

# ENVIS RP Centre

NORTH EASTERN HILL UNIVERSITY (NEHU)  
SHILLONG, MEGHALAYA



## Newsletter



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## Waste Management Practices

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## Editorial

Biomedical Waste (BMW) Management has increased tremendously thereby becoming an issue of real concern to healthcare facilities, nursing home experts as well as to nature. The bio-medicinal squanders produced from healthcare units rely on various factors, for example, waste management strategies, kind of health services units, inhabitation of human services units, specialization of medicinal services units, proportion of reusable items being used, accessibility of infrastructure, assets and so on.

The best possible administration of biomedical waste has turned into an overall compassionate subject today. Despite the fact that perils of poor administration of biomedical waste have excited the worry world over, particularly in the light of its sweeping impacts on human, well-being and the environment.

Presently there are numerous unfavorable and unsafe impacts to the environment including individuals which are caused by the "Hospital/Health care waste" created amid the patient care. Hospital waste is a potential danger to the health services laborers, public and widely varied vegetation of the area. The issues of the waste disposal in the healthcare facilities and hospitals have moved towards becoming issues of expanding concern.

*-Dr. Dinesh Bhatia*

## Introduction

Biomedical waste is the waste produced from medical activities. Huge sum of potentially infectious and hazardous waste is generated in hospitals. BMW from hospitals, nursing home and other health centers generated in huge quantities on daily basis comprising different wastes of hypodermic needles, scalpels blades, surgical cottons, gloves bandages, clothes, discarded pharmaceutical, blood and body fluids, human tissues and organs, radio-active substances and chemicals etc.

Hospitals/Clinics produce waste, which is increasing over the years in its amount and type. The hospital waste, in addition to the risk for patients and staffs who handle them moreover poses a danger to public health and environment. The Ministry of Environment, Forest and Climate Change hereby notifies the Biomedical Waste Management Rules 2016 for a regulatory management of Biomedical waste to improve the collection, segregation, processing, treatment and disposal of these wastes in an environmentally sound management.

### Did You Know:

Of the total amount of waste generated by health-care activities, about 85% is general, non-hazardous waste.



## World Health Organization (WHO) Report



According to WHO, the global economic growth of India was estimated to be 3.1% in 2015 against 3.4% in 2014. The health-care sector is growing at a tremendous rate due to its strengthened coverage, services and increasing expenditure by public as well as private players. India has a total of 1,69,913 health care facilities with bed strength of 17,86,108. Data on medical waste generated in the country is reported annually. All health-care facilities submit these data annually to the State Pollution Control Boards. The data from states are then compiled by the Central Pollution Control Board (CPCB) that are updated every year. The total quantity of medical waste generated in the country is 495.30tonnes/day (495300 kg/day). The average per bed per day medical waste generation of the country is 0.277 kg/day (495300/1786108: waste generated per day/ number of beds).

Average use of water/hospital bed/day is 400– 500 l/day. According to the rules, health-care facilities are required to ensure segregation of liquid chemical waste at the source and ensure pretreatment or neutralization prior to mixing with other effluent generated from health-care facilities (ensure treatment and disposal of liquid waste in accordance with the Water Prevention and Control of Pollution Act, 1974 (6 of 1974)).

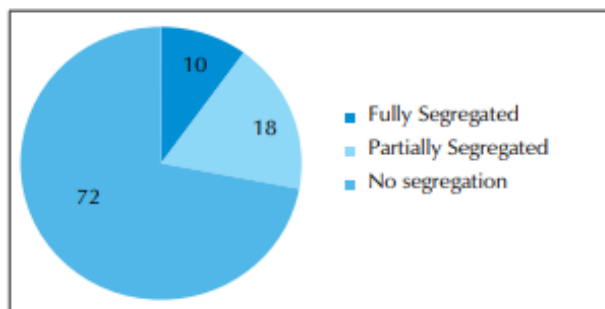
Some states have made mandatory a wastewater treatment plant Effluent Treatment Plant or Sewage Treatment Plant (ETP/STP) within the hospital (with 50 beds or more). They can discharge their wastewater only after meeting the required environmental standards. In practice, the waste water treatment facilities are struggling with the installation of such a plant and are directly discharging the wastewater into the sewer line.

In 1998, India formulated the rules on Bio-medical Waste called Bio-medical Waste (Management & Handling) Rules 1998.

