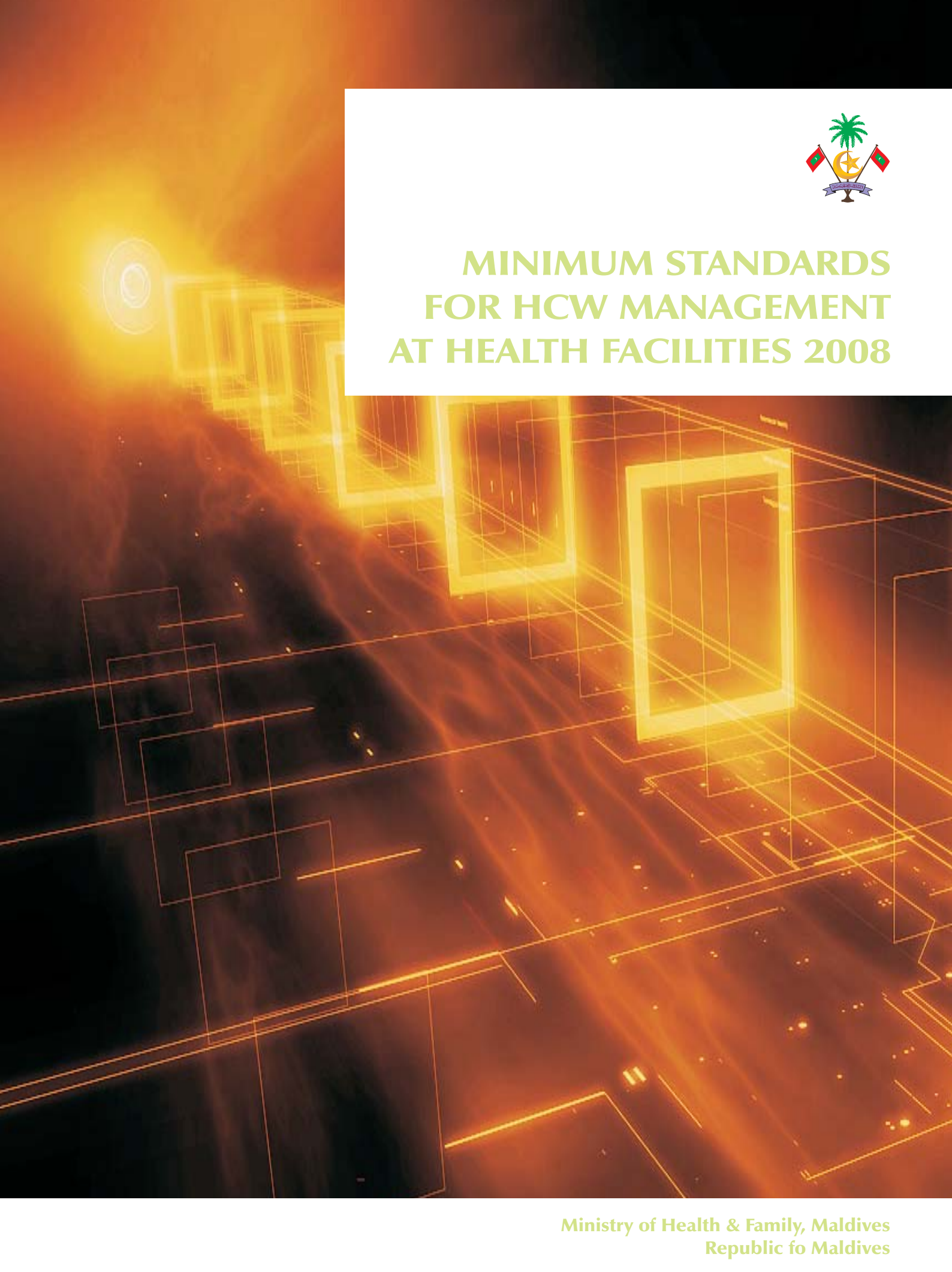


MINIMUM STANDARDS FOR HCW MANAGEMENT AT HEALTH FACILITIES 2008

Ministry of Health & Family, Maldives
Republic fo Maldives

Foreword

The Ministry of Health and Family (MOHF) places great emphasis on ensuring that health care services provided to the Maldivians are safe and of high quality. This can be achieved through well developed standards of care including necessary protocols, practice guideline and relevant training to health staff. Given the high risk to patients from inefficient management of health care wastes, through the funding assistance from World Health Organization (WHO), in June 2008 we are publishing this national guideline for health care waste management practices.

