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7 Handling, storage, and transportation of health-care waste

7.1 Waste segregation and packaging

The key to minimization and effective management of health-care waste is segregation (separation) and identification of the waste. Appropriate handling, treatment, and disposal of waste by type reduces costs and does much to protect public health. Segregation should always be the responsibility of the waste producer, should take place as close as possible to where the waste is generated, and should be maintained in storage areas and during transport. The same system of segregation should be in force throughout the country.

The most appropriate way of identifying the categories of health-care waste is by sorting the waste into colour-coded plastic bags or containers. The recommended colour-coding scheme is given in Table 7.1.

In addition to the colour coding of waste containers, the following practices are recommended:

- General health-care waste should join the stream of domestic refuse for disposal.
- Sharps should all be collected together, regardless of whether or not they are contaminated. Containers should be puncture-proof (usually made of metal or high-density plastic) and fitted with covers. They should be rigid and impermeable so that they safely retain not only the sharps but also any residual liquids from syringes. To discourage abuse, containers should be tamper-proof (difficult to open or break) and needles and syringes should be rendered unusable. Where plastic or metal containers are unavailable or too costly, containers made of dense cardboard are recommended (WHO, 1997); these fold for ease of transport and may be supplied with a plastic lining. See Fig. 7.1.
- Bags and containers for infectious waste should be marked with the international infectious substance symbol (see Fig. 7.2).
- Highly infectious waste should, whenever possible, be sterilized immediately by autoclaving. It therefore needs to be packaged in bags that are compatible with the proposed treatment process: red bags, suitable for autoclaving, are recommended.
- Cytotoxic waste, most of which is produced in major hospital or research facilities, should be collected in strong, leak-proof containers clearly labelled “Cytotoxic wastes”.
- Small amounts of chemical or pharmaceutical waste may be collected together with infectious waste.
- Large quantities of obsolete or expired pharmaceuticals stored in hospital wards or departments should be returned to the pharmacy for disposal. Other pharmaceutical waste generated at this level, such as spilled or contaminated drugs or packaging containing drug residues should *not* be returned because of the risk of contaminating the phar-

Table 7.1 *Recommended colour-coding for health-care waste*

Type of waste	Colour 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
Radioactive waste[a]	—	Lead box, labelled with the radioactive symbol[b]
General health-care waste	Black	Plastic bag

[a]Only generated in major hospitals; see also section 9.7.
[b]See Fig. 7.6.

Fig. 7.1. *Collapsible cardboard sharps container*

Fig. 7.2 *International infectious substance symbol*

macy; it should be deposited in the correct container at the point of production.

- Large quantities of chemical waste should be packed in chemical-resistant containers and sent to specialized treatment facilities (if available). The identity of the chemicals should be clearly marked on the containers: hazardous chemical wastes of different types should never be mixed.
- Waste with a high content of heavy metals (e.g. cadmium or mercury) should be collected separately.
- Aerosol containers may be collected with general health-care waste once they are completely empty, provided that the waste is not destined for incineration.
- Low-level radioactive infectious waste (e.g. swabs, syringes for diagnostic or therapeutic use) may be collected in yellow bags or containers for infectious waste if these are destined for incineration.

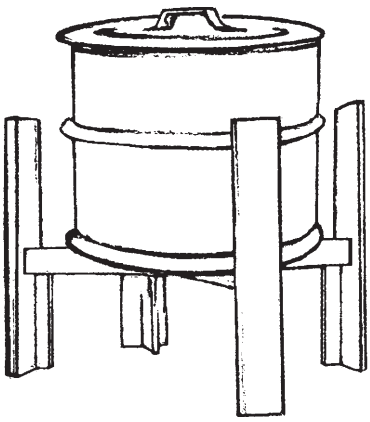
Since costs for safe treatment and disposal of hazardous health-care waste are typically more than 10 times higher than those for general waste, all general, i.e. non-hazardous, waste should be handled in the same manner as domestic refuse and collected in black bags. No health-care waste other than sharps should be deposited in sharps containers, as these containers are more expensive than the bags used for other infectious waste. Measures of this sort help to minimize the costs of health-care waste collection and treatment. When a disposable syringe is used, for example, the packaging should be placed in the general waste bin and the used syringe in the yellow sharps container. In most circumstances, the needle should *not* be removed from the syringe because of the risk of injury; if removal of the needle is required, special care must be taken.

