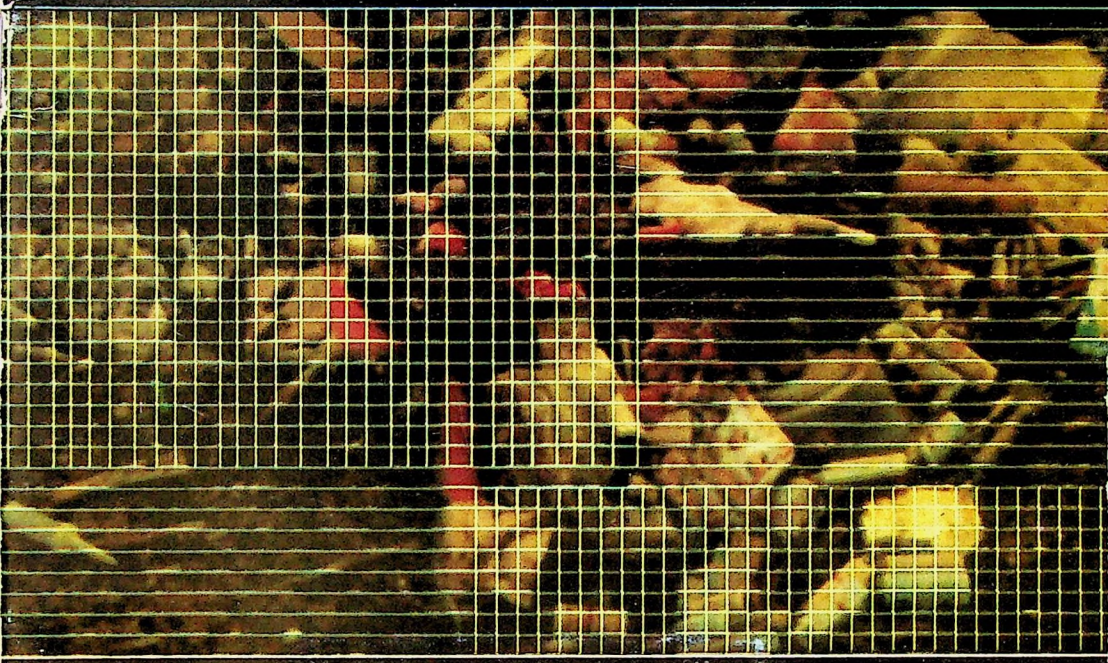
MANAGING



BIO-MEDICAL WASTE

Citizen consumer and civic Action Group

MANAGING

BIOHAZARD

BIO-MEDICAL WASTE

CAG

Citizen consumer and civic Action Group

CITIZEN, CONSUMER AND CIVIC ACTION GROUP (CAG)

CAG is a non-profit, non-political, voluntary and professional citizens' group that works for the protection of the rights of consumers on various issues. CAG is also involved in the areas of corporate responsibility, transparency, environment public health and safety.

Though the group started as 'Consumer Action Group' in 1985, it became **Citizen, consumer and civic Action Group** in the early 1990's, keeping in mind the larger role that was required in the city of Chennai. Specifically, issues affecting the common citizen such as severe pollution, lack of urban planning, poor quality of health and poor civic amenities have emerged as priorities for CAG. The study on the status of bio-medical waste management in the city of Chennai is one of CAG's current focus areas of work.

CAG's contribution has been recognised by the Government of India who awarded them the National Award for Consumer Protection in 1989 (Second Prize) and 1991 (First Prize).

Citizen consumer and civic Action Group

ACKNOWLEDGEMENTS

CAG wishes to acknowledge the efforts of the following people in making this booklet possible.

Gary Cohen and Health Care Without Harm (HCWH), USA for providing financial assistance to CAG's work on bio-medical waste;

Ravi Agarwal, Megha Rathi and others at Srishti, New Delhi whose work on bio-medical waste has been the source of inspiration for us to take up this work in Chennai and Tamil Nadu. Srishti's manual "Managing Medical Waste" has been the guiding document for this booklet.

Essential Information, USA for their extensive work on the effects of dioxins;

Rajesh Rangarajan and TOXICS LINK, Chennai for their inputs;

The unstinting efforts of my colleague Divya Mohan in putting this booklet together;

And the spirited VISTAAS team in Chennai for designing this booklet.