I am pleased that we are publishing the first national guideline for managing health care wastes in the Maldives. I would like to congratulate all those who have made this publication a reality. I take this opportunity to profoundly thank WHO for their continuous commitment to support initiatives to improve and develop our health care system. This project was developed by a team of health professionals at MOHF and I would like to congratulate them for their invaluable input and dedication to developing this guideline. I convey my sincere gratitude to the senior management of MOHF and the relevant staff from Planning and Policy Division and Quality Improvement Division of MOHF for their dedicated efforts in facilitating the compilation of this publication. This national guideline is planned to be reviewed every 3 years and published with amendments.

I hope that health care professionals and health care administrators will use this national guideline in their areas of work to improve health care waste management practices in the private and public health care services in the Maldives.

Dr.Ibrahim Yasir Ahmed

Director General of Health Services

Ministry of Health and Family

Acknowledgements

This guideline was made possible through the valuable contributions of several concerned authorities and stakeholders. First and foremost, I would like to thank the Minister of Health and Family, Dr.Aminath Jameel for her continuous guidance and support throughout the compilation of this guideline.

I wish to express my gratitude to Dr.Sheena Moosa and Dr.Ibrahim Yasir Ahmed for their valuable insights and support in facilitating the development of this guideline. I greatly acknowledge the continued assistance from the World Health Organization (WHO) in funding this project and providing their expert guidance in implementing this activity.

The overall project management and coordination was carried out by the project team for 'Health Services Policy, planning and development/HSP' at the Policy Planning Division of the Ministry of Health and Family (MOHF). I wish to convey special thanks to Ms. Aishath Shirna Shafeeq for acting as the MOHF focal point in communicating and coordinating project work with all the stakeholders.

This guideline was developed by the knowledgeable and expert team of health professionals at MOHF. We greatly thank this team for their special commitment to developing this important national guideline.

I hope that this national guideline will act as a useful guide for health professionals in standardizing health care waste management practices in the Maldives.

June 11, 2009

Ms.Aishath Samiya

Policy Planning Division

Ministry of Health and Family

Appendix 2: Health carewaste management guideline

NATIONAL MINIMUM STANDARDS FORWASTE MANAGEMENT IN HEALTH FACILITIES

The 7 steps along the waste stream, that must be followed at a typical health facility in the Maldives.

The management of waste must be consistent from the point of generation ("cradle") to the point of final disposal ("grave").
All waste handlers shall be equipped with safety gears such as gum boots, aprons, masks, eye glass and gloves while handling HCW. They must be immunized against Hepatitis B.

Three categories of health-care waste are recognized:
1. General (non-risk) waste, including uncontaminated waste similar to domestic waste;
2. Infectious health-care waste.
3. Hazardous health-care waste.

