On-site Handling of Health Care Waste - Guidance
Document Number: 502

Note: This guidance document is provided as a template and must be customized to accommodate facility specific procedures and terminology.

1. Purpose

This document is intended to provide laboratories and health care facilities with information about how to appropriately classify, segregate, collect and store their infectious waste.

2. Scope

As part of their routine services, laboratories and health facilities generate infectious waste. This waste requires appropriate management, handling, storage and disposal to make sure that it does not harm the environment or cause human or animal disease. This document includes procedures for segregation and collection, staging, on-site transporting and storage of waste.

3. Definitions

Infectious waste – any waste suspected to contain pathogenic organisms, i.e., bacteria, viruses, parasites or fungi in sufficient concentration to cause disease in susceptible hosts. Infectious waste includes waste contaminated with blood and other body fluids, laboratory cultures and microbiological stocks, waste from isolation wards, tissues (swabs), materials, or equipment that have been in contact with infected patients, excreta. This category can overlap with the categories of sharps, pathological and anatomical waste, all of which can be infectious.

Types of waste designated as infectious include, but are not necessarily limited to, the following:

- Human blood and blood products
  - All human blood, serum, plasma and blood products
  - Blood contaminated tubes, microscope slides and coverslips
  - Blood soaked bandages
- Pathological waste
  - Body tissues, organs and body parts
  - Body fluids removed during surgery, autopsy and biopsy or collected as part of patient treatment and care
- Contaminated wastes from patient care e.g., suction canisters, tubing and hemodialysis waste
- Cultures and stocks of etiologic agents and associated biological wastes
  - Culture and stock from clinical, research and industrials laboratories
  - Disposable culture plates and devices for inoculation, transferring, mixing (swabs, tips, pipette etc.)
  - Discarded live and attenuated vaccine

- Contaminated sharps
    - Hypodermic needles, lancets, syringes and scalpel blades
- Other contaminated items
    - Disposable pipettes, tips, capillary tubes, microscope slides, cover slides
    - Specimens and containers (cups, bottles, tubes and flasks)
    - Diagnostic-kit components
- PPE grossly contaminated with blood, body secretions, or cultures (gloves, masks, gowns or coats)
- Contaminated animal wastes including carcasses, body parts, body fluids, blood, or bedding from:
    - Animals known to be contaminated with infectious zoonotic organisms
    - Animals inoculated during research

Laboratory – any research, analytical, or clinical facility that performs health-care-related analysis or service. This includes medical, pathological, pharmaceutical, research, commercial and industrial laboratories.

Pathological waste – tissues, organs, body parts, human fetuses and animal carcasses, blood and body fluids. Anatomical waste, i.e., recognizable human or animal parts, also comes under this category. Even though this category may include healthy body parts, it should be considered a sub-category of infectious waste.

Sharps – items that could cause cuts or puncture wounds, including needles, scalpels and other blades, knives, infusion sets, saws, broken glass and nails. Irrespective of the associated infection risk potential, such items are usually considered to be highly hazardous health care waste.

Waste segregation – the process of sorting the waste into the relevant waste categories so that it can be appropriately disposed of. Segregation of infectious waste at the point of generation is critical for effective and efficient waste management. It not only helps to control the risk of transmission and reduce waste management costs, but also ensures that the correct pathways are adopted for storage, transport and ultimate disposal.

Waste storage – to hold the waste for a period of time after collection and before final disposal.

4. Responsibilities

4.1. **All staff.** It is the responsibility of all staff members of an institution managing or generating infectious waste to take all necessary steps to handle infectious waste so as to minimize any adverse effect on human health or the environment.

4.2. **Facility/laboratory director**. It is the responsibility of the laboratory director to ensure that appropriate and adequate waste management practices are in place and that all staff are trained in them and adhere to the procedures and policies.