Bharath Jairaj
Legal Coordinator

September 27, 2001
Chennai

CONTENTS

Citizen consumer and civic Action Group

WHAT IS BIO-MEDICAL WASTE ?

- Bio - Medical waste is "Any waste which, is generated during the diagnosis, treatment or immunisation of human beings or animals or in any research activities pertaining thereto or in the production or testing of biologicals. It includes "any waste which is generated during the diagnosis, treatment or immunisation of human beings or animals or in any research activities pertaining thereto or in the production or testing of biologicals, and including categories mentioned in Schedule 1" - as defined by the Bio-Medical Waste (Management and Handling) Rules, 1998.

- It includes infectious and non-infectious waste. Infectious waste includes pathological waste, cotton, dressing, used needles, syringes, scalpels, blades, glass, etc. and non-infectious waste includes general waste from the kitchen / canteen, packaging material.

WHAT ARE THE BIO-MEDICAL WASTE RULES?

- The Government of India formulated the Bio-Medical Waste (Handling and Management) Rules in 1998 (hereafter referred to as the Bio-Medical Waste Rules) in order to specify procedures that have to be followed in the management and disposal of waste.

- The Rules apply to all hospitals, nursing homes etc. etc. in the country

- **The Rules apply to all persons who generate, collect, receive, store, transport, treat, dispose or handle Bio Medical Waste in any form.**

SOURCES OF BIO-MEDICAL WASTE:

- **The primary sources of Bio-Medical Waste are - Hospitals, Diagnostic Centres, Laboratories, Blood Banks, Nursing Homes and Clinics and Veterinary Hospitals and Clinics.**

Non - infectious waste forms nearly 90% of the waste generated by a hospital. The remaining 10% comprises of infectious waste and is generated in all the Wards, Operation Theatres, Intensive Care Units, Laboratories and Blood Banks. The waste generated in each of these areas can be categorised as follows:

- ***General ward (Out Patient Department - OPD), Department wards, Intensive Care Unit and Emergency Care*** - Cotton, dressing, bandages, syringes, needles, IV sets and tubing, blood sets, urine bags - all contaminated with blood, pus or other body fluids and other waste like packaging, paper waste and food waste.

- ***Operation Theatres*** - Pathological waste, Cotton, dressing, instruments, contaminated plastic waste like syringes, tubing, IV sets, Blood sets, contaminated linen, contaminated gloves, caps, masks, hospital gowns used by the patients as well as the staff and doctors.

- ***Laboratories*** - Contaminated samples, cultures, pipettes, petridishes, tips, test tubes (both plastic and glass), slides.

- ***Blood Banks*** - Contaminated samples, cultures, pipettes, petridishes, tips, test tubes (both plastic and glass), slides, blood bags, unused blood bags (past the expiry date) and infected blood bags.

- ***Nursing Homes and Clinics*** - These generate the same kind of waste that hospitals generate but on a smaller scale depending on the facilities provided and the number of beds.

CLASSIFICATION OF BIO-MEDICAL WASTE

Option	Category	Treatment & Disposal
1	Human and Anatomical Waste Human Tissues, Organs, Body parts	Incineration / Deep Burial.
2	Animal Waste Animal Tissues, organs, body parts, carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospitals and animal houses.	Incineration / Deep Burial.
3	Microbiology & Biotechnology Waste Waste from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell cultures used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures.	Incineration Autoclaving / Microwaving.
4	Waste Sharps Needles, syringes, scalpels, blades, glass, etc. that may cause punctures and cuts. This includes both used and unused sharps.	Disinfection (Chemical disinfection / autoclaving / microwaving and mutilation / shredding.
5	Discarded medicines and Cytotoxic drugs Waste comprising of outdated, contaminated and discarded medicines.	Incineration / Destruction and drugs disposal in secured landfills.
6	Solid Waste Items contaminated with blood, and body fluids including cotton, dressing, soiled plaster casts, lines, bedding, other material contaminated with blood.	Incineration Autoclaving / Microwaving.
7	Solid Waste: Items generated from disposable items other than sharps such as tubings, catheters, intravenous sets etc.	Disinfection by chemical treatment Autoclaving / Microwaving and Mutilation / shredding.
8	Liquid Waste Waste generated from laboratory and washing, cleaning, housekeeping, and disinfecting activities.	Disinfection by chemical treatment and discharge into drains.
9	Incineration Ash Ash from incineration of any Bio BIO-MEDICAL Waste.	Disposal in Municipal Landfill.
10	Chemical Waste Chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc.	Chemical treatment and discharge into drains for liquids and secured landfill for solids.