Appropriate containers or bag holders should be placed in all locations where particular categories of waste may be generated. Instructions on waste separation and identification should be posted at each waste collection point to remind staff of the procedures. Containers should be removed when they are three-quarters full. Examples of suitable containers and bags are shown in Fig. 7.3 and Plates 7.1–7.3. Ideally, they should be made of combustible, non-halogenated plastics.

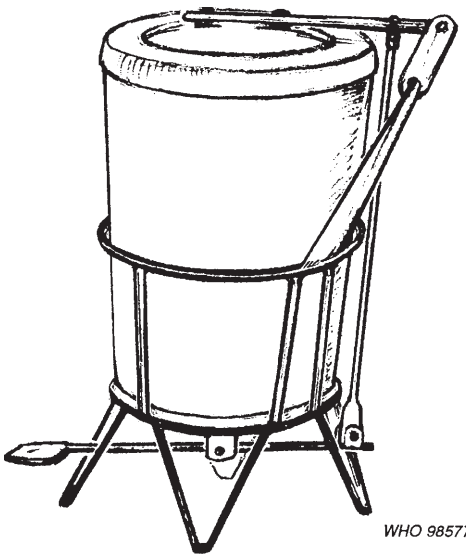
Staff should never attempt to correct errors of segregation by removing items from a bag or container after disposal or by placing one bag inside another bag of a different colour. If general and hazardous wastes are accidentally mixed, the mixture should be treated as hazardous health-care waste.

Cultural and religious constraints in certain countries make it unacceptable for anatomical waste to be collected in the usual yellow bags; such waste should be disposed of in accordance with local custom, which commonly specifies burial.

Fig. 7.3 *Waste containers recommended for small hospitals in Thailand*[a]



Cylinder-type waste container made from oil drum cut in half



WHO 98577

Cylinder-type plastic waste container with foot-operated lid

[a]Source: Ministry of Health (1995), *Handbook of hazardous healthcare waste management in 10-bed and 30-bed community hospitals*, Bangkok; used with permission.

7.2 On-site collection, transport, and storage of waste

7.2.1 Collection

Nursing and other clinical staff should ensure that waste bags are tightly closed or sealed when they are about three-quarters full. Light-gauge bags can be closed by tying the neck, but heavier-gauge bags probably require a plastic sealing tag of the self-locking type. Bags should *not* be closed by stapling. Sealed sharps containers should be placed in a labelled, yellow infectious health-care waste bag before removal from the hospital ward or department.

Wastes should not be allowed to accumulate at the point of production. A routine programme for their collection should be established as part of the health-care waste management plan.

Certain recommendations should be followed by the ancillary workers in charge of waste collection:

- Waste should be collected daily (or as frequently as required) and transported to the designated central storage site.
- No bags should be removed unless they are labelled with their point of production (hospital and ward or department) and contents.
- The bags or containers should be replaced immediately with 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.

7.2.2 Storage

A storage location for health-care waste should be designated inside the health-care establishment or research facility. The waste, in bags or containers, should be stored in a separate area, room, or building of a size appropriate to the quantities of waste produced and the frequency of collection. Recommendations for the storage area and its equipment are listed in Box 7.1.

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:	72 hours in winter 48 hours in summer
warm climate:	48 hours during the cool season 24 hours during the hot season

Cytotoxic waste should be stored separately from other health-care waste in a designated secure location.

Radioactive waste should be stored in containers that prevent dispersion, behind lead shielding. Waste that is to be stored during radioactive decay should be labelled with the type of radionuclide, the date, and details of required storage conditions. Further information is provided in section 9.7, which addresses methods of treatment and disposal of radioactive waste.

