UNIVERSITÀ
DEGLI STUDI
DI PADOVA

OPERATING PROCEDURE NO. 14

METHODS OF HEALTHCARE WASTE MANAGEMENT

August 2025

Curated by:

Environment and Safety Office

METHODS OF HEALTHCARE WASTE MANAGEMENTS

Purpose and scope of application

Medical waste is regulated by the Presidential Decree of July 15, 2003, No. 254, titled "Regulation on the management of medical waste in accordance with Article 24 of Law No. 79 of July 31, 2002", expressly referenced by Article 227, paragraph 1, letter b) of Legislative Decree 152/06.

Excluded from D.P.R. 254/2003 are the genetically modified microorganisms, as per Legislative Decree No. 206 of April 12, 2001 and animal by-products not intended for human consumption, regulated by Regulation (EC) No. 1774/2002.

Conversely, the following types of waste are included in D.P.R. 254/2003:

a) Non-hazardous healthcare waste;
b) Healthcare waste assimilated to urban waste;
c) Hazardous healthcare waste not posing an infectious risk;
d) Hazardous healthcare waste posing an infectious risk;
e) Healthcare waste requiring special disposal methods;
f) Waste from exhumations and disinterment, as well as waste from other cemetery activities, excluding plant waste from cemetery areas;
g) Special waste generated outside healthcare facilities that poses a risk comparable to hazardous infectious waste, excluding sanitary pads.

The purpose of this operational instruction is to outline the guidelines for the proper management of medical waste generated by facilities affiliated with the University of Padua, covering the entire process from waste collection at the production site to its delivery to the temporary storage facility. For general aspects, reference is made to the Technical Regulation for Waste Management from activities of the University of Padua.

Reference

- Technical Regulation for Waste Management from Activities of the University of Padua;
- Legislative Decree No. 152 of April 3, 2006 – "Environmental regulations" and subsequent amendments;
- D.P.R. No. 254 of July 15, 2003 – "Regulation on the management of medical waste in accordance with Article 24 of Law No. 179 of July 31, 2002";
- Legislative Decree No. 81 of April 9, 2008 – "Implementation of Article 1 of Law No. 123 of August 3, 2007, on health and safety in the workplace" and subsequent amendments;
- International Regulations on the Transport of Dangerous Goods (ADR) and subsequent amendments;
- Regulation 1272/2008 (CLP);

- Regulation (EU) No. 453/2010 of the Commission, dated May 20, 2010, amending Regulation (EC) No. 1907/2006 (REACH) on the registration, evaluation, authorization, and restriction of chemicals;
- Legislative Decree No. 502 of December 30, 1992 – "Reorganization of healthcare regulations in accordance with Article 1 of Law No. 421 of October 23, 1992";
- Decree No. 116 of September 3, 2020 – "Implementation of EU Directive 2018/851, amending Directive 2008/98/EC on waste, and implementation of EU Directive 2018/852, amending Directive 1994/62/EC on packaging and packaging waste"

General terms and definitions

- **Waste**: Any substance or object that the holder discards, intends to discard, or is required to discard;
- **Special waste**: Defined in Article 184, paragraph 3 of Legislative Decree 152/06, including:
    - Waste from agricultural and agro-industrial activities;
    - Waste from demolition and construction activities, as well as excavation waste, in compliance with Article 184-bis;
    - Waste from industrial processes;
    - Waste from craft activities;
    - Waste from commercial activities;
    - Waste from service activities;
    - Waste from recovery and disposal activities, sludge produced from water purification, wastewater treatment, and flue gas cleaning;
    - Waste from healthcare activities.
- **Hazardous waste**: Special waste classified as hazardous due to the concentration of hazardous substances and/or its intrinsic hazardous properties, as specified in the annexes of Part IV of Legislative Decree 152/2006 and subsequent amendments. Such waste is explicitly identified with an asterisk in the European Waste Code (EWC);
- **Waste producer**: The entity whose activity generates waste (initial producer) or any entity that carries out pre-treatment, mixing, or other operations altering the nature or composition of the waste;
- **Holder**: The waste producer or any natural or legal person in possession of the waste;
- **Recovery**: Any operation whose main outcome is to enable waste to play a useful role;
- **Disposal**: Any operation other than recovery, even when the process results in the secondary recovery of substances or energy;
- **Temporary storage before collection**: The grouping of waste for transportation to a recovery and/or disposal facility, carried out prior to collection under Article 185-bis. In the context of the University of Padua, the Temporary Storage Facility is identified as a Local Unit.
- **European Waste Catalogue (EWC)**: A periodically updated classification list of waste types, including **urban, special hazardous, and special non-hazardous waste**. Each waste type is