- Chemical treatment using atleast 1% Hypochlorite solution or any other equipment chemical reagent.
- Chemical treatment must ensure disinfection.
- Mutilation and shredding must be such to prevent unauthorised reuse.
- ***No chemical pre-treatment before incineration and chlorinated plastics shall not be incinerated.***
- Deep Burial shall be an option available only in towns with population less than 5 lakhs in rural areas.

HOW DO WE DEAL WITH THE WASTE?

- There are a few basic steps that hospitals have to follow in order to deal with Bio-Medical Waste.

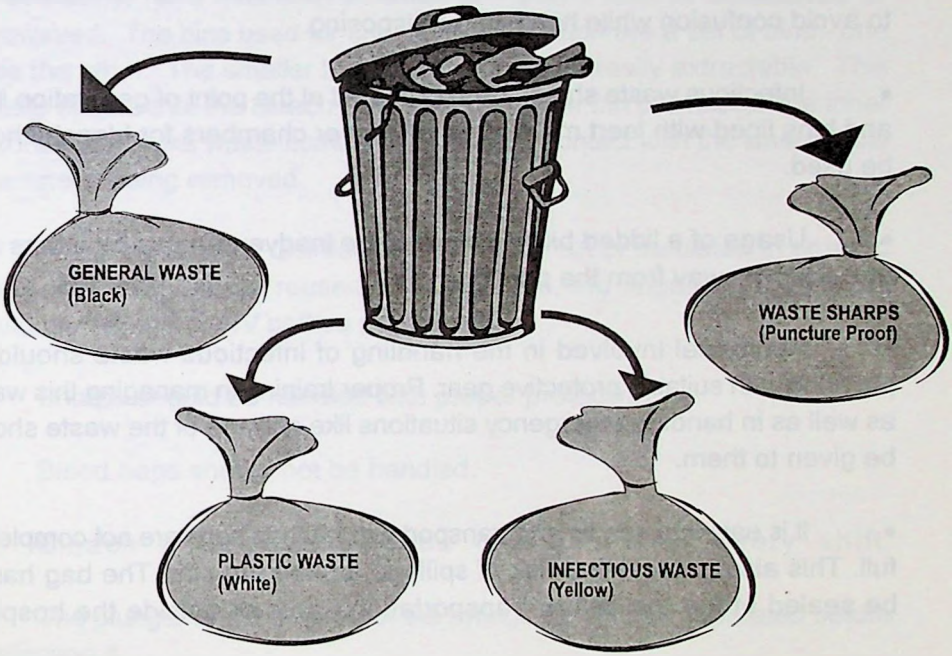
- The first and the most crucial step being that of **SEGREGATION.** Segregation of waste refers to the basic separation of the different categories of waste generated (as given earlier) at the source of their generation.

- The Bio - Medical Waste (Management and Handling) Rules, 1998 have stipulated the following method of segregation on the basis of a simple colour-coded system:

Color Code	Waste Category	Treatment as per Schedule I of the Rules
Yellow	• Human Anatomical Waste. • Animal Waste. • Microbiology and Biotechnology Waste. • Soiled Waste.	**Incineration / Deep Burial.** (These containers or bags shall not be made of chlorinated plastic).
Red	• Microbiology and Biotechnology Waste. • Soiled Waste. • Solid Waste.	**Autoclaving / Microwaving / Chemical treatment.**
Blue White Translucent	• Waste Sharps. • Solid Waste.	**Autoclaving / Microwaving / Chemical treatment and destruction and shredding.**
Black	• Discarded medicines and Cytotoxic drugs. • Incinerator ash. • Chemical Waste (Solid).	**Disposal in secured landfill.**

- Categories 8 and 10 (liquid) do not require containers/bags.
- Category 3 if locally disinfected need not be put in containers or bags.