4.3. The **waste management coordinator** must:

4.3.1. Obtain and be familiar with national and local waste management policies and regulations.

4.3.2. Designate appropriate and secure storage for infectious waste.

4.3.3. Ensure the availability of appropriate PPE for the safe handling of hazardous and general waste

4.3.4. Ensure that staff:

- Have access to and use appropriate PPE for the safe handling of hazardous and infectious waste
- Receive necessary training at induction and periodic intervals
- Are properly trained, vaccinated (including hepatitis A/B, polio and tetanus) and have access to post exposure prophylaxis

4.4. It is the responsibility of all staff that work in the facility, including maintenance, cleaning, and facility operations staff and waste handlers to:

4.4.1. Adhere to the procedures for collection, segregation and bagging of infectious waste

4.4.2. Ensure that waste is securely stored until collected for disposal

4.4.3. Promptly report any breaches in procedures to their supervisor

5. Materials and Equipment

- Plastic bags. Must be sturdy enough to resist punctures and remain intact to the point of disposal. The recommended thickness for a laboratory plastic waste bag is minimum gauge 55 micron for low-density polyethylene (LDPE) or 25 micron for high-density polyethylene (HDPE). See Table 1 for recommended color coding.

Table 1: Recommended color-coding for health care waste

Type of waste	Color of container and markings	Type of container
Highly infectious waste	Yellow, marked "HIGHLY INFECTIOUS"	Strong, leak-proof plastic bag, or container capable of being autoclaved
Other infectious waste, pathological and anatomical waste	Yellow	Leak-proof plastic bag or container
Sharps	Yellow, marked "SHARPS"	Puncture-proof container
Chemical and pharmaceutical waste	Brown	Plastic bag or container
General health care waste	Black	Plastic bag
Waste which may be "treated" e.g., soiled dressings	Orange	Orange bag
Hygiene waste	Yellow bag with black stripe (Tiger)	Plastic bag or container

Source: Adapted from: Prüss A, Giroult E, Rushbrook P, editors. Safe management of wastes from health care activities. Geneva: World Health Organization; 1999. http://www.who.int/water_sanitation_health/medicalwaste/wastemanag/en/

- Sharps containers (see Figure 1). Must be closable, puncture resistant, and leak-proof. Must be appropriately labeled and color-coded. If national rules exist, these should be followed.

Figure 1. Sharps containers

- Biohazard bins that are rigid, puncture resistant, leak resistant, and tamper proof.
- Bleach solution containing 2% active chlorine or its equivalent. Must be provided and prepared just prior to use for disinfection.
- Spill kits: adsorbents, disinfectants, dustpan, shovel.
- Personal protective equipment (PPE):
    - Gloves: Waste handlers should use heavy-duty, bright colored rubber gloves for handling biological waste. The gloves should be washed twice after handling the waste, and should be washed after every use with soap (carbolic) and a disinfectant. The size should fit the operator's hands. Note that waste handlers should not handle the waste directly, but only the containers it is in. If solid waste is spilled, it should be picked up with tongs (see related document on spill management).
    - Aprons, gowns, or suits: Aprons/gowns/suits are worn to prevent contamination of inner clothes and to protect the skin. These can be made of cloth or impermeable material like plastic.
    - Masks, eye wear and face shields: It is preferable for all staff who handle medical waste to wear masks for protection. A variety of masks, eyewear and face shields provide a protective barrier.
    - Boots and shoes to protect against splashes and dropped items. The boots should have non-slip soles and should cover the leg to the ankle. Metal toe protectors on the boots add further protection against drop injuries.
    - Refer to Doc 303: Health Care Waste Management Worker PPE – Guidance for more detail.
- Impermeable, non-leaking covered trolleys/carts. The trolleys/carts should:
    - Only be used for infectious waste
    - Have separate bins for sharps waste and nonsharps infectious waste

- Be labeled with the warning label bearing the international biohazard symbol with the words “infectious waste”
- Have no sharp edges that could damage waste bags or containers
- Consist of a solid, one-piece body with a nominal volume not exceeding 1,655 L (437 gallons)
- Be constructed of metal, rigid plastic, or fiberglass
- Be leak-proof and fitted with a lid
- Have a push handle on each side
- Preferably have a rim for each shelf that prevents containers sliding off the trolley
- Have wheels with ground clearance
- Be on four strong antistatic castors with brakes

6. Hazards and Safety Concerns

6.1. Any waste that has potentially come in contact with a patient or bodily fluids should be assumed to be infectious and handled with proper PPE and procedures.