assigned a **six-digit code (EWC code)**: the **first two digits** identify the industrial sector or type of activity generating the waste; the **next two digits** specify individual processes within the sector; the **last two digits** classify the specific type of waste generated;

- **ADR**: The European Agreement concerning the International Carriage of Dangerous Goods by Road, adopted in Geneva on September 30, 1957, and ratified in Italy in 1962. It became mandatory in the European Union on November 21, 1994, through Directive 94/55/EC. The ADR is updated every two years, with the latest revision coming into force on January 1, 2025.

Terms and definition in healthcare waste managements

- **Healthcare waste**: Waste listed in Annexes I and II of D.P.R. 254/2003, originating from public and private facilities defined under Legislative Decree No. 502 of December 30, 1992, and subsequent amendments. These facilities conduct medical and veterinary activities related to prevention, diagnosis, treatment, rehabilitation, and research, as well as provide services under Law No. 833 of December 23, 1978.
- **Non-hazardous healthcare waste**: Healthcare waste that does not fall under the classification of hazardous waste as per Legislative Decree 152/06.
- **Hazardous healthcare waste without infectious risk**: Healthcare waste listed in Annex II of D.P.R. 254/2003, characterized as hazardous under Legislative Decree 152/06.
- **Hazardous healthcare waste with infectious risk**: Includes the following waste types classified under *EWC codes 18.01.03 and 18.02.02**:
    1. Waste from infectious isolation units, where there is a risk of airborne biological transmission, including areas housing patients in isolation due to Group 4 biological agents, as defined in Annex XI of Legislative Decree No. 626 of September 19, 1994, and subsequent amendments;
    2. Waste listed in Annex I of D.P.R. 254/2003, exhibiting at least one of the following characteristics:
       2.1 Originating from isolation units and having come into contact with any biological fluid secreted or excreted by isolated patients.
       2.2 Contaminated by:
           2.2.1 Blood or other biological fluids containing visible blood;
           2.2.2 Feces or urine, if the attending physician identifies a clinically transmissible disease through these excretions;
           2.2.3 Semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, or amniotic fluid;
    3. Waste from veterinary activities, which:
       3.1 Is contaminated by pathogens harmful to humans or animals;
       3.2 Has been in contact with biological fluids that pose a risk of transmission, as identified by the veterinary physician.
- **Healthcare waste requiring special management**: Includes the following categories:
  1.1 Expired or unusable pharmaceuticals;
  1.2 Cytotoxic and cytostatic drugs, for human or veterinary use, as well as visibly contaminated materials generated from handling and using such substances;

2. Unidentifiable anatomical parts and organs, as specified in point 3 of Annex I of D.P.R. 254/2003;
3. Small laboratory animals used in experiments, as defined in point 3 of Annex I of D.P.R. 254/2003;
4. Narcotics and other psychotropic substances.

- **Special waste produced outside healthcare facilities that poses an equivalent infectious risk**: Special waste with risk characteristics similar to those defined for infectious healthcare waste in D.P.R. 254/2003, including waste from microbiological laboratories analyzing food, water, or cosmetics, blood product industries, aesthetic clinics, and similar establishments. Sanitary pads are excluded;
- **Disinfection**: A drastic reduction in microbial load achieved using disinfectant substances;
- **Sterilization**: Complete elimination of microbial load, ensuring a Sterility Assurance Level (SAL) of at least 10^{-6}, in compliance with UNI 10384/94 standards.