COLOUR CODED SYSTEM FOR SEGREGATION OF BIO-MEDICAL WASTE



HOW DO WE TREAT WASTE?

Each kind of waste requires a different process of treatment depending on the material it is made of as well as the kind of micro organisms and waste it is likely to contain. Given below is a list of the different kinds of waste and the measures that have to be taken for safe handling and disposal of each kind of waste:

Infectious waste:

- Bags should be colour coded and should also be properly labelled to avoid confusion while handling or disposing.

- Infectious waste should be segregated at the point of generation itself and bins lined with inert material or with inner chambers for bleach should be used.

- Usage of a lidded bin will discourage inadvertent use by others and also keep it away from the public.

- Personnel involved in the handling of infectious waste should be provided with suitable protective gear. Proper training in managing this waste as well as in handing emergency situations like spillage of the waste should be given to them.

- It is easier to handle and transport waste when bags are not completely full. This also reduces the risk of spillage around the bin. The bag has to be sealed at the top before transportation within or outside the hospital.

- The recommended method of destruction of infectious waste if autoclaving and microwaving. Incineration is also an option but only for certain kinds of waste. The former however apart from being more environmentally friendly is also more cost effective than incineration.

- **ALL OPERATION THEATRE (OT) WASTE SHOULD BE SENT FOR AUTOCLAVING.**

Disposable Waste:

- Such items are often single use, disposable products like syringes, IV bottles, sharps, catheters and gloves. These items are often recycled and reused illegally and it is therefore imperative that chemical disinfection be followed for them.

- They have to be dipped in a chemical disinfectant solution (concentration depends on the potency of the waste - atleast 10gms per litre of water)) for a minimum duration of $^{1}/_{2}$ to 1 hour or autoclaved or microwaved. The bins used for chemical disinfection are a set of bins - one inside the other. The smaller being perforated and easily extractable. This will help ensure that the bleach solution in the outer bin permeates the inner bin containing these waste items and minimises contact with the waste while the waste is being removed.

- These items once disinfected have to be cut or mutilated in order to ensure that they are not reused. For instance, the fingers of the gloves should be cut and the IV bottles punctured.

- Sharps should be handled with proper protection.

- Blood bags should not be handled.

- Bleach solution should be changed after every shift.

- The plunger and the barrel of the syringe have to be separated before disinfecting it.

Sharps:

- Sharps have been defined by the Central Pollution Control Board consist of needles, syringes, scalpels, blades, glass and so on. These are all capable of causing punctures, lacerations and cuts.

- Sharps need separate attention as the risk of injury and infection in this area is very high. They therefore have to be separated at the point of generation.

- Manual bending, breaking or clipping of needles should be avoided as this may cause accidental innoculation. They should be destroyed with a Needle Cutter / Destroyer and then shredded.

- Sharps should be placed in a puncture proof container and it has to be marked conspicuously by the Universal Biohazard symbol.

Liquid Waste:

- Liquid chemical waste has to be neutralised with reagents before disposal.

- Liquid pathological waste has to be treated with disinfectant before disposal.

EMERGENCY SITUATIONS:

Accidents should be avoided and therefore systems have to deal with emergency situations should be developed. One of the most common occurrences while dealing with Bio-Medical Waste is the spillage and leakage of waste.

- Spill Protocol is therefore essential for any hospital. This refers to the measures that have to be taken to contain and decontaminate the accident site. This should include the following:

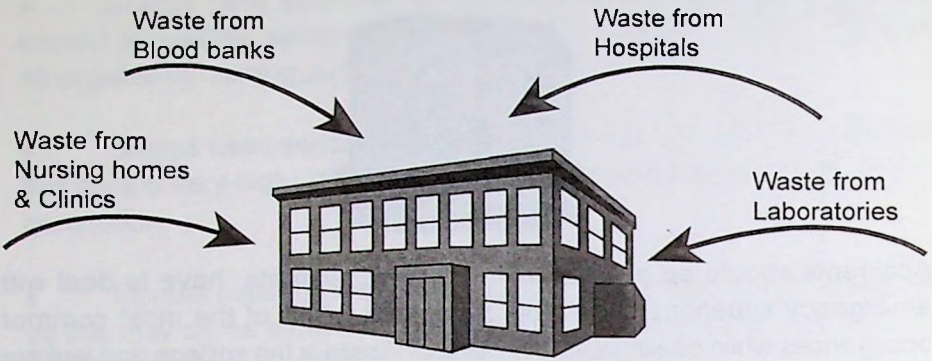
1. The surface containing the spill has to be mopped up with a swab soaked in disinfectant and then the swab should be put in the infectious waste bin.