Box 7.1 Recommendations for storage facilities for health-care waste

- The storage area should have an impermeable, hard-standing floor with good drainage; it should be easy to clean and disinfect.
- There should be a water supply for cleaning purposes.
- The storage area should afford easy access for staff in charge of handling the waste.
- It should be possible to lock the store to prevent access by unauthorized persons.
- Easy access for waste-collection vehicles is essential.
- There should be protection from the sun.
- The storage area should be inaccessible for animals, insects, and birds.
- There should be good lighting and at least passive ventilation.
- The storage area should not be situated in the proximity of fresh food stores or food preparation areas.
- A supply of cleaning equipment, protective clothing, and waste bags or containers should be located conveniently close to the storage area.

7.2.3 On-site transport

Health-care waste should be transported within the hospital or other facility by means of wheeled trolleys, containers, or carts that are not used for any other purpose and meet the following specifications:

- easy to load and unload;
- no sharp edges that could damage waste bags or containers during loading and unloading;
- easy to clean.

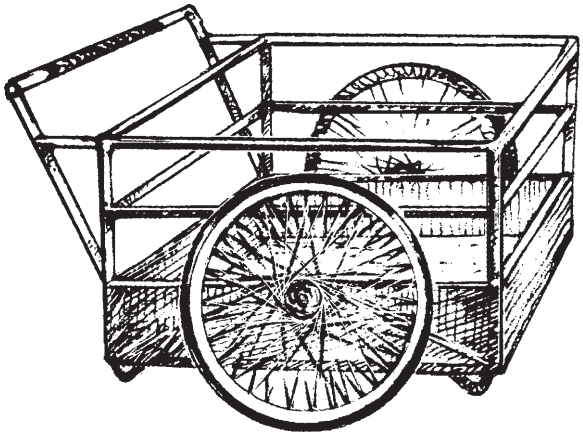
The vehicles should be cleaned and disinfected daily with an appropriate disinfectant (see Chapter 14). All waste-bag seals should be in place and intact at the end of transportation. Different types of vehicle for the on-site transportation of health-care waste are shown in Plate 7.4 and Fig. 7.4.

7.3 Off-site transportation of waste

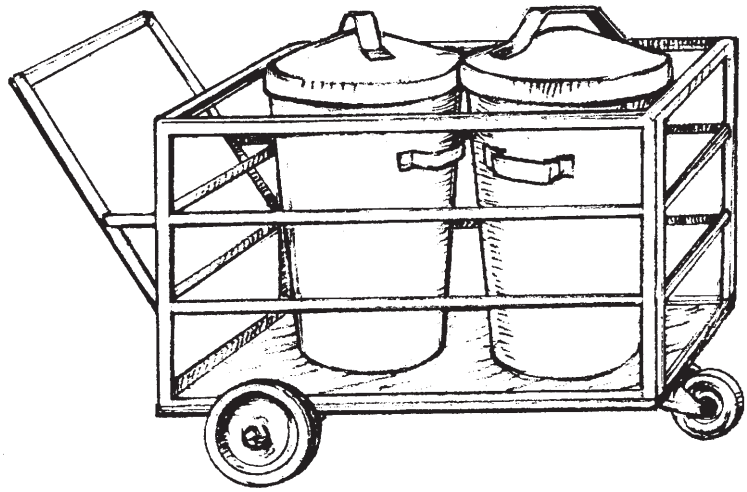
7.3.1 Regulation and control system

The health-care waste producer is responsible for safe packaging and adequate labelling of waste to be transported off-site and for authorization of its destination. Packaging and labelling should comply with

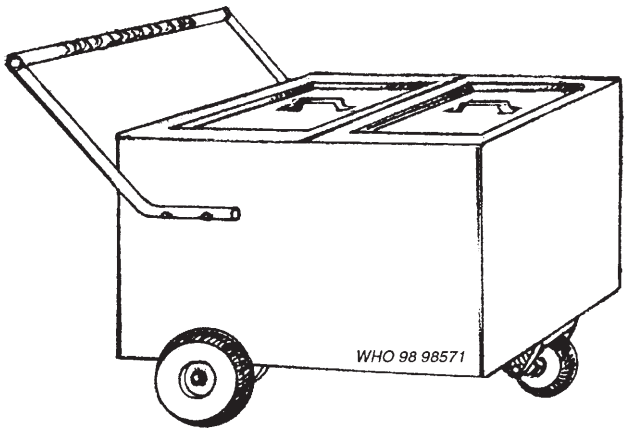
Fig. 7.4 *Wheeled vehicles used for transportation of health-care waste in small hospitals in Thailand*[a]



