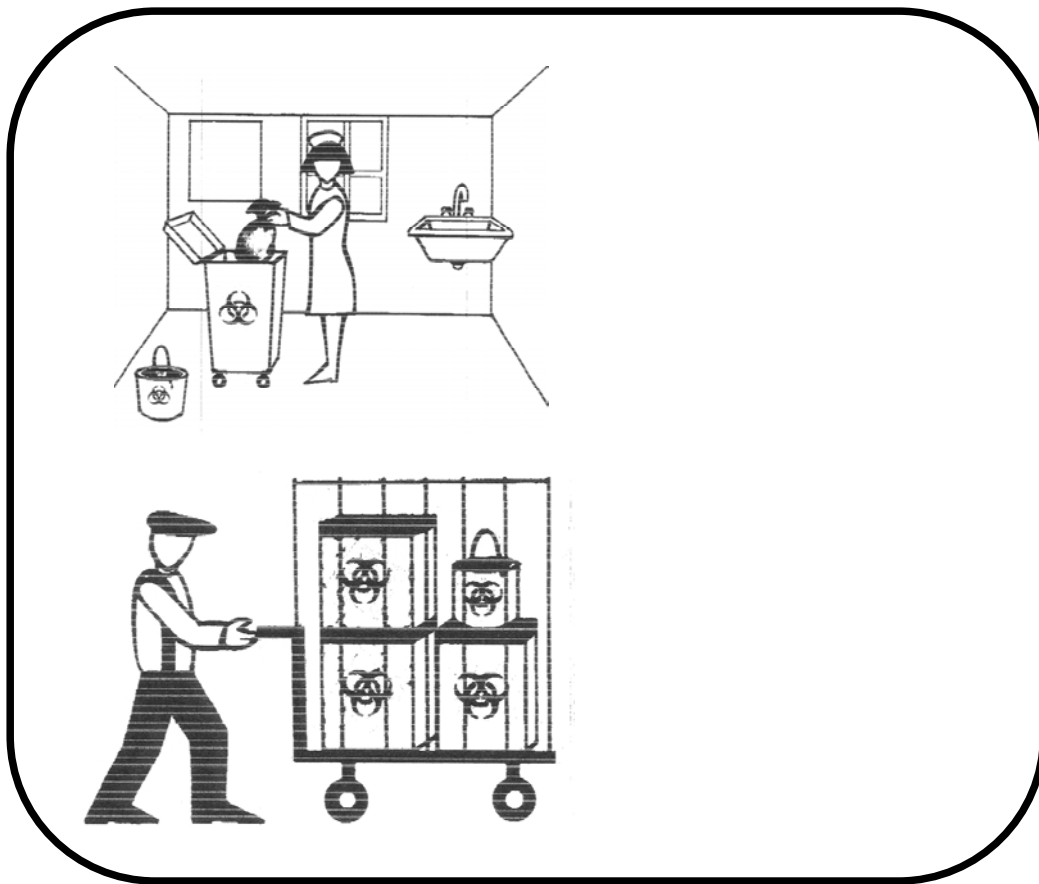


# Guidelines on Sustainable Health Care Waste Management in Gauteng

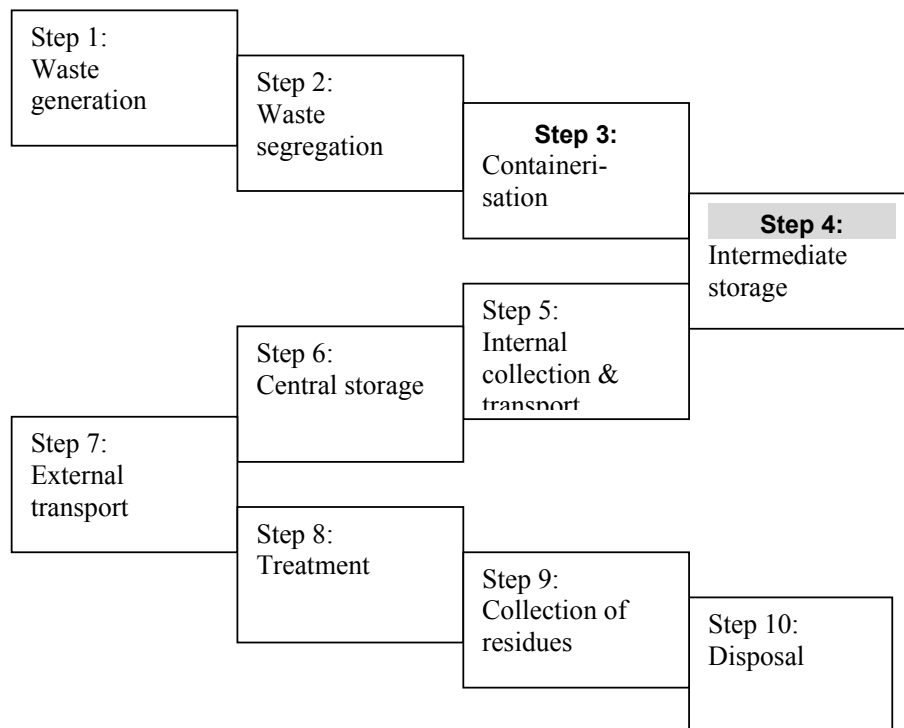
## **MODULE 4: Internal transport and storage:**

- Collection
- Intermediate storage
- Internal transport
- Central storage
- Examples on transport equipment



## 4. Module 4: Internal Transport and Storage

Box 4.1: Steps of the HCW flow included in this Module



### 4.1 Objectives of Module 4

This module of the Guidelines includes recommendations on the internal collection, transport and storage of HCW at health care facilities. The number of steps in this “internal management“ of the waste depends on the character and size of the particular institution.

In principle the “internal handling” includes the following steps:

Transport from the department to an intermediate storage room;  
Intermediate storage;  
Internal transport from intermediate to central storage room;  
Central storage.

The objective of Module 4 is therefore to provide detailed guidance on the execution of each of the above steps. Although the information provided may be very detailed for the smaller health care institutions, the parties responsible will be required to use sound judgement on the extent to which this particular Module of the Guidelines will apply.

## 4.2 Target Group

For this Module of the Guidelines the focus will be on the HCW workers (cleaners and general assistants) and primarily their managers within the health care institutions that are responsible for the collection of HCW from the various sources and transport to the storage areas.

In some instances nurses and in-ward assistants will be totally responsible for or otherwise to some extent participate in the internal transport of the waste from the wards to the intermediate storage rooms. It is therefore also important for those particular staff groups to get familiar with the contents this Module.