2. No reagents should be sucked into the pipette with the mouth.

3. Other precautions to be kept in mind are the same as those followed in the rest of the hospital.

4. Laboratories should be well ventilated so as to ensure that personnel do not breathe in contaminated air. Precautions should also be taken to ensure that the general public do not breathe in this air.

CENTRALISED FACILITY FOR BIO-MEDICAL WASTE:



- Small healthcare units, like nursing homes and clinics, with minimal investment and space constraints may find it difficult to afford an individual disposal facility for bio-medical waste.

- In such cases these units could overcome this shortcomings by teaming up to establish a centralised facility for disposing off bio-medical waste.

- The Bio-Medical Waste Rules also have provisions for such combined facilities.

- Many municipalities and corporations across the country are proposing to establish such common treatment facilities.

- Bangalore and Hyderabad have already set the trend in the South, with Chennai soon to follow suit.

COMMUNITY'S ROLE IN BIO-MEDICAL WASTE MANAGEMENT:

While management of bio-medical waste is primarily the responsibility of medical institutions and those who actually generate this waste, the community has a very important role to play in ensuring that the hospital practices the prescribed procedures for treating bio-medical waste.

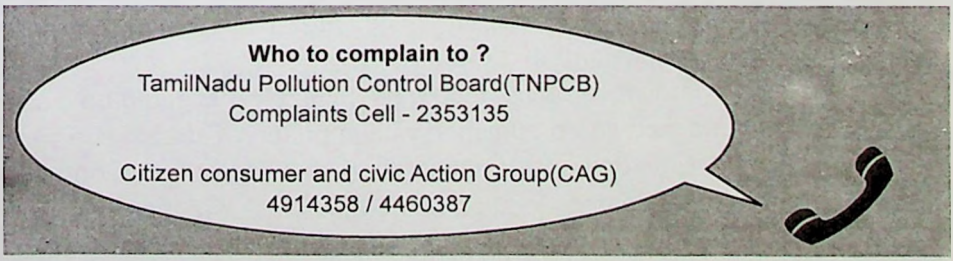
Patients, who form a part of the community, constantly utilise services of healthcare institutions and hence they also share the responsibility of ensuring that these institutions do not pollute the community.

A community can therefore do the following to ensure a higher level of health:

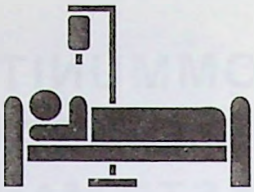
- Communities should strive to ensure that awareness programmes should be conducted in their areas through residents' associations on the issue.

- Communities should ensure medical practitioners having clinics in their localities do not dispose off their waste in the municipal waste stream, but arrange to send it to the centralised facility.

- Communities should remain vigilant and should promptly report breach in proper bio-medical waste practices by any hospital to the pollution control board.



PATIENTS ROLE IN A HOSPITAL:



- Patients can ensure that they dispose off of waste only in the bins provided in the hospital and help keep the premises clean and litter-free.
- Patients should understand the system of Bio -Medical Waste Management followed in the hospital.
- Patients should make sure that they report any irregularities in the hospital to the management.
- Patients with infectious diseases should ensure that they strictly adhere to the procedure suggested by the doctors especially for disposal of body fluids like sputum.

PROCEDURAL REQUIREMENTS UNDER THE BIO-MEDICAL WASTE RULES:

- Hospitals are required to file Form I to the prescribed authority for grant of Authorisation accompanied with the payment of the fee as prescribed by the State or Central Government.
- They are also required to submit a copy of their Annual Reports to the prescribed authority under Form II by January 31st every year.
- These reports shall be sent to the Central Pollution Control Board by the state pollution control board.
- Hospitals are mandatorily required to maintain records regarding generation treatment, disposal etc. of bio-medical waste, and these should be kept open for scrutiny. They are also required to report accidents under Form III.
- For non-compliance or violation a hospital or clinic could be closed or individuals could be punished with imprisonment upto five years (under the Environment Protection Act) or fined upto Rs. one lakh or both. For repeated violation a fine of Rs.5000/- every day could be levied.