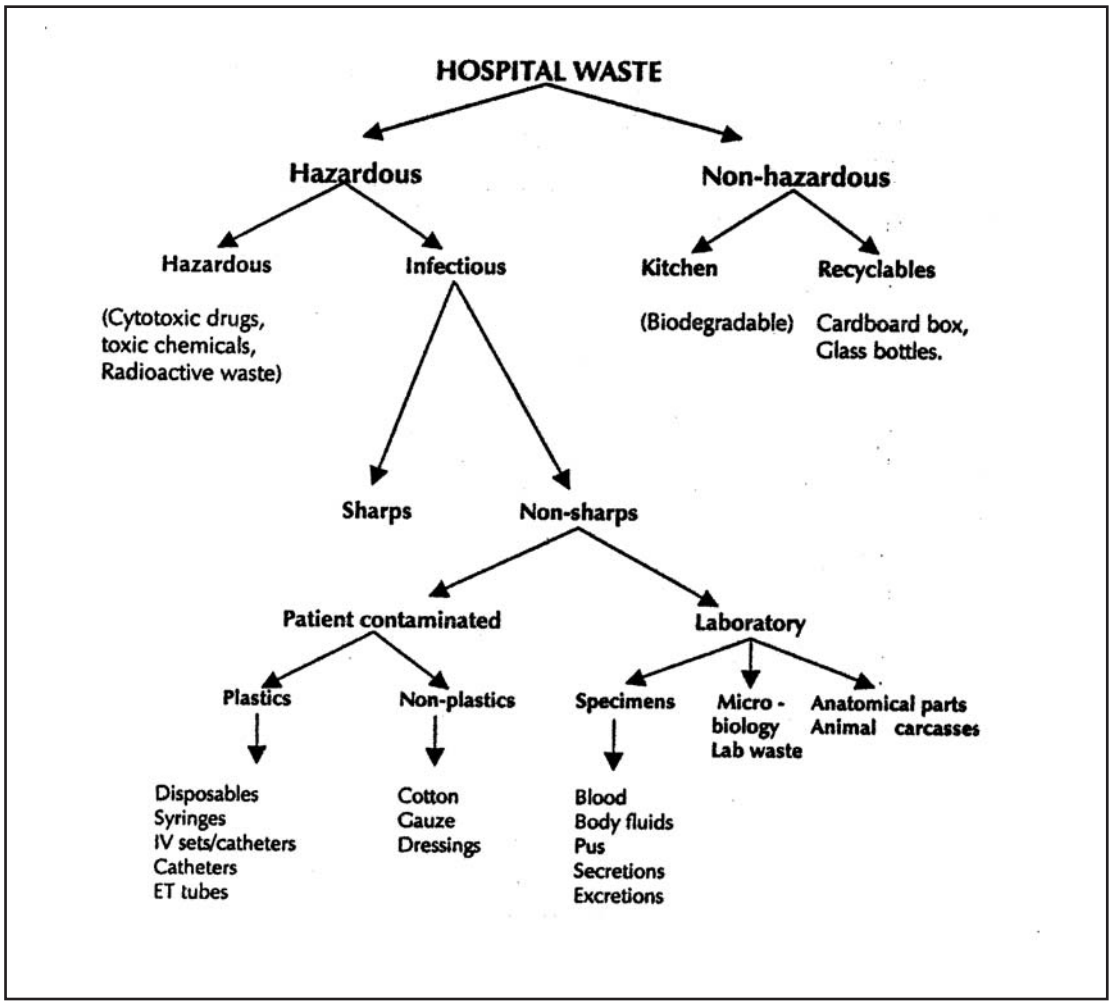
Infectious health-care waste includes:

• Usual infectious waste, excluding sharps but including anatomical or pathological waste, and waste contaminated with human blood or other body fluids, excreta, and vomit. This category typically makes up about 75% of the hazardous health-care waste, or around 15% of the total waste, produced by health-care establishments.
• Chemical and pharmaceutical residues, e.g. cans, bottles, or boxes containing such residues, and small quantities of outdated products.
• Non-recyclable and discarded pressurized containers, which are hazardous only if burned as they may explode. Many undamaged containers may be refilled.

Hazardous health-care waste, which should be given special attention includes:

• Sharps, especially hypodermic needles.
• Highly infectious non-sharp waste, including microbial cultures, carcasses of inoculated laboratory animals, highly infectious physiological fluids, pathological and anatomical waste. • Bulk quantities of outdated hazardous chemicals, such as strong disinfectants, or waste containing mercury.
• Genotoxic waste, e.g. radioactive or cytotoxic waste, typically used in cancer chemotherapy.

Practical classification of health care waste



STEP 1: WASTE MINIMIZATION

This first step comes prior to the production of waste and aims at reducing as much as possible the amount of health care waste (HCW) that will be produced by setting up an efficient purchasing policy and having a good stock management, for example.

Chemicals and pharmaceuticals

• Careful management of stores will substantially reduce quantities of chemical and/or pharmaceutical waste. The waste in these categories should be limited to residues of chemical or pharmaceutical products in their original packaging (bottles, boxes, cans, etc)
• Ordering, of relatively small quantities rather than large quantities should be frequent; this applies particularly to unstable products.
• The oldest batch of a product should be used before newer batches.
• All the contents of each box or bottle should be used

Pressurized containers

• Many undamaged pressurized gas containers may be easily recycled. They should be returned to their original supplier for refilling.
• Pressurized containers must never be incinerated as they may explode, causing injury to workers and/or damage to equipment.