## 4.3 Scope of Module 4

After the successful execution of the activities described in Module 4 on the generation, segregation and containerisation of HCW at health care facilities, the next step is to transport such HCW containers (cardboard boxes, plastic bags, sharps containers, specicans, etc.) from the source where it was generated, to an intermediate storage facility, which is likely to be a dedicated room or the sluice in the case of larger clinics and hospitals. In the case of smaller clinics and other small HCW generators, this facility will probably not exist and the activity is then to transport the HCW directly from the source to the central storage area.

Where the central storage areas in larger health care facilities are not within close proximity of the source or intermediate storage areas, the waste collected from the intermediate storage areas are to be moved in larger volumes by means of a trolley or bulk HCW container to the central storage area. From the central storage area, the waste will be collected for onsite- or offsite treatment.

This module would therefore describe all of the activities required for transport of HCW from the source to the intermediate storage area, the intermediate storage of the HCW, the internal transport to the central storage area and finally the storage of HCW at the central storage area.

## 4.4 Reference to Other Modules

The information in this module is to be read in conjunction with Module 1, which is the module designed to address all the cross cutting issues identified in the process of integrated HCW management.

To get a better understanding of the interfacing that needs to take place in terms of HCW segregation and containerisation on the one side, and external HCW collection and off-site transport on the other side, readers are referred to Modules 4 and 6 respectively for more information.

## 4.5 Collecting HCW from Source and Transport to Intermediate Storage

The steps mostly involved in the collection of HCW from the source for transport to the intermediate storage rooms are presented in Box 4.1:

Box 4.1: Steps involved in collection of HCW from source for transport to the intermediate storage area.