FORM I

(see rule 8)

APPLICATION FOR AUTHORISATION

(To be submitted in duplicate.)

To

The Prescribed Authority
(Name of the State Govt/UT Administration)
Address.

1. Particulars of Applicant

(i) Name of the Applicant
(In block letters & in full)
(ii) Name of the Institution:
Address:
Tele No., Fax No. Telex No.

2. Activity for which authorisation is sought:

(i) Generation
(ii) Collection
(iii) Reception
(iv) Storage
(v) Transportation
(vi) Treatment
(vii) Disposal
(viii) Any other form of handling

3. Please state whether applying for resh authorisation or for renewal:
(In case of renewal previous authorisation-number and date)

4. (i) Address of the institution handling bio-medical wastes:

(ii) Address of the place of the treatment facility:

(iii) Address of the place of disposal of the waste:

5. (i) Mode of transportation (in any) of bio-medical waste:

(ii) Mode(s) of treatment:

6. Brief description of method of treatment and disposal (attach details):

7. (i) Category (see Schedule 1) of waste to be handled

(ii) Quantity of waste (category-wise) to be handled per month

8. Declaration

I do hereby declare that the statements made and information given above are true to the best of my knowledge and belief and that I have not concealed any information.

I do also hereby undertake to provide any further information sought by the prescribed authority in relation to these rules and to fulfill any conditions stipulated by the prescribed authority.

Date :

Signature of the Applicant

Place :

Designation of the Applicant

FORM II

(see rule 10)

ANNUALREPORT

(To be submitted to the prescribed authority by 31 January every year).

1. Particulars of the applicant:

(i) Name of the authorised person (occupier/operator):

(ii) Name of the institution:

Address

Tel. No

Telex No.

Fax No.

2. Categories of waste generated and quantity on a monthly average basis:

. Brief details of the treatment facility:

In case of off-site facility:

(i) Name of the operator

(ii) Name and address of the facility:

Tel. No., Telex No., Fax No.

4. Category-wise quantity of waste treated:

. Mode of treatment with details:

. Any other information:

. Certified that the above report is for the period from

Date ..... Signature .....

Place..... Designation.....

FORM III

(see Rule 12)

ACCIDENT REPORTING

1. Date and time of accident:

. Sequence of events leading to accident

. The waste involved in accident :

. Assessment of the effects of the accidents on human health and the environment,.

. Emergency measures taken

. Steps taken to alleviate the effects of accidents

. Steps taken to prevent the recurrence of such an accident

Date ..... Signature .....

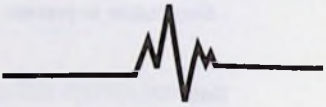
Place..... Designation.....

OVERVIEW OF TECHNOLOGY USED FOR BIO-MEDICAL WASTE TREATMENT AND DISPOSAL

As bio-medical is a specialised class of waste, that is highly infectious and hazardous, there are specific technologies are required to treat and dispose the waste. The standard technologies being utilised in the country for treatment and disposal of bio-medical waste are

- Microwave
- Autoclave
- Incineration

Microwave

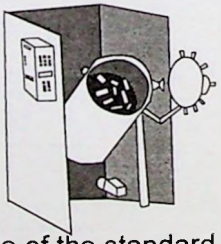


- The microwave is based on the principle of generation of high frequency waves.

- These waves causes the particles within the waste material to vibrate, generating heat.

- This heat generated from within, kills all pathogens.

Autoclave



- The autoclave operates on the principle of the standard pressure cooker.

- The process involves using steam at high temperatures.

- The steam generated at high temperature penetrates waste material and kills all micro organisms.

INCINERATION

A process that works on the simple principle of burning or combustion is technically called incineration. The incinerator, as the machine is referred to, uses either oil or electricity to power itself. Waste material is fed into the incinerator and is burnt in it. Normally incinerators are operated at temperatures between 300 ^{o}C to 1100 ^{o}C based on the volume of waste, the type of incinerator and the type of fuel used. Incinerators used in India are either single chambered or double chambered.