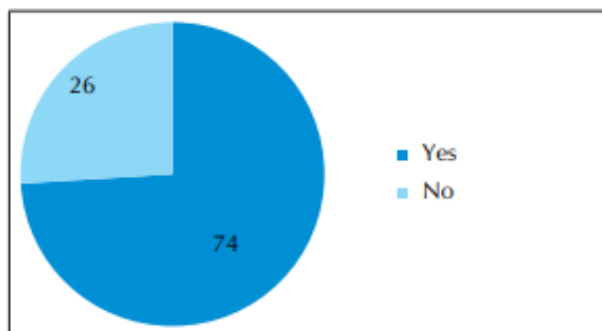
Over the years, the Ministry of Environment, Forest and Climate Change (MoEFCC), further revised and amended these rules and named them as Bio-medical Waste Management Rules, 2016 which are now available online on the Ministry's website.

Figure below shows the study outcome from a few hospitals in India namely West Bengal, Bihar, Uttarakhand and Jharkhand, to analyze the biomedical waste management system that hospitals are following, conducted by World Health Organization (WHO) in the **Report on health-care waste management status in countries of the South-East Asia Region-April 2017**.

**Figure 1: Segregation Status of Hospitals – India (%)**



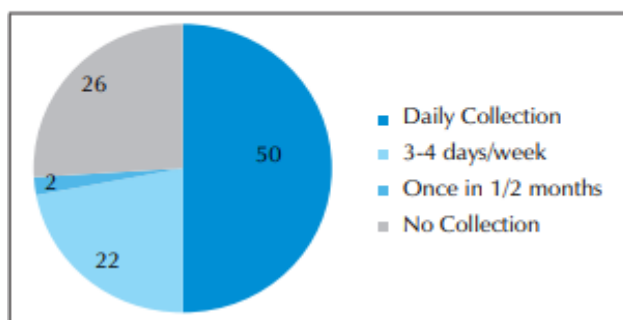
**Figure 2: Connectivity with CBWTF (%)**



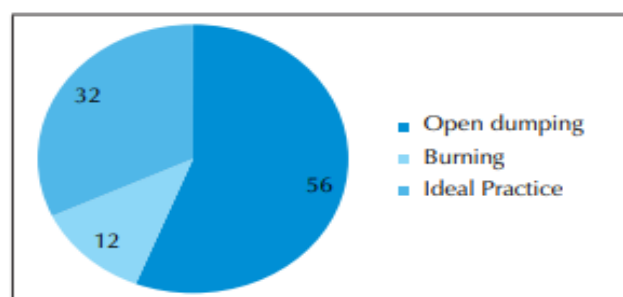
The greatest threat to our planet  
is the belief that someone else will save it.

- Robert Swan

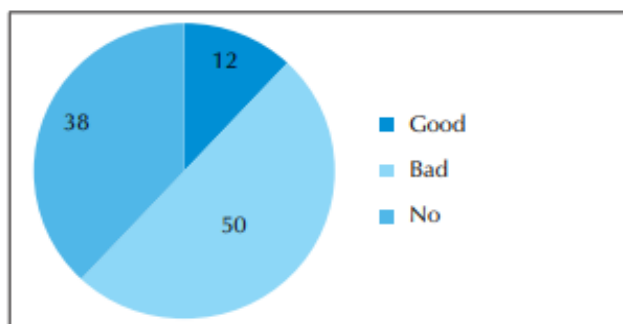
**Figure 3: Frequency of waste collection by CBWTF Vehicle (%)**



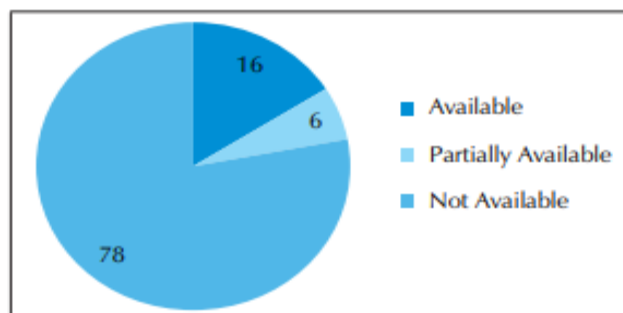
**Figure 4: Nature of waste Dumping (%)**



**Figure 5: Interim Storage Facility (%)**



**Figure 6: PPE Availability (%)**



- PPE - Personal protective equipment
- CBWTF - Common biomedical waste treatment facility

Source: WHO

## BMW in Meghalaya

The State Pollution Control Board (SPCB) monitors the management of medical waste at state level. The State Health Secretaries and Chairmen or Member Secretary of SPCBs and Central Pollution Control Board (CPCB) make sure that all the districts in the state conduct regular monitoring through the District Level Monitoring Committee and the implementation of BMW Rules, 2016 is reviewed by MoEFCC.