6.2. Health care wastes in some circumstances are incinerated and dioxins and other toxic air pollutants may be produced as emissions.

6.3. Sharps, including needles, scalpels and other blades, knives, infusion sets, saws, broken glass and nails can cause cuts or puncture wounds and transmit infection. Due to their high potential for injuries and contamination, needles are one of the most dangerous items that are handled in any health care facility.

6.4. Disinfectants are toxic, and undue exposure may result in respiratory distress, skin rashes or conjunctivitis. However, used normally and according to the manufacturers’ instructions and national chemical safety regulations, they are safe and effective.

6.5. Ash from incinerators contains dioxins and heavy metals. Concentrations will vary with the waste incinerated and the conditions of incineration.

6.6. All staff operating and working around autoclaves should be made aware of hazards such as hot surfaces, and the dangers of autoclaving of certain toxic, corrosive, radioactive or volatile substances.

7. Procedures

7.1. Segregation and containerization

7.1.1. Infectious waste

- Infection waste must be segregated from other waste at the point of origin in the generating facility.
- Avoid contaminating the external surface of the container.
- Once any waste has been discarded, it should not be taken from its container, segregated, or handled in any way. For example, under no circumstances should a discarded sharp (used or unused) be removed from a sharps container.

- Infectious waste must be contained in plastic bags inside rigid containers (see below for more details on plastic bags and rigid containers).
- The container for infectious waste should be made of good quality plastic or other strong material. Examples include:
    - Plastic bags for solid and semi-solid wastes inside rigid containers. The bags should be sturdy enough to resist punctures and should remain intact to the point of disposal (see specifications in the Materials section, above).
    - If a rigid container is to hold any containers with free liquids, enough absorbent material must be placed inside the liner of the rigid container sufficient to absorb 15% of the total volume of the free liquids inside the rigid container.
    - Reusable containers
        - Reusable pails, drums, dumpsters, or bins used for containment of infectious waste must not be used for the containment of waste to be disposed of as noninfectious, or for other purposes.
        - Reusable containers for infectious waste must be thoroughly washed and decontaminated each time they are emptied, unless the surfaces of the containers have been completely protected from contamination by disposable liners, bags or other devices removed with the waste.
    - Rigid, puncture-resistant containers for sharps.
- Waste containers must be kept closed at all times with lids securely in place, unless waste is actively being added to or removed from the container.
- The container for infectious waste should be colored and labeled with the international biohazard symbol. Check with your local and national regulations regarding the specific color scheme and labels that should be used in your facility. The WHO color codes (see above) are recommended if there are no national standards.


The international symbol for biological hazard.

- Infectious laboratory waste
    - If the facility laboratory has an autoclave, the infectious lab waste, especially stocks and cultures, should be autoclaved before leaving the laboratory. Note: Contaminated waste should not be autoclaved in an autoclave that is used for the production of “clean” materials e.g., culture media and sterile glassware. Laboratories should have separate clean and dirty autoclaves.

7.1.2. Sharps must be contained for storage, transportation, and disposal in leak-proof, rigid, puncture-resistant containers manufactured for the purpose of sharps containment. These containers must be taped closed or tightly lidded to preclude loss of contents.

7.1.3. Infectious waste with multiple hazards. (e.g., toxic, radioactive, or other hazardous chemicals) must be segregated from the general infectious waste stream when additional or alternative treatment is required or in cases where the wastes are regulated under state or federal authority.

7.1.4. Specimens of blood and body fluid wastes must be segregated and placed in appropriately colored bags inside leak-proof containers labeled with a biohazard label.

7.1.5. Solid or semi-solid wastes such as pathological wastes, animal carcasses, and laboratory wastes, may be placed in plastic-bag-lined containers sturdy enough to resist puncture under conditions of use and to the point of disposal.