Incineration not only attempts to both kill the pathogens but also destroy the materials in which these reside - most of which are plastic disposables or cellulose rich materials etc. The burning of plastics, especially in unregulated incinerators is extremely hazardous as it creates a new set of chemical toxins, some of which according to current research, are highly toxic even in trace quantities. Some of the ***chemical toxins produced by waste incinerators*** are:

(a) Heavy metals, such as lead, cadmium, arsenic, chromium, nickel and so on, which are compounds that are present in plastics.

(b) Acid gases such as sulphur gases, hydrogen chloride and nitrogenous gases, particulate matter

(c) Dioxins and furans.

(d) Poly-Chlorinated Bi phenyls (PCBs) which, if not trapped in pollution control devices, have grave health effects on humans like endrocrinal problems thus causing disruptions in the human nervous system. If trapped, they become a part of the fly ash which is also very toxic and has to be disposed off carefully.

Of these, ***dioxins and furans are extremely toxic.*** These belong to a family of polycyclic aromatic hydrocarbons compounds which are formed when waste containing PVC plastic is burnt.

WHAT IS DIOXIN?

Dioxin is the common name for a class of 75 chemicals. Dioxin has no commercial use. It is a toxic waste product formed when waste containing chlorine is burned or when products containing chlorine are manufactured. PVC (polyvinyl chloride) plastic is a major source of the chlorine in medical waste. Commonly used PVC items in health care include medical equipment such as IV bags, gloves, tubing, oxygen tents, mattress covers, packaging and office supplies such as medical binders.

Exposure

When medical facilities burn their waste containing chlorinated plastics like PVC, dioxin will be emitted from the smokestacks of the incinerator. Dioxin particles travel long distances (transboundary). They are highly stable and do not break down and hence travel up the food chain. Ninety percent of human exposure to dioxin occurs through our diets of meat, dairy products, eggs and fish. Dioxin builds up in fatty tissue.

Health Effects

Dioxin is proved to be a human carcinogen by the International Agency for Research on Cancer (IARC). Immune system disruption, reproductive and development Effects and hormone disruption are amongst the major health problems reported from dioxin exposure. (Adapted from the Dioxin Factsheet of Essential Information)

Incinerators are difficult to run: In hospital environments, technologies like incineration fail because untrained hospital staff operate incinerators. Surveys show that most Incinerators (over 85%) are operated at incorrect temperatures, do not destroy the waste completely, are fuel inefficient, and are out of order most of the time. **There is a lot of difference between the theory and practices employed in the operation of Incinerators, making them a high risk method of disposal of waste - especially medical waste.**

OCCUPATIONAL HAZARDS:

- Hospital staff and waste handlers in the hospital run the highest risk of contracting disease from following improper Bio Medical Waste Management practices as they are exposed to a multitude of diseases and infection. Therefore, in the interests of the hospital, recognising the importance of Bio Medical Waste Management at the earliest is crucial as, apart from contracting disease, hospital staff can also be carriers of disease and infection.

- The current situation prevalent among healthcare waste handlers in hospitals is tantamount to violation of the basic human right of just and favourable conditions of work, in particular the Right to Safe and Healthy working conditions (Art 23) but also that of basic Right to Life and Security of person (Art 3).

- The hazardous nature of health care waste may be due to one or more of the following characteristics:

1. It contains infectious agents.

2. It is genotoxic (waste with mutagenic, teratoxic or carcinogenic properties). This kind of waste includes - certain cytotoxic drugs (those drugs with the ability to kill or stop the growth of certain living cells), vomit, urine or faeces from patients treated with cytotoxic drugs, chemicals and radioactive materials.

3. It contains toxic or hazardous chemicals or pharmaceuticals.

4. It is radioactive.

5. It contains Sharps.

Infectious waste may contain a wide variety of pathogenic micro-organisms. Pathogens in infectious waste may enter the body through a number of routes:

. Through a puncture, abrasion or a cut in the skin.
. Through the mucous membrane.
. By inhalation.
. By ingestion.

- There is a particular concern about infection with the Human Immuno-deficiency Virus (HIV) and Hepatitis viruses B and C for which there is strong evidence of transmission via health care waste. These viruses are generally transmitted through injuries from syringe needles contaminated with human blood.