Sharps like needles and used on patients are either to be placed directly into a sharps container (if provided on the nursing trolley), or alternatively it is to be carried in a suitable puncture proof container like for instance a kidney dish, to the nearest available sharps container;

General infectious waste generated at the patient is either to be placed into an infectious waste container (plastic bag) provided as part of the nursing trolley, or alternatively it is to be carried in a leak proof (like for instance stainless steel) container to the nearest general infectious HCRW container;

Liquid or pathological HCRW is to be carried in a leak proof (like for instance stainless steel) container to the nearest specican container. If applicable, the pathological waste is to be placed

in a separate plastic bag and sealed before being placed in the specican;  
Removing plastic HCW bags that are hanging from racks and bundling (without excessive deformation) the open end of the liners, or in the case of rigid containers, bundling while the liner remains inside the rigid containers. Replace all containers removed with empty containers that meets the particular requirements for the type of waste to be collected;  
Removal of sharps containers that reached the full mark from nursing trolleys or brackets;  
Closing and sealing the bags/liners, followed by closing and sealing of lids where rigid containers (disposable or reusable and including sharps containers) are used;  
Marking or labelling the sealed containers if required;  
Replace all removed containers with empty containers that meets the particular requirements for the type of waste to be collected;  
Collecting and transporting (where applicable) full containers from the source to the intermediate storage areas.

The closing and sealing procedure for sharps containers and specicans will be dependant on the design of the particular container.

It is however to be emphasised that intermediate storage areas (like for instance sluice rooms) are likely to be available only in larger health care facilities, as the central storage area may be some distance away from the point of generation. For smaller health care facilities like clinics, it is unlikely that there would be any intermediate storage facilities, resulting in a need for the HCW bags and rigid containers to be collected and transported directly to the central storage area.

Although the allocation of responsibility for this activity may vary according to the size of the health care institution, transporting of HCW from the source to the intermediate storage area is likely to be the responsibility of cleaners in larger facilities, and that of the nursing staff in smaller facilities. Care should in all instances be taken when HCW bags and rigid containers are carried to prevent direct contact with the HCW. Box 4.2 includes recommendations regarding the handling of general infectious HCRW containers/receptacles as well as spillage.

**Box 4.2: Recommendations related to the handling of general infectious HCRW containers/receptacles as well as spillage:**

General infectious HCRW bags and liners that are not contained in rigid containers should be carried in such a way that it does not come in contact with the human body, thus preventing injuries/infection due to incorrectly segregated sharps in the bags;  
General infectious HCRW bags and liners should also be handled carefully to avoid compressing the waste, thus preventing damage to the bags that could lead to spillage or human contact with the contents of the bags;  
Bags with holes should be placed inside another bag to prevent spilling of HCW. If the bag is however damaged to the extent that there is a risk for the HCW to spill during re-bagging or if HCW is already spilt, a dedicated scoop and hand broom should be used to recover the waste and deposit it in another container. The area where the spill took place, as well as any equipment used during the clearing up of the HCW, is then to be disinfected;  
Should HCGW bags on visual inspection be found to contain HCRW, such bags are to be re-bagged in a red bag indicating for it to be handled and treated as HCRW. Under no circumstances is further segregation of HCW allowed (should HCGW and HCRW have been mixed), as this will pose a serious risk of infection to workers.

#### **4.6 Intermediate Storage of HCW at Health Care Facilities**

The rate of HCW generation, the size of containers used as well as the distance from the HCW source to the central storage area on the health care facility premises, will determine the need for intermediate

storage facilities. In smaller clinics and at health care practitioners, the short transport distance from the generation point to the central storage area will enable health care professionals to transport the containers from the source, directly to the central storage area. Box 4.3 details recommendations related to the provision of intermediate storage areas.

Box 4.3: Recommendations related to the provision of intermediate storage areas.

