of South Carolina's (MUSC's) infectious waste. Components of this Plan include a spill plan, contingency plan for alternate treatment, storage and/or disposal sites, handling and storage of infectious waste, radiological monitoring, and personnel health and safety training. A copy of this Plan will remain in

the infectious waste transportation vehicle at all times and on file in Occupational Safety and Health Program's (OSHP's) office in Harborview Office Towers.

- A. Spill Plan: MUSC presently transports infectious waste from 25 small-quantity generators producing less than 50 pounds of infectious waste per month, and one generator producing more than 50 pounds of infectious waste per month. In the event that an accident occurs resulting in a spill or release of infectious waste during transport, the following actions are to be taken:
- a) Contact MUSC immediately at (843) 792-3604 and provide pertinent information regarding the occurrence.
 - b) Contact the South Carolina Department of Health and Environmental Control (DHEC) immediately at (803) 253-6488 and provide pertinent information regarding the occurrence.
 - c) Take measures to minimize exposure to human health and the environment. All waste should remain within the confines of the transport vehicle whenever possible.
 - d) Clean up spill area to the greatest extent possible. Appropriate personal protective equipment should be donned which includes, at a minimum, gloves and eye protection. Gloves and eye protection will remain in the transport vehicle at all times.
 - e) MUSC employee(s) shall remain with the vehicle at all times, if possible. In the event that it is necessary to leave the vehicle to make a phone call, etc., the vehicle will not remain unattended for more than one hour unless it is located in a secured area not generally accessible to the public.
 - f) Disinfect the transportation vehicle using 10:1 water to bleach ratio.

- B. Contingency Plans for Alternate Treatment, Storage and/or Disposal Sites: MUSC's Occupational Safety and Health Program manages the contract for off-site treatment of infectious waste. On-site sterilization, using a mobile sterilization unit, is being performed by Occupational Safety and Health employees.
- C. Handling and Storage of Waste: MUSC operates 24 hours a day, seven days a week. Since our contractor presently picks up MUSC's infectious waste Tuesdays through Saturdays, waste generated at MUSC is transported to one of three loading docks by Environmental Service or Housekeeping personnel daily and immediately loaded onto a trailer for off-site incineration or autoclaving. No infectious waste will remain on-site for over 14 days in an unrefrigerated state or for over 30 days in a refrigerated state. When loading the infectious waste onto trailers or otherwise handling the waste, all OSHP personnel will don appropriate PPE. At a minimum, this will include safety glasses and appropriate gloves.
- D. Radiological Monitoring: All infectious waste is screened before it is transported off site to ensure that it does not contain any radioactive isotopes. All infectious waste trailers are screened by personnel from MUSC's Radiation Safety department prior to leaving MUSC. In addition, stationary monitoring devices are also utilized at the Sabin Street Infectious Waste Loading Dock to further ensure that "hot" carts are quickly identified and do not leave the University until they are "cold".
- E. Personnel Health and Safety Training: All OSHP workers have taken or are scheduled to take a 40-hour HAZWOPER Training course. An 8-hour annual refresher course is also mandatory for OSHP personnel having completed the course. In addition, staff safety meetings are conducted with all OSHP personnel on a weekly basis to ensure that everyone is aware of any recent developments within any and all internal OSHP departments and at MUSC.

MUSC is operated under a RCRA Part B Permit, and has developed an Environmental Protection Agency (EPA) and DHEC-approved Hazardous Chemicals Waste Plan. As part of this plan, OSHP personnel provide training to all hazardous waste generators on campus annually. This training provides instruction on proper hazardous and infectious waste identification, treatment, storage, and disposal practices, and informs generators of the consequences regarding improper handling of these type wastes.