Waste vehicle with opaque floor and partly opaque sides



Waste vehicle that can be loaded with either containers or plastic bags



Waste vehicle with opaque sides and compartments to load waste or waste bags

[a]Source: Ministry of Health (1995), *Handbook of hazardous healthcare waste management in 10-bed and 30-bed community hospitals*, Bangkok; used with permission.

national regulations governing the transport of hazardous wastes, and with international agreements if wastes are shipped abroad for treatment. In case there are no such national regulations, responsible authorities may refer to *Recommendations on the transport of dangerous goods*, published by the United Nations.

The control strategy for health-care waste should have the following components:

- A consignment note should accompany the waste from its place of production to the site of final disposal. On completion of the journey, the transporter should complete the part of the consignment note especially reserved for him and return it to the waste producer. A typical consignment note for carriage and disposal of hazardous waste, used in the United Kingdom, and the routing of the consignment note are shown in Figs 7.5 and 7.6, respectively.
- The transporting organization should be registered with, or known to, the waste regulation authority.
- Handling and disposal facilities should hold a permit, issued by a waste regulation authority, allowing the facilities to handle and dispose of health-care waste.

The consignment note should be designed to take into account the waste control system in operation within the country. The "Multimodal Dangerous Goods Form" recommended by the United Nations may be taken as an example (for a simplified version of this form see Fig. 7.7).

If a waste regulation authority is sufficiently well established, it may be possible to pre-notify the agency about the planned system of transport and disposal of the health-care waste and obtain the agency's approval.

Anyone involved in the production, handling, or disposal of health-care waste has a general "duty of care", i.e. an obligation to ensure that waste handling and associated documentation comply with the national regulations.

7.3.2 Special packaging requirements for off-site transport

In general, the waste should be packaged according to the recommendations provided in section 7.1 above, in sealed bags or containers, to prevent spilling during handling and transportation. The bags or containers should be appropriately robust for their content (puncture-proof for sharps, for example, or resistant to aggressive chemicals) and for normal conditions of handling and transportation, such as vibration or changes in temperature, humidity, or atmospheric pressure.

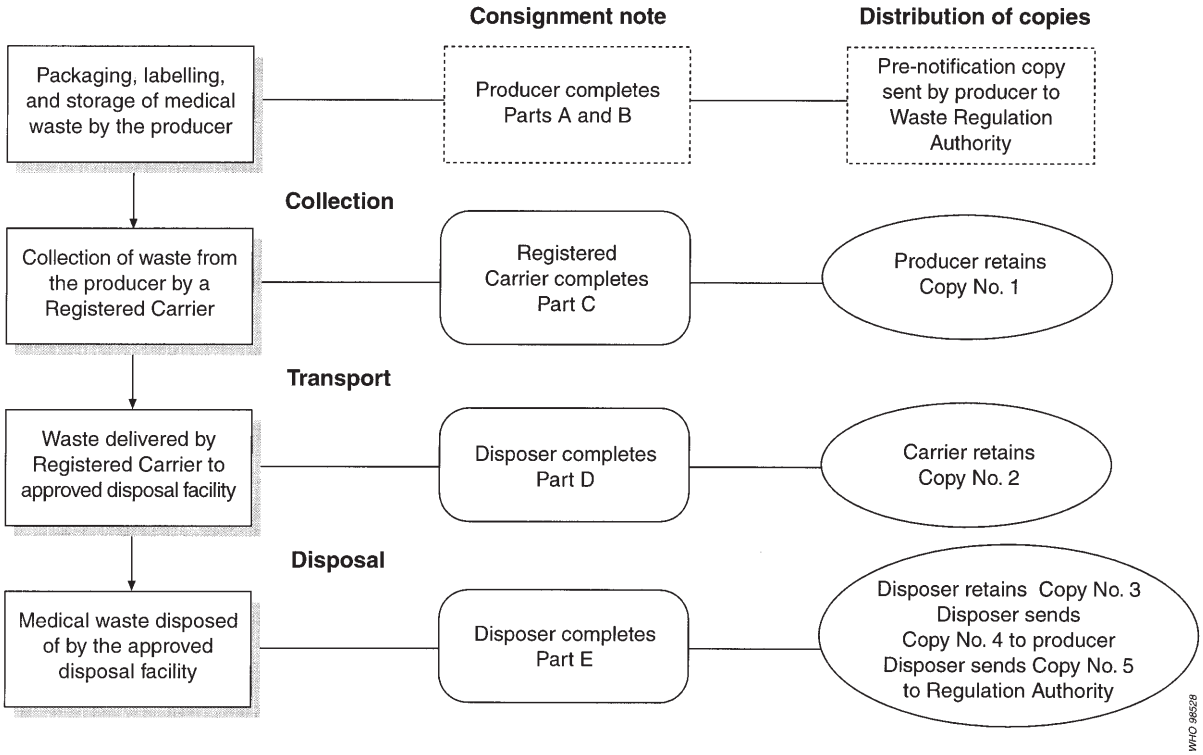
In addition, radioactive material should be packed in containers whose surfaces can be easily decontaminated. The United Nations recommend further packing requirements for infectious substances. For infectious health-care wastes, it is recommended that packaging should be design type-tested and certified as approved for use. Health-care wastes that are known or suspected to contain pathogens likely to cause human disease should be considered as "Infectious Substances" (UN No. 2814: INFECTIOUS SUBSTANCE, AFFECTING HUMANS) and should comply with the packaging requirements indicated in Box 7.2. The packaging recommended for most health-care wastes, with a relatively low probability that infectious substances are present and which are not