7.1.6. Pharmaceutical, heavy metal and radioactive wastes

- Small amounts of pharmaceutical waste (discarded items used in the handling of pharmaceuticals i.e., bottles/vials with residues, gloves, masks, ampoules, and IV bags) can be collected and disposed together with infectious/sharps waste. Large amounts of obsolete or expired pharmaceutical waste should be returned to the supplier or manufacturer (refer to national laws and regulations or Guidelines for Safe Disposal of Unwanted Pharmaceuticals [see References section]).
- Waste with a high concentration (above threshold concentrations in accordance with local/national laws and regulations) of heavy metals (e.g., mercury) should be dealt with by a specialist contractor or safely stored until it is possible. The most frequently encountered heavy metal in health care facilities is mercury. UNDP GEF has produced detailed guidance on cleanup, storage and transportation of mercury; see References section for more details.

7.1.7. Radioactive waste should be managed in accordance with national legislation. Radioactive waste must be stored in an area approved for this purpose. The storeroom must be reserved exclusively for this type of waste and must be lockable.

- Sealed radiation sources should be returned to the supplier wherever possible.
- Much health-care-generated radioactive waste has a short half-life and can be allowed to decay naturally. While this is occurring, waste must be contained in radiation-proof repositories (leak-proof, lead-lined and clearly labeled with name of radionuclide and date of deposition). Wastes can also be sealed in concrete vaults to decay. These must also be labeled with the radionuclide and the date of deposition.

7.1.8. Noninfectious waste

- All noninfectious wastes, such as general hospital refuse, should be segregated at the source to separate out recyclables. General waste for disposal is usually packaged in regular black bags. No special labeling is required on these bags.
- Uncontaminated (noninfectious) broken glass should be placed in puncture-proof containers in order to minimize the potential for causing injury to waste handling personnel. The containers should be clearly labeled “Broken Glass” and located in an area that is easily accessible to staff but not to patients or members of the public.

7.2. Collection

7.2.1. Some key points when collecting medical waste:

- Waste containers should be filled no more than three-quarters full.
- Infectious waste should be collected every day in warm climates and at least every other day in cool conditions.
- The bags or containers should be replaced immediately with the new ones of the same type. A supply of fresh collection bags or containers should be readily available at all locations where waste is produced.
- Sharps should be collected at least every three months.

- Ward staff are responsible for keeping bins in their areas clean.
- Use secondary containers for the transportation of liquid waste.

7.2.2. Avoid accumulation of waste at the point of generation by adhering to an established waste collection routine.

7.2.3. In some cases, there might be intermediate, temporary storage of waste before it is collected and moved.

- Waste should be collected daily from intermediate storage (or as frequently as required) and transported to the designated central storage site.
- The intermediate storage room should be placed close to the main entrance to the wards to minimize the movement of sealed/closed waste containers inside the wards.
- Intermediate storage areas should meet the same parameters as the main storage area (see below).
- Bags of waste should be kept in rigid containers (e.g., dustbins) to prevent leakage.
- Intermediate storage areas must be cleaned at least daily.

7.3. Storage

7.3.1. If infectious waste is not treated the same day as generated, minimize its storage time before it is treated. Unless a refrigerated storage room is available, storage times for health care waste (i.e., the delay between production and treatment) should not exceed the following:

Temperate climate (average temperature of 10°C and not exceeding 15°C):

- 72 hours in winter
- 48 hours in summer

Warm climate (average temperature of 22°C and not exceeding 28°C):

- 48 hours during the cool season
- 24 hours during the hot season

7.3.2. If refrigerated storage is available, infectious waste can be stored for up to 1 week from generation to disposal.

7.3.3. Storage temperature and duration of storage should be monitored.

7.3.4. Designated areas for storage of infectious waste must be segregated from other wastes. Segregation that has occurred during collection should be maintained during storage.

7.3.5. Storage areas, enclosures, or containers used for the containment of infectious waste should be secured in order to deny access by unauthorized persons and marked with prominent warning signs on, or adjacent to, the exterior of entry doors, gates or lids. Wording of warning signs shall state: “CAUTION – INFECTIOUS (BIOHAZARDOUS) WASTE STORAGE AREA,” and should be accompanied by the international biohazard symbol. Warning signs shall be readily legible from a distance and written in local language.