For hospitals and larger clinics it is recommended that dedicated intermediate storage areas for HCW be established for each ward/department or group thereof;

If sluice rooms have sufficient space available, this can be used as intermediate HCW storage areas;

Although the size of the intermediate storage areas is ultimately determined by the rate of HCW generation in its service area, the type of containers used as well as the frequency of HCW collection, a *minimum* size of 2 × 3 meters is recommended. But will depend on the type of containers being used and may be bigger where wheelie bins are used. In addition to full containers, the area should also allow for the storage of empty containers. Backup storage space is also to be allowed for in the event of a sudden increase in the HCW generation rate; Intermediate storage areas should be well ventilated, well illuminated and easy to clear, for example by providing a tiled floor and walls. HCW that is likely to generate odours is to be removed more frequently;

Access to intermediate storage areas should preferably be easy for waste collection via the main passages, thus avoiding movement of HCW through wards;

Intermediate storage areas should be lockable to ensure controlled access;

Each ward/department should ideally be equipped with an intermediate storage area, but depending on the availability of space and distances, intermediate storage areas could be shared by two or more wards/departments, assuming that responsibility for cleaning and orderliness could be managed.

For smaller HCW generators, where transport of HCW containers from the source to the central storage area will not have a significant impact on the daily health care activities, there is no need for intermediate storage areas. The requirements for such central storage areas will be dealt with under Section 4.8 of this Module.

The various options available for intermediate HCW storage dealing with its location, size and the frequency of collection, is presented in Box 4.4.

Box 4.4: Options available for intermediate storage of HCW:

Sluice rooms used as intermediate storage areas or dedicated intermediate storage areas provided;

Direct transport of HCW for storage at mortuary, at central storage area or at on-site treatment facility, depending on type of HCW;

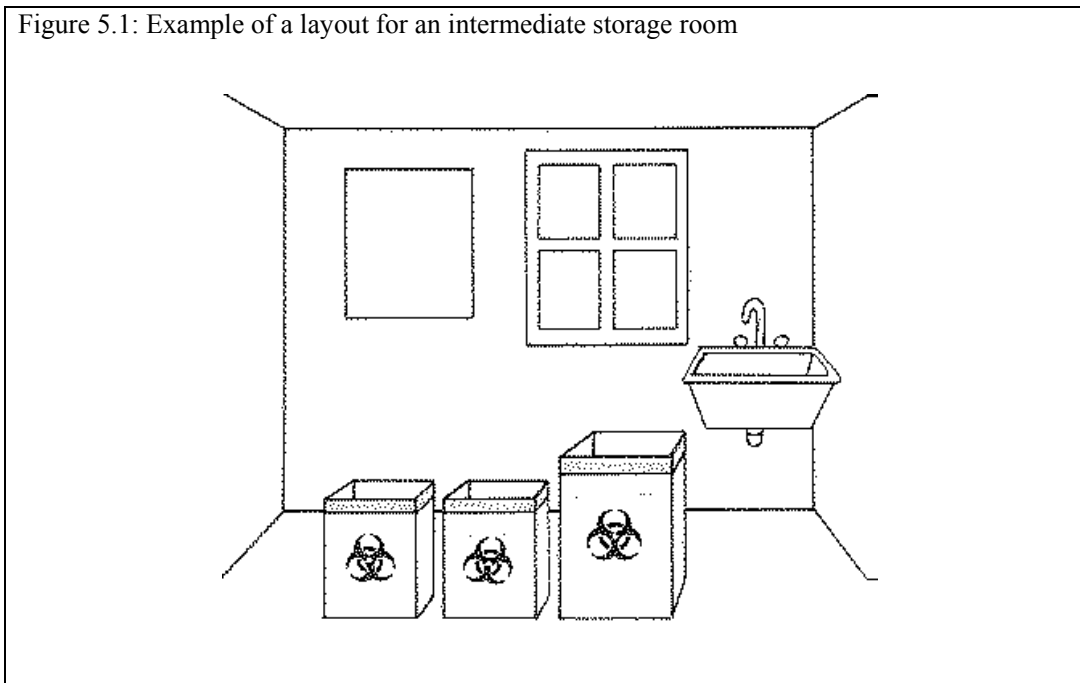
Size of intermediate storage area to accommodate collection rounds undertaken less than once a day or at least once a day, with the option of allowing for on-call collection for “problem wastes” like anatomical waste;

Intermediate storage area dedicated to each ward or department, or for groups of wards or departments;

Intermediate storage area capacity for HCRW only, for both HCRW and HCGW, for full containers only or for both full and empty containers.