For additional definitions, refer to D.P.R. No. 254 of July 15, 2003.

Responsibility

Key roles in waste management at the University of Padua are:

- **Legal Representative:** The Rector, who is responsible for managing special waste produced at the University;
- **Local Unit Manager**: Identified as the producer/holder of the waste, responsible for the Local Unit (temporary storage before collection);
- **Operations Delegate**: Ensures the proper execution of procedures related to the Local Unit's management (staff responsible for temporary storage before collection);
- **Structure Manager**: This includes the Department Director, Director of the Experimental Agricultural Enterprise, Directors of Centers and Hubs, the Prefect of the Botanical Garden, and the General Director (for matters concerning the Central Administration);
- **Environment and Safety Office,** responsible for:
  - Administrative and accounting management of waste disposal;
  - Coordination of disposal activities;
  - Regulatory updates;
  - Technical support for related procedures;
  - Technical support for remediation operations (excluding asbestos-related operations).
- **Laboratory Manager**: A faculty member or technical staff responsible for laboratory activities. Responsible for waste disposal. **The name of the Laboratory Manager must be communicated by the Structure Manager to the Local Unit Manager and the Environment and Safety Service.**

Classification of Healthcare Waste

Healthcare waste is classified based on two criteria:

- **Origin**: All municipal and special hazardous and non-hazardous waste generated in medical and veterinary facilities as defined by D.P.R. 254/2003 is considered healthcare waste;

- **Infectious risk:** Waste that does not originate from healthcare facilities (as defined by Legislative Decree No. 502 of December 30, 1992) but presents an infectious risk according to D.P.R. 254/2003 is also considered healthcare waste.

The University's facilities generate both hazardous and non-hazardous healthcare waste.

According to D.P.R. 254/2003, the following are classified as **hazardous infectious healthcare waste**:

1. Waste from infectious isolation areas;
2. Waste visibly contaminated with feces or urine from patients with a clinically identified transmissible disease;
3. Waste contaminated with vaginal secretions, seminal fluid, cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, amniotic fluid;
4. Waste contaminated with pathogens harmful to humans or animals;
5. Waste in contact with biological fluids identified by a veterinary physician as carrying a risk of disease transmission.

These waste types are classified with the codes CER 18.01.03* (human origin) CER 18.02.02* (animal origin).

There are also healthcare wastes that do not pose infectious risks and fall into the category of **non-hazardous healthcare waste.** An example of this type is animal bedding, in cases where no risk of transmissible disease has been identified. These wastes are classified under **CER code 18.02.03**.

Below is a non-exhaustive list of the main types of healthcare waste produced in university facilities:

- Single-use personal protective equipment (PPE) (gloves, protective clothing, masks, aprons, shoe covers, gowns);
- Single-use materials (vials, pipettes, test tubes);
- Animal bedding for experimentation;
- Empty containers;
- Petri dishes, culture media, and other microbiology materials contaminated by pathogens;
- Sharps materials such as needles, syringes, blades, glass, lancets, fingerstick devices, venflons, swabs, razors, and single-use scalpels;
- Non-recognizable tissues, organs, and anatomical parts;
- Sections and/or carcasses of experimental animals.