Based on Meghalaya SPCB 2015 annual report, the Status of BMW is as follows: -

1. The total number of Health Care Facilities (HCFs) in the state is 701.
2. There are 6385 numbers (approx.) of beds in the hospitals of the state.
3. The Total number of Bedded Hospitals and Non-Bedded Hospitals are more than 170 and 439 numbers respectively. While Veterinary Hospitals / Research organisations/Clinics/Diagnostic Centres, Pathological Labs, etc., account for more than 90 numbers.
4. 27 numbers HCFs are utilizing Common Bio-Medical Waste Incinerator installed at Mawiong, Shillong by Shillong Municipal Board.
5. The total quantity of BMW generated per day is reported at 1157.54 Kgs.
6. The total quantity of Bio-Medical Wastes treated per day is reported at 1157.54 Kgs.

## Major Sources of BMW

- Hospitals and other health facilities
- Laboratories and research centres
- Mortuary and autopsy centres
- Animal research and testing laboratories
- Blood banks and collection services
- Nursing homes
- Biomedical waste generated at home if health care is being provided.

## Segregation of BMW

According to the BMW Rules, 2016, waste should be segregated into 4 categories viz. yellow, red, white and blue. For General waste, a black colored plastic bag is used. Color coded containers should be lined with respective colored plastic bags as shown below.



All Human and Animal Anatomical Waste, Soiled Waste, Expired or Discarded Medicines, Chemical Waste, Discarded linen, mattresses, beddings contaminated with blood or body fluid etc. are discarded into yellow non-chlorinated plastic bags.

All Contaminated Waste (Recyclable) Wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles and fixed needle syringes) and vaccutainers with their needles cut) are discarded into red non-chlorinated plastic bags.



All broken or discarded and contaminated glassware including medicine vials and ampoules, except those contaminated with cytotoxic wastes, and Metallic Body Implants are discarded into plastic bags in cardboard boxes with blue colored marking.

All Waste sharps including metals, needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts are discarded into puncture proof, leak proof, tamper proof containers lined with white color-coded plastic bags.



All other waste other than mentioned above which are non-hazardous are discarded into bins lined with black color-coded plastic bags

\*Disposal by deep burial is permitted only in rural or remote areas where there is no access to common bio-medical waste treatment facility. This will be carried out with prior approval from the prescribed authority and as per the standards specified in Schedule-III. The deep burial facility shall be located as per the provisions and guidelines issued by Central Pollution Control Board from time to time.

Source: BMW Rules 2016, MoEFCC, GoI

Bins and bags should carry the biohazard symbol indicating the nature of waste to the patients and public.



The ENVIS RP Centre, NEHU, Shillong team did awareness campaign for the following two hospitals of Meghalaya, Shillong explaining them the safe practices to be followed for Biomedical waste management and study the current practices being followed by them in this regard.

### HISTORY OF NAZARETH HOSPITAL

Located in the heart of the city of Shillong, Nazareth Hospital is a voluntary, Non-profit organization started in 1959 as an out-patient treatment center. The Archdiocese of Shillong, the legitimate proprietor of Nazareth Hospital has endowed its organization and administration to the Sisters of the Sacred Cross Menzingen (North Indian Area) in the year 1988. The Hospital with its rich legacy of benefit was established in reaction to the needs of society. Since its initiation, it has gone through numerous stages of improvement and advancement, giving emergency services, routine administration and specialty services round the clock to visitors. It holds the status of a referral and educating institute.

In 1965, the hospital expanded into a 60-bedded hospital with OPD, Pharmacy and Laboratory facilities. In 1967, ten more beds were added to the existing number and in 1971, due to the increased demand, another 50 beds were added, making it 120 beds. The Community Health Program, which started in 1970, included Maternal and Child Health, Health Education and Immunization programs. The school of nursing was started in 1979. A new multi-story block was opened in 1997 with the help of MISEREOR, Germany. With this new block the bed strength was increased to 375.