Figure 4.1 illustrates a typical layout of the primary installations that are to be provided for an intermediate storage room.

Figure 5.1: Example of a layout for an intermediate storage room



#### 4.7 Internal Transport between Intermediate and Central Storage Areas

To prevent a build-up or the prolonged storage of HCW at or near the point of generation, internal collection and transport of HCW is required. Internal collection of HCW is therefore the removal of HCW from the intermediate storage area (or point of generation where no intermediate storage area exists), for transport to the central storage area or onsite treatment facility (where applicable). The rate of HCW generation, the types of containers used, the distance between the internal storage (or generation) area and the central storage area as well as the accessibility for different types of trolleys to both the intermediate as well as the central storage areas will inter alia determine the internal transport system to be used.

Box 4.5 provides a number of recommendations related to internal transport of HCW.

##### Box 4.5: Recommendations related to internal transport of HCW:

There should be no accumulation or storage of HCW inside the wards/departments;  
All HCW shall be removed from internal storage areas for transport to the central waste storage area at least once a day;  
Collection of HCW from intermediate storage areas should preferably be done by dedicated cleansing or waste management staff that have received the necessary training;  
In the case of small generators, the health care professionals may be responsible for the removal of HCW;  
Staff responsible for HCW management shall only handle the HCW once containerised and shall not undertake any form of segregation. HCW workers should be appropriately informed about the way in which containers are to be handled as well as the risks of infection as well as the associated occupational health and safety risks;  
All activities related to internal collection and transport of HCW shall conform with the requirements of the OHS Act;  
HCW bags are to be carried away from the body, e.g. the legs, (due to the risk of pricking) and such handling is to be limited to the closing and deposition of HCRW bags into the collection trolley. The number of containers carried should

be limited to what can be carried safely without coming in direct contact with the body. The mass of individual HCW containers to be handled manually should not exceed 15 kg and containerisation of HCW should in all instances ensure a safe working environment;

All personal protective equipment (PPE) required such as gloves, aprons etc., are to be provided to all persons responsible for the handling of HCW containers;

Only one unit of each type of receptacle should be in use at an identified location at any time to minimise the filling time and allow for best possible reduction of odour, whilst limiting access to the HCW;

Wherever practical, all internal transfer/transport of HCW should be based on wheeled transportation to secure best possible ergonomics for workers while securing cost-efficient and flexible collection. Manual transport of HCW should be avoided wherever practical, with heavy or awkward lifts and manipulations not being permitted under any circumstances;

Based on the building configuration as well as the distance from the various intermediate storage areas to the central storage area, a decision could be taken on the viability of using a small tractor as a driving mechanism for multiple trolleys;

Equipment used for transport of HCW shall ensure safe transport thereof, avoiding spills and preventing unauthorised persons from coming into contact with the HCW. Trolleys, when loaded, shall not be left unattended;

The transport equipment used shall be easy to load and unload, whilst securing the HCW containers during transport;

HCRW containers shall only be loaded to the design level and shall be secured to prevent containers from dropping of the trolleys;

The equipment used should be durable with low maintenance requirements. It should further be easy to clean and disinfect (metal items should preferably be manufactured from stainless steel);

Transport equipment should be easy to move and manoeuvre and should be able to get access to all places from which HCW is to be collected or to which HCW is to be delivered. This includes allowance for elevator sizes in the event of multi storey buildings;

Precise trolley dimensions for the loading areas is determined by the types and sizes of HCW containers to be transported;

It is further important during the design of the trolleys to pay attention to the type and size of wheels to be used, to the comfort of the handle and the way in which it will be placed when parked to avoid a tripping hazard, that there are no protruding elements and that the trolleys are equipped with “bumpers” to prevent damage to walls and frames. The trolleys should however not become too heavy to be pushed/pulled.

Box 4.6 below presents examples on different types of trolleys and wheelie bins for internal transport of HCW.