France: In 1992, 8 cases of HIV infection were recognised as occupational infections. Two of these cases, involving transmission through wounds, occurred in waste handlers

- Sharps not only cause cuts and punctures but also infect these wounds if they are contaminated with pathogens. Owing to this double risk of injury and disease transmission, sharps are considered as a very hazardous waste class.

USA: In June 1994, 39 cases of HIV infection were recognised by the Centers for Disease Control and Prevention as occupational infections, with the following pathways of transmission:

**** 32 from hypodermic needle injuries.***
**** 1 from blade injury.***
**** 1 from glass injury (broken glass from a tube containing infected blood).***
**** 1 from contact with non-sharp infectious item.***
**** 4 from exposure of skin or mucous membranes to infected blood.***

- Different pathogenic micro-organisms have varying abilities to survive in the environment. For example it has been found that the Hepatitis B virus is very persistent in dry air and can survive for several weeks on a surface; it is also resistant to brief exposure to boiling water. It can survive exposure to some antiseptic chemicals and remains potentially infectious for up to 10 hours at a temperature of 60 ^{o} C.

- Equipment that is essential for a worker handling waste: Rubber gloves, shoes or boots, thick trousers and thick long-sleeved shirts. They should also be provided with convenient washing facilities (with warm water and soap) - particularly at the storage and incineration facilities.

- Periodic immunisation of hospital workers and staff against Hepatitis B is an absolute necessity.

- As far as cleaning up of spillages of body fluids or other potentially infectious waste is concerned, workers have to be provided with protection for eyes, respirators and hand tools like a shovel (to avoid direct contact with the waste) in addition to the standard gear mentioned above, in order to avoid any risk of eye injury and inhalation of any toxic fumes or dust.

MERCURY IN HOSPITALS:

- Mercury is used in hospitals in thermometers, blood pressure instruments, feeding tubes, dilators and batteries, dental applications, fluorescent tubes and in specific laboratory chemicals.

- Mercury is a highly toxic metal that has the ability to pass all the four main human physiological barriers - skin, blood, brain and placenta.

- Mercury can cause a variety of diseases on exposure like - bronchitis, muscle tremors, irritability and personality changes. It can also affect the central nervous system in a variety of ways - impaired vision and hearing, paralysis, sleeplessness, emotional instability, developmental defects during foetal development and during childhood. It is particularly dangerous to foetuses, women of child-bearing age, pregnant women and young children.

- It is important to note that toxic heavy metals like mercury produce health effects and symptoms that are not specific and are common to other disorders. Hence, health effects of Mercury maybe wrongly diagnosed or may even escape diagnosis i.e they may not be attributed to heavy metal poisoning.

- Hospitals and healthcare service providers in western countries are switching to non-mercury alternatives and gradually phasing out mercury in medical applications. Non -mercury substitutes are not only safe but also more accurate than their mercury counterparts.

ROLE MODELS OF BIO-MEDICAL WASTE MANAGEMENT

MADRAS MEDICAL MISSION, Chennai

1. Segregation of waste at source or at the point of generation.
2. Sharps Management.
3. Training of staff including doctors.
4. No incineration of waste.
5. A dedicated waste autoclave as well as a shredder **FOR PLASTICS AND SHARPS**.

SUNDARAM MEDICAL FOUNDATION, Chennai

1. A system for management of Bio-Medical Waste is being practised.
2. Dedicate autoclave for waste.
3. Sharps management initiated.
4. All plastics autoclaved.
5. Training was imparted to all hospital staff

SRI RAMACHANDRA MEDICAL COLLEGE AND HOSPITAL, Chennai

1. Segregation of waste.
2. Treatment of liquid waste and plastic waste.
3. Segregation, Hydroclaving and Shredding of plastic waste.

ORTHO NOVA MEDICAL CENTRE, New Delhi

1. A process to segregate the waste at all points till final point of disposal.
2. Proper containment and disinfection.
3. Trained personnel who are responsible.
4. Method of waste reduction.
5. Information distribution system.
6. A format to ensure the system runs smoothly.

HOLY FAMILY HOSPITAL, New Delhi

1. Good segregation system in place.
2. Proper waste sharps management and disinfection systems.
3. Well-trained staff.
4. Good monitoring of overall system.

For any further information please contact:

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