### Study

Nazareth Hospital utilizes the most recent Biomedical Waste treatment and disposal measures as per the Biomedical Waste Management Rules, 2016. To guide and to educate all hospital staff on the critical, and now statutory, issue of appropriate hospital waste management, a '*Manual for Hospital Waste Management*' has been issued by the facility. What's more, the administration has likewise assigned an *Infection Control Team* including an *Infection Control Officer* to administer all issues relating to BMW administration and two Infection Control Nurses to guarantee appropriate adherence to the rules of the same.

### Waste Category

The hospital generates two types of waste namely, General (non-hazardous waste) and Hazardous (infection or toxic waste) based on their site of generation. The Infection Control Nurse inspects and ensures that proper segregation is being carried out at all points of generation and that sanitation staff are collecting the waste at least twice daily. They also ensure the availability of colour-coded bags and bins, labels and tags necessary for effective waste disposal.



ETP at NAZARETH HOSPITAL



ENVIS TEAM at NAZARETH HOSPITAL

### Did You Know:

Open burning and incineration of health care wastes can, under some circumstances, result in the emission of dioxins, furans, and particulate matter.



## Segregation

Colour-coded plastic-lined containers are deliberately set at all points of generation, keeping in mind the end goal to abstain from mixing of the different categories of waste. The sanitation staff gathers the waste, cleans the container with disinfectant and replaces the colour-coded plastic liner, twice every day. This procedure is recorded in an enroll with points of interest of the measure of waste in Kg, before being treated and put away in the Common Storage Area (CSA). General waste is put away in a roofed and grill-protection walled in area which guarantees that waste isn't open to scavenging animals and birds. There is an internal entryway which is accessed by the hospital sanitation staff and an external bolted entryway accessed by the Municipal Civic Authorities. BMW is stored in fitting shading coded and marked compartments. Recyclable waste is also kept in an isolated enclosure. A locked rear gate and security guarantee that no rag-pickers can gain access to the clinic waste.



Common Storage Area (CSA)

## Waste Treatment and Transportation

BMW is transported by the sanitation staff utilizing trolleys/carts from the point of generation twice every day. This is done on non-visiting hours of the hospital to maintain a strategic distance from mishaps, spillages and introduction of visitors to hazardous waste. If there should be an occurrence of any spillage or leakage, the Infection Control Nurse is informed for prompt activities of sanitization and cleaning. All the waste are transported to the CSA and lastly gathered by the Municipal Civic Authorities in case of common waste and by Municipal Biomedical Waste Transport truck for BMW. Syringes which have been sterilized at the point of generation, I.V. bottles and other such waste are subjected to shredding before collection by authorized recyclers. In case of Mercury spillage, the collected mercury is given over to the Infection Control Nurse which is then collected by Fresh Air Waste Management Services Pvt. Ltd., Guwahati.

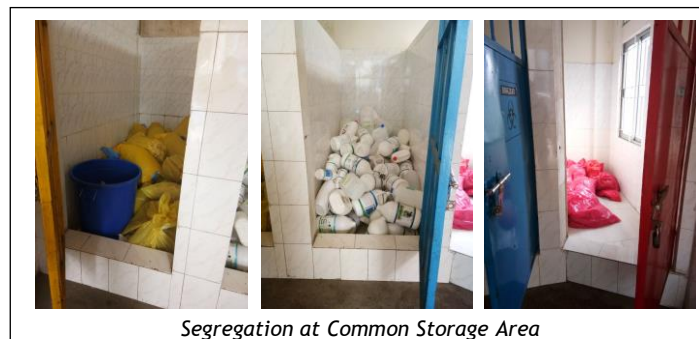
Nazareth Hospital also gives training of the staff, the patients and their attendants to completely fathom and actualize Hospital Waste management practices.



Segregation Guidelines



Segregation at Nursing Station || General Waste Storage



Segregation at Common Storage Area

Bio-medical waste generated in households during healthcare activities shall be segregated as per BMW rules 2016 and handed over in separate bags or containers to municipal waste collectors.  
- MoEFCC, GoI

## HISTORY OF CHILDREN'S HOSPITAL

Children's hospital is the first hospital for children in Northeast India, established in 2009 by Dr. Debashish Das. It is situated at Pohkseih, Rynjah, Shillong, at Near St John White Hall School.