Mercury

• A mercury audit should be conducted in all health facilities
• Thermometers, blood pressure apparatus and other equipment containing mercury, should be marked and should have instructions on the methods to control and manage any spill
• If possible, all mercury blood pressure apparatus and thermometers should be replaced with digital ones.
• Imports of mercury containing instruments should be restricted and phased out as alternatives come in.

Cyanide

• Potassium cyanide should not be used to estimate hemoglobin. Haematological counters should be used instead.

STEP 2: SEGREGATION AND CONTAINERIZATION

Proper identification of waste packages warns health-care personnel and waste handlers about their contents. To make separate collection possible, hospital personnel at all levels, especially nurses, support staff, and cleaners, should be trained to sort the waste they produce.

Segregation must be done at the point of generation of the waste. To encourage segregation at source, (reusable) containers or baskets with liners of the correct size and thickness should be placed as close to the point of generation as possible.

• Bins and bags should be properly **colour-coded** (red for infectious waste) and have the international biohazardous waste symbol clearly marked. When they are 3/4 full, the liners should be closed with plastic cable ties or string and placed into larger containers or liners at the intermediate storage areas.

• Suitable latex gloves must always be used when handling infectious waste.
•The human body parts/ anatomical wastes/ placenta wastes etc. as being handed over to the patient's relative/friend for burying underground, shall be handed over in bio-hazard bag so as to prevent any spillage of blood, body fluids etc. with instruction to bury the bag/container along with the wastes.
•The expired and discarded drugs shall be segregated in pink colour. It shall not be subjected to autoclaving / shredding. Whenever generation of genotoxic / cytotoxic drug wastes is expected, segregate the same in pink colour with label of Genotoxic / Cytotoxic wastes .

•The hazardous wastes such as pressurized container, batteries etc. shall be segregated in orange colour with label of Hazardous Wastes . It shall also not be subjected to autoclaving/ shredding.

Management of sharps

Sharps wastes shall be given outmost attention while their handling, treatment and disposal because of their categorization into one of the most dangerous categories of waste generated from any HCF. During the handling of wastes, injuries can occur when syringe-needles or other sharps have not been collected in rigid puncture proof containers

• Sharps should be segregated at the point of use
• Sharps should be collected directly in sharps containerwhich limits the hazards associated with handling.
• Health care workers should **NOT** recap or remove needles.

•Mechanical needle cutter (not electrically operated needle destroyer as it gives rise to fumes and sometimes sparks which may not occupationally be safe) shall be placed at every injection administration point. The specification of mechanical needle cutter is given below.
• Immediately after administrating injection, the needle of the syringe shall be cut using mechanical syringe cutter. The needle shall be so cut that
(i)needle gets broken; and (ii) plastic hub of syringe through which root of needle is attached also gets detached from syringe.
•The syringe (having needle detached) shall be segregated into a blue container as this is no more sharps category but like an infectious plastic wastes.
• The other categories of sharps wastes such as broken vials/ampoules, glass bottles, seizures, scalpels, blades etc. shall be segregated in white translucent puncture proof container. The specifications of such sharps container is given below.

Specifications of needle cutter

•The needle cutter shall be mechanically operated and not electrically operated as it gives rise to gases and sometimes sparks which may not occupationally be safe. Further, it shall have a closed system arrangement so that spillage does not occur while using it.
• The needle cutter shall have cutting blades so placed that it cuts plastic hub of syringe through which root of needle is attached and not the needle. The blade of the cutter shall be robust and made up of good quality steel so that it does not corrode and its sharpness is durable.
•There shall be a puncture proof sturdy white translucent container below the needle cutter blades so that the detached needle automatically falls in the container.
•The white translucent container should not be permanently fixed with the cutter rather it shall have provision of replacing and preferably reusing the container after imparting requisite disinfection.

• The white translucent container shall be of adequate size (i.e. neither too big nor small but it gets filled two-third during a day) as per the expected volume of needles generation and shall have distinct label of bio-hazard symbol and sharps wastes .
• The material of the white translucent container shall be of non-PVC and it shall be able to withstand temperature and pressure during autoclaving.