7.3.6. Floors of storage areas shall be of impervious material to prevent saturation of liquid and semi-liquid substances, and a perimeter curb (drainage channel) is recommended to contain spills.

7.3.7. Storage areas shall be well lit and ventilated and must not be overcrowded.

7.3.8. Storage areas should be situated on the ground floor, near the rear entrance and away from patient areas and staff break areas wherever possible. Minimize movement of sealed/closed wasted containers inside the ward.

7.3.9. There should be a water supply for cleaning purposes.

7.3.10. Storage areas should be located away from functional areas, drinking water tanks, chimneys, diesel generator sets, oil storage, gas storage chambers and other potential sources of fire.

7.3.11. All bio-hazardous waste storage areas should be locked to prevent unauthorized access, and access should be limited to authorized employees only.

7.3.12. The storage area should be big enough to store the required number of waste bags for three days of waste.

7.3.13. All drums, containers and tanks that contain liquid waste should be clearly labeled to identify their contents, and lids or caps are secured.

7.3.14. Storm water drains should not be located in areas where liquid waste is stored or handled.

7.3.15. Stored waste should be protected from the sun.

7.3.16. There should be a special drain to discharge the washing products, which should go to the sewer.

7.3.17. The area should include a supply of cleaning equipment, protective clothing, and waste bags or containers.

7.3.18. Measures should be taken to exclude pests and disease vectors e.g., feral animals, rats and flies.

7.4. On-site transportation

7.4.1. Refer to the facility waste management plan, if available, for details on the waste collection routine. (Refer to Doc 102: Facility Health Care Waste Management Plan – Guidance for example plan).

7.4.2. Handling and transportation of waste containers should be done in such a way that exposure to staff and others is prevented.

7.4.3. Transportation routes through the facility should be planned to minimize the movement of loaded waste carriers through patient care and other clean areas.

7.4.4. Use carts with raised sides if possible when transporting waste (refer to the Materials and Equipment section).

8. Reporting and Recordkeeping

8.1. Doc 504: Waste Receipt Log. If the waste is to be treated on site, this should be filled in every day by the waste treatment center staff. If the waste is to be sent off site for treatment, the waste log should be completed by the waste collection staff or whoever is responsible for managing the relationship with the contractors who will take the waste away.

8.2. Refer to other SOPs and guidance documents for details on reporting and recordkeeping.

9. References

9.1. World Health Organization [Internet]. Injection safety, fact sheet n° 231, 2006, [cited 2013 March 29]. Available from: http://www.who.int/mediacentre/factsheets/fs231/en/

9.2. Secretariat of the Basel Convention (SBC) and the United Nations Environmental Program. Technical guidelines on environmentally sound management of biomedical and health-care wastes. Châtelaine, Switzerland: SBC; 2003. 79 p. http://www.basel.int/Portals/4/Basel%20Convention/docs/pub/techguid/tech-biomedical.pdf

9.3. Prüss A, Giroult E, Rushbrook P, editors. Safe management of wastes from health care activities. Geneva: World Health Organization; 1999. http://www.who.int/water_sanitation_health/medicalwaste/wastemanag/en/

9.4. UNDP GEF. Guidance on Cleanup Storage and Transport of Mercury from Health Care. UNDP GEF Global Health care Waste Project; 2010: 41pp. http://gefmedwaste.org/downloads/Guidance%20on%20Cleanup%20Storage%20and%20Transport%20of%20Mercury%20from%20Health%20Care%20July%202010.pdf

9.5. World Health Organization. Guidelines for safe disposal of unwanted pharmaceuticals in and after emergencies. Geneva: World Health Organization; 1999. 31 pp. http://www.who.int/water_sanitation_health/medicalwaste/unwantpharm.pdf

10. Related Documents

Doc 102: Facility Health Care Waste Management Plan – Guidance

Doc 303: Health Care Waste Management Worker PPE – Guidance

Doc 502: On-site Handling of Health Care Waste – Guidance

Doc 503: On-Site Handling and Transport of Infectious Waste for Housekeeping Staff – SOP

Doc 504: Waste Receipt Log

11. Attachments

None