Dr. Das is a reputed Paediatrician from Shillong, the city where he was born and raised. It provides state of the art health care facilities and aims to provide top quality medical service for children.

The hospital is spread over one-acre area with a built-up space of 20,000 square feet.

The spacious and hygienic hospital has 74 numbers of beds, an operation theatre, well-equipped laboratory, ultrasound facilities and other medical equipment necessary for paediatric care.

The hospital has been setup in such a way that children would feel comfortable and homely. The assortment of attractions also makes children forget their aches and pain and it is equipped with a playpen consisting of an array of toys.

It is a highly recommended hospital for children with updated medical facilities, hospitable staff and excellent doctors. The hospital is furnished with an outdoor park and attractive interior decor which provides a comfortable atmosphere for children.



ENVIS TEAM with Staff of Children's Hospital

## Study

The hospital management has designated an Officer In-charge to oversee all issues pertaining to Biomedical Waste Management and Infection Control team or nurses to ensure proper adherence to the guidelines of the same.

The Officer in-charge along with the Infection Control Nurses monitored and ensured that proper segregation is being carried out at all points of waste generation. They also ensured that waste is handled without adversely affecting human health and the surrounding. The Officer in-charge is responsible for applying the grant of authorization to the prescribed authority mentioned in Form-I and also responsible for submitting the annual report in Form-IV, to the prescribed authority on or before 30th June every year for the period from January to December of the preceding year.

## Waste Generation

Every ward or department of the hospital generates different kinds of waste. The hospital waste includes Human Anatomical waste, expired or Discarded Medicines, Chemical liquid waste, Micro-biology, Biotechnology and other clinical laboratory waste, Contaminated waste (Recyclable), Waste sharps including metals and Glassware/Ampules/vials.



Colour-coded labeled plastic containers

## Did You Know:

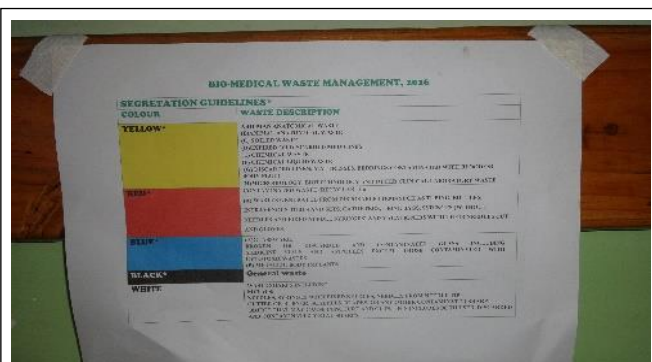
Health care establishments are responsible for the segregation of waste and it is mandatory for them to have an agreement with the authorized service providers, who dispose it legally.



## Segregation

Appropriate color-coded labeled plastic bags or containers are placed in all locations where particular categories of waste are generated.

Instructions on separation and identification of waste are posted at each waste collection point to remind the health staff of the procedures to be carried out.



*Proposed system for Segregation*

Personal protective equipment such as gloves and mask are provided to the workers.

The Nursing stations comprised of needle destroyer, hub-cutter and puncture proof container with 10% Sodium hypochlorite, savlon and bleaching for disinfection. Sharps waste was disposed in Underground sharp pit with Hume pipe. Containers with black polythene were found in all the bathrooms/restroom where general waste is collected.



*Needle Destroyer*



*10% Sodium hypochlorite (bleach)*



*Underground sharp pit with Hume pipe*

## Waste Treatment and Transportation

Nursing staff ensures that waste bags are tightly closed. Waste are collected daily from all locations or wards of the hospital and transported by ward girls/boys to the main storage site stored in a separate room. From there they are transported off-site and for authorization of its destination.



*Main Storage Waste Unit*

**Did You Know:**

According to the EPA, silver is listed as a hazardous waste due to its level of toxicity.

Training is being provided yearly to all hospital staff on management of medical waste generated in the hospital premises. The hospital also conducts periodic check-up for all its health care staff and others involved in handling of Biomedical waste and maintain the records for the same.