Fig. 7.5 *Example of consignment note for carriage and disposal of hazardous waste*[a]

[Name of waste regulation authority] [Address and telephone number of waste regulation authority]	Serial no. Originator's reference
CONSIGNMENT NOTE FOR THE CARRIAGE AND DISPOSAL OF HAZARDOUS WASTE	
Producer's Certificate **A**	(1) The material described in B is to be collected from: .... and (2) taken to: ..... Signed ..... Name ..... On behalf of ..... Position ..... Address ..... Telephone no. .... Date .... Estimated date of collection .....
Description of the Waste **B**	(1) General description and physical nature of waste (2) Relevant chemical and biological components and maximum concentrations (3) Quantity of waste and size, type and number of containers (4) Process(es) from which waste originated
Carrier's Collection Certificate **C**	I certify that I collected the consignment of waste and that the information given in A (1) and (2) and B (1) and (3) is correct, subject to any amendment listed in this space: I collected this consignment on ..... at ..... hours Signed ..... Name ..... Date ..... On behalf of ..... Vehicle reg. no. ..... Address ..... Telephone no. ....
Producer's Collection Certificate **D**	I certify that the information given in B and C is correct and that the carrier was advised of appropriate precautionary measures. Signed ..... Name ..... Date ..... Tel. no. .....
Disposer's Certificate **E**	I certify that Waste Disposal Licence No ..... , issued by ..... [name of issuing body], authorizes the treatment/disposal at this facility of the waste described in B (and as amended where necessary at C). Name and address of facility .... This waste was delivered in vehicle ..... [reg. no.] at ..... hours on ..... [date] and the carrier gave his name as ..... on behalf of ..... Proper instructions were given that the waste should be taken to ..... Signed ..... Name ..... Position ..... Date ..... on behalf of .....
For use by Producer/ Carrier/ Disposer	

[a]Based on a consignment note that has been used in the United Kingdom.

Fig. 7.6 *Route of the consignment note used in the United Kingdom*[a]



[a] Source: London Waste Regulation Authority (1994).

Box 7.2 United Nations packaging requirements for infectious substances, class 6.2, UN No. 2814: INFECTIOUS SUBSTANCE, AFFECTING HUMANS (adapted to hazardous health-care waste)[a]

The packaging should include the following essential elements:

- An inner packaging comprising:
  — watertight primary receptacle of metal or plastics with leak-proof seal (e.g. a heat seal, a skirted stopper, or a metal crimp seal);
  — a watertight secondary packaging;
  — absorbent material in sufficient quantity to absorb the entire contents placed between the primary receptacle and the secondary packaging.
- An outer packaging of adequate strength for its capacity, mass, and intended use, and with a minimum external dimension of 100 mm.