CLASSIFICATION OF HEALTHCARE WASTE PRODUCED BY THE UNIVERSITY OF PADUA	**CER code**
WASTE PRODUCED BY THE HEALTHCARE AND VETERINARY SECTOR OR RELATED RESEARCH ACTIVITIES (except kitchen and catering waste not directly deriving from therapeutic treatment)	**18.**
waste from maternity wards and waste related to the diagnosis, treatment and prevention of diseases in humans	**18.01**
waste that must be collected and disposed of by applying special precautions to avoid infections	18.01.03*
**chemicals consisting of or containing dangerous substances	18.01.06*

cytotoxic and cytostatic medicines	18.01.08*
waste related to research and diagnosis, treatment and prevention of diseases in animals	**18.02**
waste that must be collected and disposed of by applying special precautions to avoid infections	18.02.02*
waste that must not be collected and disposed of by applying special precautions to avoid infections	18.02.03
cytotoxic and cytostatic medicines	18.02.07*

***Only for certain Local Units agreed upon with the Environment and Safety Office*

Operating procedures for healthcare waste

Healthcare waste must be collected, packaged, and transported to the temporary storage facility according to the following instructions. It is the responsibility of the **Laboratory Manager** (see University Regulations) to ensure **the correct classification and proper disposal** of waste according to the procedures outlined below. **Workers must** adhere to the instructions regarding the proper collection of waste, as communicated to them through adequate information and training.

Collection and packaging

The collection of healthcare waste must take place within the facility, in immediate proximity to the production site. During this phase, it is standard practice to **disinfect healthcare waste with infectious risk** using disinfectants (e.g., a 5% sodium hypochlorite solution) or to treat it in an autoclave following the specific procedures for managing biological risk in the laboratory. If there is a potential for contamination of the external packaging, disinfection must also be applied externally. The purpose of disinfection is to reduce the risk during the collection and transport stages of the waste. However, it does not guarantee complete elimination of the infectious load, which would require a sterilization process. Therefore, the utmost caution is recommended during all subsequent phases.

Waste should then be collected in **UN-approved containers** provided by the storage facility contacts.

The types of packaging are as follows:

Corrugated polypropylene containers of 60 liters, with a pre-inserted internal plastic bag. *Suitable for disposable materials and PPE.*	 **Maximum weight: 7 kg.**

Black rigid PVC plastic containers, with a separate plastic bag provided. *Suitable for waste from sections and/or carcasses of small laboratory animals, and liquid healthcare waste.*	 **Maximum weight: 15 kg.**
The containers must bear the label "Hazardous Infectious Healthcare Waste," the biological hazard symbol, the "R" label on a yellow background, the ADR pictogram 6.2, and the UN code 3291. 	

The following types of containers are also provided, which, once filled, **should be placed inside the black rigid PVC plastic containers, ensuring not to exceed the maximum weight:**

5-10 liter PEHD containers for the collection of liquid sanitary waste (culture media, animal serum, etc.).	 **Maximum weight: 5-10 kg.**
Yellow/red polypropylene containers (for sharp and cutting items) "Halibox" of 1, 2.5/3, and 3.5/4 liters, bearing the label: "Infectious hazardous sanitary waste, sharp and cutting items".	 **Fill up to 3/4 of the volume.**

For **non-hazardous waste classified under code 18.02.03 (generally bedding)**, it is allowed to be packaged using high-strength polyethylene bags marked with the label "NON-HAZARDOUS SPECIAL WASTE - CER 18.02.03" and provided by the staff at the Temporary Storage area. Sections and/or carcasses of experimental animals should always be managed as infectious risk waste (Article 14 of D.P.R. 254/2003) and stored in a refrigerator or freezer until they are sent for final disposal. All containers must be filled respecting the weight/volume limits mentioned above, avoiding compressing or manipulating the waste; transferring waste from one bag to another is prohibited. Once the filling volume is reached, the inner bag must be closed with a tie, clip, or adhesive tape. Subsequently, the outer packaging should be sealed following the molding lines or applying the appropriate snap-on safety lid.

On the container, in addition to the risk symbols, the university's waste **identification label** must also be applied and filled out with the following main information:

- Description of the waste;
- Name of the structure that produced the waste;
- Weight and volume;
- Date of production.