Specifications for sharps container

The sharps container shall have small adequate opening for putting sharp wastes into it in such a way that once sharps wastes are put into it they can not come out while container handling/transportation. It shall have other provisions similar to that of container used in the needle cutter as mentioned above.

STEP 3: INTERMEDIATE STORAGE

In order to avoid both the accumulation and decomposition of the waste, it must be collected on a **regular** daily basis. This area, where the larger containers are kept before removal to the central storage area, should not accessible to unauthorized people such as patients and visitors. The waste should be collected daily.

• Hazardous health-care waste should be stored in a closed room.
• Waste should not be stored close to patients or where food is prepared.

Safe handling and storage

• Health facility cleaning personnel should be informed about the potential risks posed by waste handling.
• They should be trained in safe handling procedures and should wear protective aprons and gloves.
• Before containers of hazardous health-care waste are transferred , they should be sealed. Waste bags and containers should also be labeled with the waste category.

STEP 4: INTERNAL TRANSPORT IN THE HEALTH FACILITY

Transport with in the health facility is usua lly performed using a dedicated wheelie bin or trolley.
• Wheelie bins or trolleys should be easy to load and unload, have no sharp edges that could damage waste bags or containers and be easy to clean.
• The transport of general waste must be carried out separately from the collection of healthcare risk waste to avoid potential cross contamination or mixing of these two main categories of waste.
• The collection should follow specific routes through the health facility to reduce the passage of loaded carts through patient care and other clean areas.

STEP 5: CENTRALIZED STORAGE

The central storage is applicable to hospitals. This area should be sized according to the volume of waste generated as well as the frequency of collection.
• The facility should not be situated near to food stores or food preparation areas and its access should always be limited to authorized personnel.
• The storage area should also be easy to clean, have good lighting and ventilation, and be designed to prevent rodents, insects or birds from entering.
• The hazardous waste storage area should also be clearly separated from the central storage area used for general waste in order to avoid cross-contamination.
• Storage time should not exceed 24-48 hours especially in countries that have a warm and humid climate (unless infectious disease waste is autoclaved).

STEP 6: TREATMENT

All HCW must be rendered non-infectious before removing from the health facility. There are a number of different treatment options to deal with infectious waste. Treatment and disposal methods for infectious and hazardous waste may be classified into three categories

• Thermal processes
• Chemical processes
• Containment processes

Autoclaving

Autoclaving is an efficient wet thermal disinfection process. Typically autoclaves are used in health facilities for the sterilization of recyclable items, and these units allow for the treatment of only limited quantities of waste. Special autoclaves, with shredders, allow for the treatment of highly infectious waste, such as microbial cultures and sharps.

There are generally two types of autoclave available for treating HCW. They are gravity flow autoclave and vacuum autoclave. In vacuum autoclave HCW are subjected to prevacuum pulses to purge the autoclave of all air and hence is preferred over gravity flow autoclave for treating large quantity of HCW.

When operating a gravity flow autoclave, HCW shall be subjected to:

- A temperature of not less than 121°C and a pressure of 15 pounds per square inch gauge (psi) for an autoclave residence time of not less than 60 minutes;

- A temperature of not less than 135°C and a pressure of 31 psi for an autoclave residence time of not less than 45 minutes; or
- A temperature of not less than 149°C and a pressure of 52 psi for an autoclave residence time of not less than 30 minutes;

When operating a vacuum autoclave, HCW shall be subjected to a minimum of one pre-vacuum pulse to purge the autoclave of all air. The waste shall be subjected to the following:

- A temperature of not less than 121°C and a pressure of 15 psi per an autoclave residence time of not less than 45 minutes; or
- A temperature of not less than 135°C and a pressure of 31 psi for an autoclave residence time of not less than 30 minutes;

HCW shall not be considered properly treated unless all time / temperature / pressure indicators indicate that the required time / temperature / pressure were reached during the autoclave process. If for any reasons, time / temperature / pressure indicator indicates that the required temperature, pressure or residence time was not reached, the entire load of HCW must be autoclaved again until the proper temperature, pressure and residence time were achieved.

Recording of operational parameters: Each autoclave shall have graphic or computer recording devices which will automatically and continuously monitor and record dates, time of day, load identification number and operating parameters throughout the entire length of the autoclave cycle.