Box 4.6: Examples of trolleys and wheelie bins for internal transport (wheelie bins could also be used for external transport) (REDRAWING NEEDED !!!!)

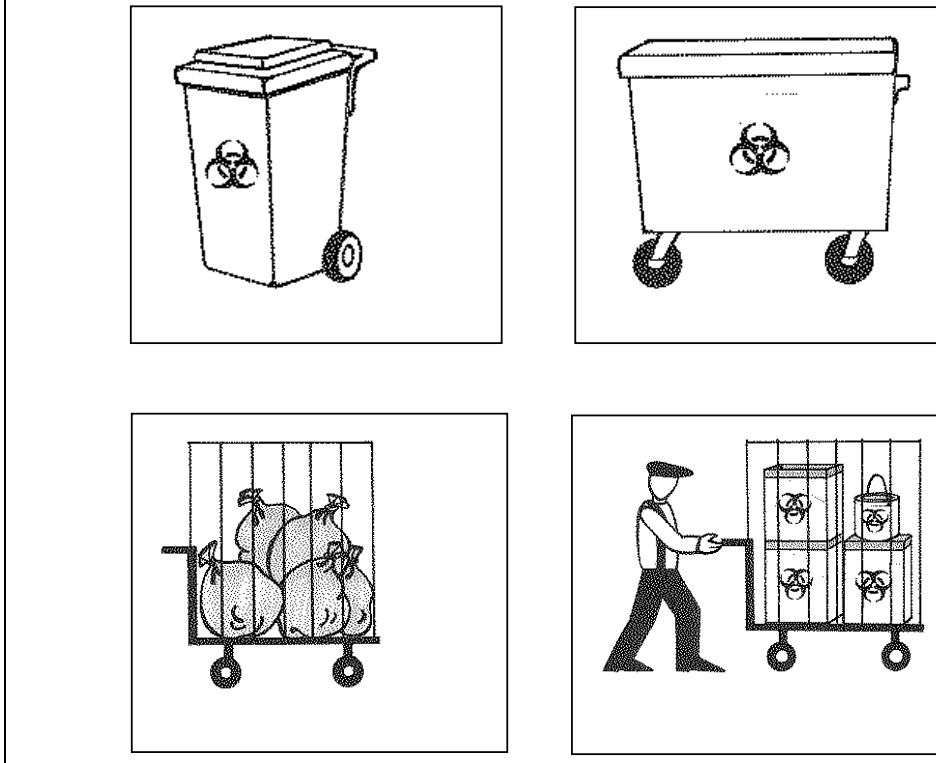


Figure 4.2 presents a typical example of the way in which HCW containers are to be carried in a safe manner.



Figure 4.2: Necessary personal protective equipment to use for carrying HCRW

The required training should therefore include the aspects as presented in Box 4.7.

Box4.7: Training requirements for staff responsible for internal collection and transport of HCW

Procedures for safe handling and loading of various HCW containers;  
Emergency procedures in the event of an accident or HCW spillage;  
Occupational Health and Safety requirements, including the correct use of personal protective equipment.



Standard procedures related to this are to be compiled and distributed to all affected members of staff. In addition to this, the information is also to be conveyed by means of graphic illustrations like for instance posters, particularly as many of the persons involved in this activity may not be able to be capacitated by means of written procedures and manuals due to the many different languages used in South Africa.

The most prominent options for rendering the internal collection and transport service is summarised in Box 4.8. These include consideration of the responsible parties, frequency of service delivery, as well as the alternative types of collection equipment to be used.

Box 4.8: The following options are available for internal collection and transport of HCW:

Service delivery by health care professionals at small HCW generators, or by internal or external cleaning staff or by waste management staff at larger HCW generators;

Fixed collection schedule less than once a day, once a day or more than once a day. Alternatively when called upon or when full containers are observed;

Manual carrying of HCW containers over short distances, movement by means of individual trolleys over medium distances or motorised movement of multiple trolleys over long distances to central storage areas;

Trolley bins for collection of bagged HCW or caged collection trolleys for collection of bagged or boxed HCW.