Transfer to temporary storage before collection

The **temporary storage** of hazardous healthcare waste with infectious risk must be carried out under conditions that do not cause alterations that could pose health risks, and **the duration of storage must not exceed five days from the moment the container is closed**. In compliance with hygiene and safety requirements and under the responsibility of the producer, **this term may be extended to thirty days for quantities less than 200 liters.**

The transfer to temporary storage must only be performed by **authorized and trained personnel**, using **trolleys with sides**, and with the proper personal protective equipment (PPE).

Properly packaged healthcare waste must be transferred to temporary storage accompanied by the "Temporary Storage Hazardous Healthcare Waste Form" **(Attachment 1)**. It is mandatory for the **signature to be that of the laboratory manager** and legible; the signature at the bottom of the form constitutes an assumption of responsibility for the contents and characteristics of the waste. Waste without an accompanying form will not be accepted for deposit.

For each CER code, a separate form (Attachment 1) must be filled out; containers with the same CER code must be listed on the same form. Each form contains the following key information:

- CER code;
- Description of the waste and the nature of each type of waste in the containers;
- Name of the structure that produced the waste;
- Name and signature of the laboratory manager;
- For each package deposited: volume, weight, and packaging type (black containers or cartonplast);
- If there are containers of liquid healthcare waste, the number and volume must be indicated on the form;
- If the healthcare waste contains disinfectants or other chemicals, these must be declared.

The weight is recorded after weighing at the time of delivery to temporary storage, with the assistance of the deposit staff. During this phase, the weight is noted both on the transfer form and on the waste label.

Personal Protective Equipment (PPE)

All operations involving the handling/movement of laboratory material and waste must be carried out while wearing appropriate PPE. These must be selected based on the type of risk and according to the guidelines provided in the risk assessment.
Below is an indicative, non-exhaustive list of the main PPE:

- Disposable gloves made from hypoallergenic material, compatible with the substances being handled;
- Safety goggles with side shields to protect against splashes;
- Face shields or protective masks;
- Laboratory coats or overalls.

In case of accidental spills, kits or materials for absorbing biological substances must be available. Personnel must be trained, informed, and instructed on how to respond in case of an emergency.

Index

Attachment 1! - Sheet for the Transfer of Healthcare Waste to the Temporary Storage Area

Ufficio Ambiente e Sicurezza - Università di Padova

1. DIP./IST./CENTRO _____ **Tel. Interno** _____

SCHEDA DEPOSITO TEMPORANEO RIFIUTI PERICOLOSI DI ORIGINE SANITARIA

2. RESPONSABILE del LABORATORIO _____

3. TIPO di RIFIUTO, CODICE C.E.R./E.E.R.

Indicare il tipo di rifiuto ; utilizare una scheda per ogni C.E.R./E.E.R.

☐	**RIFIUTI DI ORIGINE UMANA**	**18.01.03***
☐	**RIFIUTI DI ORIGINE ANIMALE**	**18.02.02***
☐	**RIFIUTI DI ORIGINE ANIMALE - CARCASSE**	**18.02.02***
☐	**RIFIUTI CITOTOSSICI E CITOSTATICI**	☐ **18.01.08***
		☐ **18.02.07***

4. CONTENITORI		**5. COMPOSIZIONE DEL RIFIUTO**	**6. PESO**
Tipologia Contenitore	*Numero*	*Indicare in stampatello tutti i componenti del rifiuto*	*(Kg.)*

In conformità con la normativa, si dichiara che i suddetti rifiuti:

1 - **NON** contengono materiali radioattivi

2 - contengono le seguenti sostanze chimiche _____

_____

3 - sono stati sottoposti a:

☐ sterilizzazione in autoclave — temperatura _____ °C — tempo _____ min

☐ disinfezione con: _____

NUMERO CONTENITORI _____ PESO TOTALE _____ Kg.

VOLUME TOTALE _____ Lt. NOTE _____

7. DATA _____/_____/_____

8. FIRMA DEL RESPONSABILE_____