Validation test

Spore testing: The autoclave shall completely and consistently kill the approved biological indicator at the maximum design capacity of each autoclave unit. Biological indicators for autoclave shall be Bacillus stearothermophilus spores using vials or spore strips, with at least 1 × 104 spores per millilitre.

Routine Test

A chemical indicator strip/tape that changes colour when a certain temperature is reached can be used to verify that a specific temperature has been achieved. It may be necessary to use more than one strip over the waste package at different location to ensure that inner content of the package has been adequately autoclaved.

Shredding

- The shredder for HCW shall be of robust design with minimum maintenance requirement. The shredded waste shall be made of such size that it becomes non-recognizable
- The shredder should be properly designed and covered to avoid spillage and dust generation. It should be designed such that it has minimum manual handling.

- The hopper and cutting chamber of the shredder should be so designed to accommodate the waste bag full of HCW.
- The shredder blade should be highly resistant and should be able to shred waste sharps, syringes, scalpels, glass vials, blades, plastics, catheters, broken ampoules, intravenous sets/ bottles, blood bags, gloves, bandages etc and including plastic bags used as liners which are quite thin. It should be able to handle/ shred wet waste after autoclaving.
- The shredder blade shall be of non-corrosive and hardened steel.
- The shredder should be so designed and mounted so as not to generate high noise & vibration.
- If hopper lid or door of collection box is opened, the shredder should stop automatically for safety of operator.
- In case of shock-loading (nonshreddable material in the hopper), there should be a mechanism to automatically stop the shredder to avoid any emergency/accident.
- In case of overload or jamming, the shredder should have mechanism of reverse motion of shaft to avoid any emergency / accident.
- The motor shall be of adequate capacity connected to the shredder shaft through a gear mechanism, to ensure low rpm and safety.
- The unit shall be suitably designed for operator safety, mechanical as well as electrical.
- The shredder should have low rotational speed (maximum 50 rpm). This will ensure better gripping and cutting of the biomedical waste.
- The discharge height (from discharge point to ground level) shall be sufficient (minimum 3 feet) to accommodate the containers for collection of shredded material. This would avoid spillage of shredded material.

Chemical disinfection

Chemical disinfection using 1% hypo chlorite solution may occasionally be used in situations where the infectious HCW can not be imparted autoclaving, primarily for treating infected liquid wastes. Autoclaving shall be followed by mutilation/shredding. It will:

- reduce treated waste volume and hence ease in transportation and storage;
- ensure that even disinfected wastes can not be reused;
- distinct between non-treated and treated waste; and
- give better aesthetic look and thus help in eliminating fear of general public and easy acceptance to integrate their disposal with National Solid Waste Management Policy

Encapsulation

Encapsulation is recommended as the easiest technology for the safe disposal of sharps.
• Sharps must be collected in puncture proof and leak proof containers, such as high density polyethylene boxed, containers.
• When a container is three quarters full, a material such as cement mortar, bituminous sand, plastic foam, or clay is poured in until the containers is completely filled.
• After this material has dried, the container is sealed and may be stored before transportation to an incinerator.
It is also possible to encapsulate chemical or pharmaceutical residues together with sharps**.** Encapsulation is not suitable for infectious waste. Such waste should be treated in an autoclave before storage

Special Waste Categories

Pharmaceutical waste

• Large amounts of pharmaceutical waste may require high temperature incineration (if an incinerator is able to reach a combustion temperature of 800 degrees C.
• When incineration is not feasible pharmaceutical waste should be encapsulated.
• Small quantities of chemical waste will include residues of chemicals in their packaging, outdated or decomposed chemicals that are no longer required. These are generally collected in yellow containers, together with infectious waste, and follow that same disposal pathway (either incineration or safe burying).

Large quantities of chemical waste should *not* be collected in yellow plastic bags or containers. There is no safe and cheap method for their disposal; the treatment options are the following:
• Incineration equipped for the safe disposal of hazardous chemical waste. The thermal reactivity of the waste should be checked; certain solvents will burn and can therefore be incinerated in simple incineration units although it must be remembered that those containing halogens could cause air pollution.
• Return to original supplier (if the supplier has facilities for safe disposal). In this case appropriate provisions should be included in the original purchase contract for chemicals.
• Exportation to a country with the expertise and facilities to dispose safely of hazardous chemical waste. Shipment of chemical waste should comply with international agreements, such as the Basel Convention on the transport of dangerous goods.