In Table 4.1 below examples of equipment for internal transport of HCW, including technical specifications and typical prices, are shown.

Table 4.1: Guiding specifications and prices of internal waste collection and transport equipment.

Item	Technical specification	Approximate price in Rand / piece
240-litre wheelie bin	Plastic.	xxxx
660-litre wheelie bin	Plastic	xxx
Expanded metal cage trolley (±0,7 x 1,5 metres)	Powder coated steel.	xxx
Expanded metal cage trolley (±0,7 x 1,5 metres)	Galvanised.	xxx
Bar fence trolley (±0,7 x 1,5 metres)	Powder coated steel.	xxx
Bar fence trolley (±0,7 x 1,5 metres)	Galvanised.	3-5,000
Electrical carts		20 – 50,000
Gas driven carts	xx	xx

#### 4.8 Storage of HCW at the Central Storage Area

Having collected and transported the HCW from the various sources (or intermediate storage areas) inside the health care facility, the HCW is to be accumulated at a central onsite storage area from where it is to be collected for onsite- or offsite treatment. Centralised storage can therefore be described as the placement of HCW in a suitable location outside the health care facility, but within the outer perimeter thereof, with the intention of near future removal for treatment and/or disposal.

Although limited, there may be situations where the health care facility, and therefore the sources of HCW generation, are spread over such large areas, that the establishment of a second central storage

area may be justified to reduce the transport distance between the intermediate storage areas and the central storage area.

A number of recommendations related to the central storage of HCW are presented in Box 4.9.

Box 4.9: Recommendations related to central HCW storage:

The following requirements exist for central HCW storage areas:

Each health care facility should have at least one dedicated central HCW storage area serving as either i) the interface from where service providers collect waste for off-site treatment or ii) from where waste is brought to the nearby on-site treatment facility;

The size of the central storage area will be determined by the total volume of HCW being generated between external collection rounds, with adequate allowance for backup in the event of a sudden increase in the HCW generation rate or alternatively a temporary breakdown in the HCW collection service; Should an on-site treatment facility be used, the size of the central storage area could be reduced, depending on the availability and efficiency of the on-site treatment operation;

For smaller HCW generators, the intermediate and central storage areas could be combined;

The central storage area should be well ventilated and illuminated, be equipped with any required monitoring facilities (e.g. monitoring for radioactivity) and should also provide easy access for trolleys delivering HCW and trucks collecting HCW. Ramps should not have an incline of more than 1:10 (vertical : horizontal);

The central storage area is to provide effective access control by means of a lock to prevent unauthorised human and animal access, ensure isolation from the elements, protect waste from rodents, insects and vectors;

Clear signage should be provided at the entrance that indicates the contents of the room, the contact details for the responsible person as well as contact details for use in the event of an emergency;

The central storage facility should be placed away from food storage and kitchens;

The configuration of containers during storage will depend on the type of containers being used:

HCRW cardboard boxes (as well as reusable boxes) may only be stacked to a maximum height of three boxes;

Sharps containers are to be stacked in a configuration that will prevent it from collapsing;

Wheelie bins are not to be stacked at all;

High density waste like for instance blood or pathological waste in specicans, not to be stacked at all;

HCGW and HCRW may be stored in the same room, provided that the various HCW categories are separated to the extent that it will avoid unintentional mixing; Where justified, bulk HCGW storage containers, with or without compaction equipment to reduce the volume, may be considered as part of the central HCW storage facility;