A list of contents should be enclosed between the secondary packaging and the outer packaging. The outer packaging should be appropriately labelled.

[a] Source: United Nations (1997), used with permission.

Fig. 7.7 *Adaptation of the Multimodal Dangerous Goods Form recommended by the United Nations*[a]

<table>
<tr><td rowspan="3">Shipper/Consignor/Sender (Name & Address)</td><td colspan="2">Transport document number</td></tr>
<tr><td>Page 1 of pages</td><td>Shipper's reference</td></tr>
<tr><td></td><td>Freight Forwarder's reference</td></tr>
<tr><td>Consignee</td><td colspan="2">Carrier (to be completed by the carrier)</td></tr>
<tr><td>Additional handling information</td><td colspan="2">SHIPPER'S DECLARATION
I hereby declare that the contents of this consignment are fully and accurately described below by the proper shipping name, and are classified, packaged, marked and labelled/placarded and are in all respects in proper condition for transport according to the applicable international and national governmental regulations.</td></tr>
<tr><td colspan="3">Shipping marks Number & kind of packages; description of goods Gross mass (kg) Net mass Cube (m^3)</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td>Container identification no./ Vehicle registration</td><td>Seal number(s)</td><td>Container/vehicle size & type</td><td>Tare (kg)</td><td>Total gross mass (including tare) (kg)</td></tr>
<tr><td colspan="2">CONTAINER/VEHICLE PACKING CERTIFICATE
I herby declare that the goods described above have been packed/loaded into the container/ vehicle identified above in accordance with the applicable provisions
MUST BE COMPLETED AND SIGNED FOR ALL CONTAINER/VEHICLE LOADS BY PERSON RESPONSIBLE FOR PACKING/LOADING</td><td colspan="3">RECEIVING ORGANISATION RECEIPT
Received the above number of packages/containers/trailers in apparent good order and condition unless stated hereon:
RECEIVING ORGANISATION REMARKS:</td></tr>
<tr><td>Name of the company</td><td>Haulier's name</td><td colspan="3">Name of company (of shipper preparing this note)</td></tr>
<tr><td>Name/Status of declarant</td><td>Vehicle reg. no.</td><td colspan="3">Name/Status of declarant</td></tr>
<tr><td>Place and date</td><td>Signature and date</td><td colspan="3">Place and date</td></tr>
<tr><td>Signature of declarant</td><td>DRIVER'S SIGNATURE</td><td colspan="3">Signature of declarant</td></tr>
</table>

[a]Source: United Nations (1997), used with permission.

Box 7.3 United Nations packaging requirements for infectious substances, class 6.2, UN No. 3291: CLINICAL WASTE, UNSPECIFIED, N.O.S., OR (BIO)MEDICAL WASTE, N.O.S., OR REGULATED MEDICAL WASTE, N.O.S. (adapted to hazardous health-care waste)[a]

There are two possibilities for packaging:

- Rigid and leak-proof packaging (complying with a number of requirements and tests specified by the United Nations (1997)).
- Intermediate bulk containers—large rigid or flexible bulk containers made from a variety of materials such as wood, plastics, or textile (complying with a number of requirements and tests specified by the United Nations (1997)).

Packaging or intermediate bulk containers intended to contain sharp objects such as broken glass and needles shall be resistant to puncture and shall undergo additional performance tests.

[a]Source: United Nations (1997), used with permission.

likely to cause human disease (UN No. 3291: CLINICAL WASTE, UNSPECIFIED, N.O.S., OR (BIO)MEDICAL WASTE, N.O.S., OR REGULATED MEDICAL WASTE, N.O.S.), is simpler and is indicated in Box 7.3. However, since these packaging requirements are relatively complex, it is suggested that the United Nations recommendations are consulted directly for further details (United Nations, 1997).

7.3.3 Labelling

All waste bags or containers should be labelled with basic information on their content and on the waste producer. This information may be written directly on the bag or container or on preprinted labels, securely attached.