Hazardous chemical waste

• Hazardous chemical wastes of different nature should never be mixed.
• Hazardous chemical waste should not be disposed of in sewer systems.
• Large amounts of chemical waste should not be buried as they may contaminate ground water.
• Large amounts of chemical disinfectants should not be encapsulated as they are corrosive ad sometimes flammable.
• Cytotoxic drugs are highly hazardous to the health of the individual and to the environment. Disposal options are to return to original supplier or incinerate at high temperatures.
• Residues from cytotoxic drugs or other cytotoxic waste should never be mixed with other pharmaceutical waste.
• Cytotoxic waste should never be discharged into natural water bodies or land filled

Pressurized containers

• Undamaged pressurized containers should be treated according to guidelines of relevant national authority or returned to the supplier for refilling, and adequate provision for this should be included in the original purchase contracts.
• Aerosol containers cannot usually be refilled. Pressurized containers should **never** be burned or incinerated because of the severe risk of explosion.

Used batteries and thermometers

• Batteries, thermometer, and various items of measuring equipment may have a high metal content, including toxic heavy metals such as mercury or cadmium.
• These must be treated according to guidelines of relevant national authority or may be exported to a country with the expertise and facilities to dispose safely of hazardous chemical waste.
• Conditions of shipment should comply with the Basel Convention.
• This type of waste should not be incinerated because of the toxic metallic vapors emitted, nor should it be buried without encapsulation as this may cause pollution of the groundwater.

STEP7: EXTERNAL TRANSPORT & FINAL DISPOSAL

External transport should be done using dedicated vehicles or vessels.
• Vehicles/vessels should be easy to load and unload by hand, easy to clean / disinfect, and fully enclosed to prevent any spillage in the hospital premises or on the road.
• All vehicles should have a consignment note from the point of collection to the final disposal facility.

Infectious waste that has been treated by autoclaving may be disposed in through the general waste stream.

Incineration

Wastes requiring incineration

Anatomical parts and animal carcasses, and

Cytotoxic drugs (outdated), toxic laboratory chemicals other than mercury.

Patient contaminated non-plastics and non-chlorinated plastics.

Waste that cannot be incinerated

Chlorinated plastics, volatile toxic wastes such as mercury.

Checklist for Verification

1. Waste minimization
Small quantities of products purchased Yes No
Oldest batch used before newest batch Yes No
All contents of bottles used Yes No
Mercury thermometers replaced with digital thermometers Yes No

2. Segregation
Waste separated at point of generation Yes No
Bins colour coded Yes No
Bags colour coded Yes No
Latex globes used when handling waste Yes No
Sharps segregated and placed in sharps' containers Yes No

3. Intermediate storage
Waste collected on daily basis Yes No
Waste placed in larger containers i.e. wheel bins Yes No
Storage close to ward/ labs/ theatres in a closed room Yes No
Storage away from patients and food areas Yes No

4. Internal Transport
Waste bags and bins labeled with waste category Yes No
Staff trained in safe handling procedures Yes No
Staff wearing PPE Yes No
Transport in wheelie bin or trolley Yes No

5. Centralized storage
Access limited to authorized persons Yes No
Storage area easy to clean Yes No
Storage are well lit and ventilated Yes No
Storage time < 48 hours (unless infectious waste is autoclaved) Yes No

6. External transport
Dedicated vehicle/vessel used to transport waste Yes No
Waste areas enclosed to prevent spillage Yes No
Vehicle have consignment note from hospital to treatment facility Yes No

7. Treatment and final disposal
Highly infectious waste autoclaved Yes No
Qualified technician operate autoclaves Yes No
Sharps' containers transported to incinerators when ¾ full Yes No
Pharmaceutical waste transported to incinerator Yes No
Chemical waste encapsulated Yes No
Batteries recycled Yes No
Mercury recycled Yes No
Pressurized containers recycled or returned to supplier Yes No
Incineration done to correct temperature Yes No