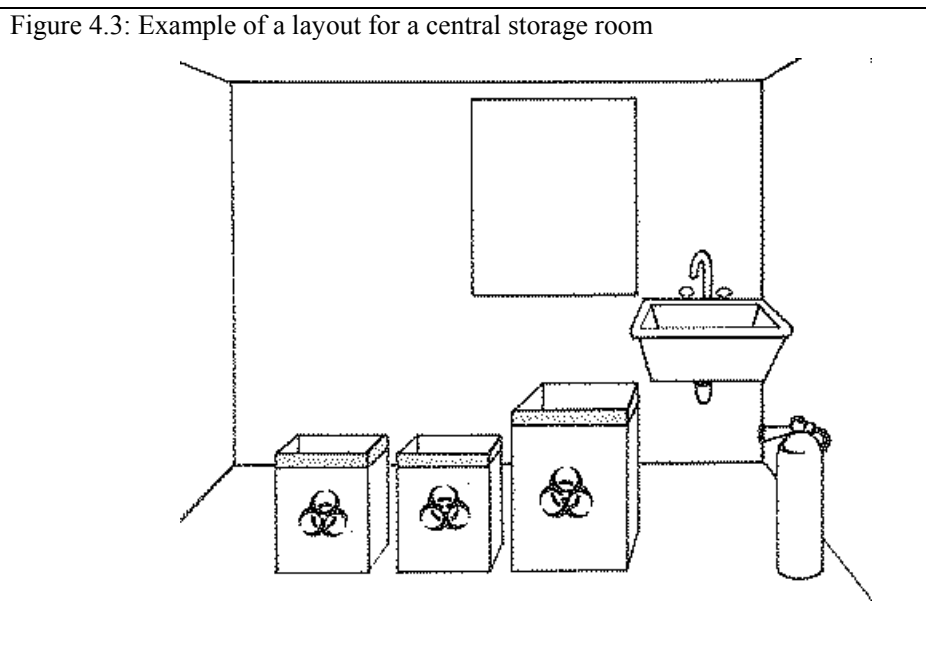
As most HCW contains biodegradable materials, the packaging should be tight and the storage time limited;

The central storage room temperature should be kept down by protecting it from temperature increases resulting from direct sunlight and un-insulated corrugated iron walls/roofs. Although it is preferred that HCRW be removed daily, the maximum storage time for HCW should be 72 hours (in moderate climates) and 48 hours (in hot climates);

All pathological waste as well as other HCRW, where required due to climatic conditions or extended storage periods, shall be cooled / refrigerated by means of i) dedicated cooling / refrigeration facilities for HCW at the central storage area,

or ii) the possible use of the morgue for cooling down of pathological waste;  
In the event of pharmaceutical waste being stolen, a dedicated area with increased security is to be provided for the storage of such waste;  
The floor of the central storage should be hard standing and impermeable with a floor drain and water supply as part of a wash facility. The floor should be free from damp and moisture;  
The storage room should be easy to clean and disinfect. For this purpose walls with ceramic tiles are preferred;  
A supply of cleaning equipment, protective clothing and waste bags or containers should be located conveniently close to the storage area;  
There should be no sources of open fires that can result in the outbreak of a waste fire;  
Where the distance from the any of the sources to the central storage area exceeds 500-m, the establishment of a second central storage area should be considered, in order to get a shorter travelling time between the source and the HCRW central storage areas.

Figure 4.3 shows an example of a layout for a central storage room indicating required equipment and fixed installations.



The training required would go hand-in-hand with the training of the internal collection and transport staff, which will ultimately be responsible for the placing of containers inside the central storage area as well as the maintenance of the facility. Training will furthermore include the particular occupational health and safety as well as the emergency response measures that are to be implemented and adhered to for the central storage area.

In Box 4.10 a number of what is considered to be the most prominent options for centralised HCW storage, are considered.

Box 4.10: The following options are available for centralised storage of HCW:

Single or multiple centrally located storage areas for large health care facilities;  
Dedicated expired pharmaceutical storage area that will reduce the risk of theft and reuse of pharmaceutical waste.

Storage area sized for storage of HCRW only, storage of both HCRW and HCGW, storage of full HCW containers only or full HCW containers with dedicated area for new/sterilised empty containers.

Single or multi layer stacking depending on the type of containers to be stacked;  
Storing smaller containers in larger containers for easier handling.

HCW collection less than daily, daily or more than daily or as called upon;

No refrigeration or dedicated refrigerated facility at central storage area, or the use of the mortuary as refrigerated area for pathological waste;

Storage of HCGW in disposable plastic bags, small reusable containers, uncompacted bulk containers or in bulk compacter containers.

#### **4.9 Annexure 4.1: Proposals for posters and other info materials**

**(TO BE FINALISED AND INSERTED ON COMPLETION OF THE PILOT PROJECTS)**