According to the United Nations recommendations for Class 6.2 substances, the following indications should appear on the label:

- the United Nations substance class, e.g. Class 6.2 for infectious waste (see Box 7.4 for other classes that may be relevant to health-care waste);
- the United Nations packaging symbol, e.g. the international symbol for infectious substances (see Figs 7.2 and 7.8 and Plate 7.5);
- the proper shipping name and the UN number (see examples in Box 7.5);
- the total quantity (mass or volume) of waste covered by the description;
- the country authorizing the allocation of the label (identified by international code system used on motor vehicles).

Box 7.4 United Nations substance classes that may characterize health-care waste

Class 5.1: Oxidizing substances

Class 6.1: Toxic substances

Class 6.2: Infectious substances (containers of sharps should in addition be marked with "Danger, contaminated sharps")

Class 7: Radioactive material

Class 8: Corrosive substances

Classes 5.1, 6.1, and 8 would usually characterize chemical or pharmaceutical waste.

The classification should represent the most hazardous property of the transported waste.

Box 7.5 Examples of proper shipping names (recommended by the United Nations)

Note 1: N.O.S. = not otherwise specified.

Note 2: For wastes, the word "WASTE" should precede the shipping name.

Class	*UN number*	*Shipping name*
5.1	3212	HYPOCHLORITES, INORGANIC, N.O.S.
5.1	3139	OXIDIZING LIQUID, N.O.S.
5.1	1479	OXIDIZING SOLID, N.O.S.
6.1	1851	MEDICINE, LIQUID, TOXIC, N.O.S.
6.1	2810	TOXIC LIQUID, ORGANIC, N.O.S.
6.1	2811	TOXIC SOLID, ORGANIC, N.O.S.
6.1	3249	MEDICINE, SOLID, TOXIC, N.O.S.
6.2	3291	CLINICAL WASTE, UNSPECIFIED, N.O.S., or (BIO)MEDICAL WASTE, N.O.S., or REGULATED MEDICAL WASTE, N.O.S.
6.2	2814	INFECTIOUS SUBSTANCE, AFFECTING HUMANS
6.2	2900	INFECTIOUS SUBSTANCE, AFFECTING ANIMALS only
7	2912	RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA), N.O.S.
8	1759	CORROSIVE SOLID, N.O.S.
8	1760	CORROSIVE LIQUID, N.O.S.

Fig. 7.8 *International ionizing radiation symbol*

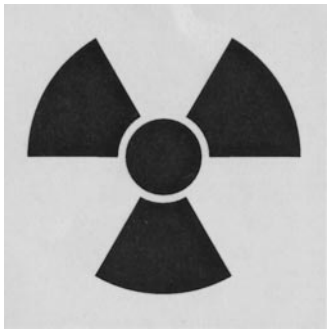


Fig. 7.9 *Blank label*

[SYMBOL]

(UN Class/year of waste packaging)

(UN Number, proper shipping name)

(Country/name of producer)

(Waste class/date of production)

(Special remarks)

(Waste quantity—waste destination)

It is also recommended that the last two digits of the year of manufacture of the packaging specified by the competent authority are marked on the package, as well as a special code designating the type of packaging (for details see United Nations, 1997).

For health-care waste, the following additional information should be marked on the label:

- waste category
- date of collection
- place in hospital where produced (e.g. ward)
- waste destination.

In case of problems involving questions of liability, full and correct labelling allows the origin of the waste to be traced. Labelling also warns operative staff and the general public of the hazardous nature of the waste. The hazards posed by container contents can be quickly identified in case of accident, enabling emergency services to take appropriate action.

Typical blank and completed labels are shown in Figs 7.9 and 7.10 respectively.

Cytotoxic waste should be marked with the label "CYTOTOXIC WASTE".

7.3.4 Labelling for radioactive waste

Three labels have been designed by the UN/IAEA for radioactive material, providing information on the levels of activity of a given package. Unless the package is large (and it is assumed here that all packages containing radioactive waste do not exceed 1 m^2 in cross-sectional area),

Fig. 7.10 *Example of correct labelling*

[BIOHAZARD SYMBOL]

CLASS 6.2/98

(UN Class, year of waste packaging)

3291 CLINICAL WASTE, UNSPECIFIED, N.O.S.

(UN Number, proper shipping name)

GB/Queen's University Hospital London

(Country/name of producer)