**Table 1: Segregation and Average quantity of waste generated per day in the year 2017**

Average Waste Generated per day in Children's Hospital, Shillong, Year 2017			
Category	Types of waste	Method of Treatment/Disposal	Average Quantity KG/day
Yellow	Human Anatomical waste	Returned to Bio-Medical Waste Transportation Marten	0.22
	Animal Anatomical waste		N.A
	Soiled Waste		6.04
	Expired or Discarded Medicines	Returned to Pharmacy	N.A
	Chemical solid waste	N.A	N.A
	Chemical liquid waste	ETP	18,500 litres
	Discarded linen, mattresses beddings contaminated with blood or body fluids	N.A	N.A
	Micro-biology, Biotechnology and other clinical laboratory waste	Returned to Bio-Medical Waste Transportation Marten	3.78
Red	Contaminated waste (Recyclable)	Returned to Bio-Medical Waste Transportation Marten	5.89
Blue	Glassware/Ampules/vials	Returned to Bio-Medical Waste Transportation Marten	7.78
	Metallic Body Implant	N.A	N.A
White(Translucent)	Waste sharps including metals	Sharp Pit	0.2

The liquid and chemical wastes are generated in laboratory and during housekeeping activities. Liquid waste such as blood and body fluid contaminated is disinfected with 10% hypochlorite solution and chemical waste is discharged into holding tanking.

These toxic liquid wastes are then sent to effluent treatment plants which are installed in the backside of the building before release into cement concrete underground sewers which are then fed directly to Sewage treatment plant and are monitored, evaluated and controlled effectively.



*Effluent Treatment Plants (ETP)*



*Underground Sewers*

## Conclusion

The management of above mentioned hospitals focused on guaranteeing adherence to the Rules and Regulation laid down by the Central Pollution Board and the State Government in respect to the control and secure administration of Biomedical Waste, and all endeavors are being made to closely follow the rules issued from time to time by the Government. The study showed a reduction of biomedical waste generation in both the hospitals due to effective waste segregation.



*Sewage Treatment Plant (STP)*



*Sewage Treatment Plant*

To save mankind from the “adverse effects of healthcare waste” effective management of biomedical waste is not only a legal necessity but also a “social responsibility”. Safe disposal of biomedical waste is now a legal requirement in India. The respective waste management committee are responsible for monitoring at the hospital level. To reduce the health care waste generation, a proper segregation of waste at source of generation is very important.

In accordance with Biomedical Waste Management Rules 2016, it is the duty of every “occupier” i.e. a person who has the control over the institution or its premises, to take all steps to ensure that waste generated is handled without any adverse effect to human health and environment.

Management of hospital waste is of extreme importance. The ENVIS Centre, NEHU in future would like to extend this awareness campaign to smaller hospitals and PHCs located in the state.



## Do's and Dont's

### Segregation

#### Do's

- a. Always segregate waste into infectious and non-infectious waste at source of generation.

#### Don'ts

- a. Never mix infectious and non-infectious waste at source of generation

### Collection and Storage

#### Do's

- a. Always collect the waste in covered bins.
- b. Fill the bins up to the 3/4th level.
- c. Clean the bins regularly with soap and water

#### Don'ts

- a. Never overfill the bins.
- b. Never mix infectious and non-infectious waste in the same bin.
- c. Never store waste beyond 48 hrs

### Transportation

#### Do's

- a. Always carry/transport the waste in closed containers from the source of generation to final disposal.
- b. Use dedicated waste collection bins for transporting waste

#### Don'ts

- a. Never transport the waste in open containers or bags, it may spill and cause spread of infections.
- b. Never transport waste with sterile equipment.

### Treatment and Disposal

#### Do's

- a. Always remember to disinfect and mutilate the waste before its final disposal

#### Don'ts

- b. Never throw infectious waste into general waste without any pre-treatment and mutilation.

### Broken Glasses

#### Do's

- a. Always safely cut and discard the ampoules and vials in puncture proof container.

#### Don'ts

- a. Never cut the ampoules in such a way that they can hurt others.

### Metal Sharps

#### Do's

- a. Discard the metal sharps like blades, lancets and scalpels in puncture proof containers.
- b. Disinfect the metal sharps with disinfectant solution before final disposal into sharps pit.

#### Don'ts

- a. Never discard the metal sharps in non-puncture proof containers

### Anatomical Waste

#### Do's

- a. Always segregate infectious waste and anatomical parts like placenta from other waste streams at the source of generation

#### Don'ts

- a. Never dispose the anatomical waste in un-secure open areas or in water bodies

**For further information, please contact:**

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