Sharps/collected 04.05.1998

(Waste class/date of production)

DANGER—CONTAMINATED SHARPS

(Special remarks)

350 kg—Special incinerator ARD, London

(Waste quantity—waste destination)

Table 7.2 *Categories of packages for radioactive waste*[a]

Conditions		Category
Maximum radiation level at a distance of 1 m from the external surface of the package	Maximum radiation level at any point on the external surface	
Not more than 0.0005 mSv/h	Not more than 0.005 mSv/h	I-WHITE
More than 0.0005 mSv/h but not more than 0.01 mSv/h	More than 0.005 mSv/h but not more than 0.5 mSv/h	II-YELLOW
More than 0.01 mSv/h but not more than 0.1 mSv/h	More than 0.5 mSv/h but not more than 2 mSv/h	III-YELLOW

[a]Adapted from IAEA (1996), used with permission.

the labels should be chosen according to Table 7.2. If the two types of conditions of Table 7.2 differ, the package shall be assigned to the higher category. This categorization is as recommended in *Regulations for the safe transport of radioactive material* (IAEA, 1996). For large packages or higher activity levels than those dealt with here, these regulations (IAEA, 1996) should be consulted directly.

7.3.5 Preparation for transportation

Before transportation of the waste, dispatch documents should be completed, all arrangements should be made between consignor, carrier, and consignee, and, in case of exportation, the consignee should have confirmed with the relevant competent authorities that the waste can be legally imported and that no delays will be incurred in the delivery of the consignment to its destination.

7.3.6 Transportation vehicles or containers

Waste bags may be placed directly into the transportation vehicle, but it is safer to place them in further containers (e.g. cardboard boxes or wheeled, rigid, lidded plastic or galvanized bins). This has the advantage of reducing the handling of filled waste bags but results in higher disposal costs. These secondary containers should be placed close to the waste source.

Any vehicle used to transport health-care waste should fulfil the following design criteria:

- The body of the vehicle should be of a suitable size commensurate with the design of the vehicle, with an internal body height of 2.2 metres.
- There should be a bulkhead between the driver's cabin and the vehicle body, which is designed to retain the load if the vehicle is involved in a collision.
- There should be a suitable system for securing the load during transport.
- Empty plastic bags, suitable protective clothing, cleaning equipment, tools, and disinfectant, together with special kits for dealing with liquid spills, should be carried in a separate compartment in the vehicle.
- The internal finish of the vehicle should allow it to be steam-cleaned, and the internal angles should be rounded.
- The vehicle should be marked with the name and address of the waste carrier.
- The international hazard sign should be displayed on the vehicle or container, as well as an emergency telephone number.

A vehicle used for the transportation of health-care waste in the United Kingdom is shown in Fig. 7.11.

Vehicles or containers used for the transportation of health-care waste should not be used for the transportation of any other material. They should be kept locked at all times, except when loading and unloading. Articulated or demountable trailers (temperature-controlled if required) are particularly suitable, as they can easily be left at the site of waste production. Other systems may be used, such as specially designed large containers or skips; however, open-topped skips or containers should never be used for transporting health-care waste.

Where the use of a dedicated vehicle cannot be justified, a bulk container that can be lifted on to a vehicle chassis may be considered. The container may be used for storage at the health-care establishment and replaced with an empty one when collected. Refrigerated containers may be used if the storage time exceeds the recommendations in section 7.2.2 or transportation times are long. The finish of these bulk containers should be smooth and impervious and permit easy cleansing or disinfection.

The same safety measures should apply to the collection of hazardous health-care waste from scattered small sources.

Health-care establishments that practise minimal programmes of health-care waste management should either avoid off-site transportation of hazardous waste or at least use closed vehicles to avoid spillage.

Fig. 7.11 *Example of vehicle used for transportation of health-care waste in the United Kingdom*

The internal surfaces of any vehicle used for this purpose should be easy to clean.

7.3.7 Routing

Health-care waste should be transported by the quickest possible route, which should be planned before the journey begins. After departure from the waste production point, every effort should be made to avoid further handling. If handling cannot be avoided, it should be pre-arranged and take place in adequately designed and authorized premises. Handling requirements can be specified in the contract established between the waste producer and the carrier.

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