

Biomedical Waste Management

Waste
Management



Dr.Praveen Katiyar

**Let the wastes of “the sick” not
contaminate the lives of
“the healthy”.**

-Dr. K. Park

Waste
Management

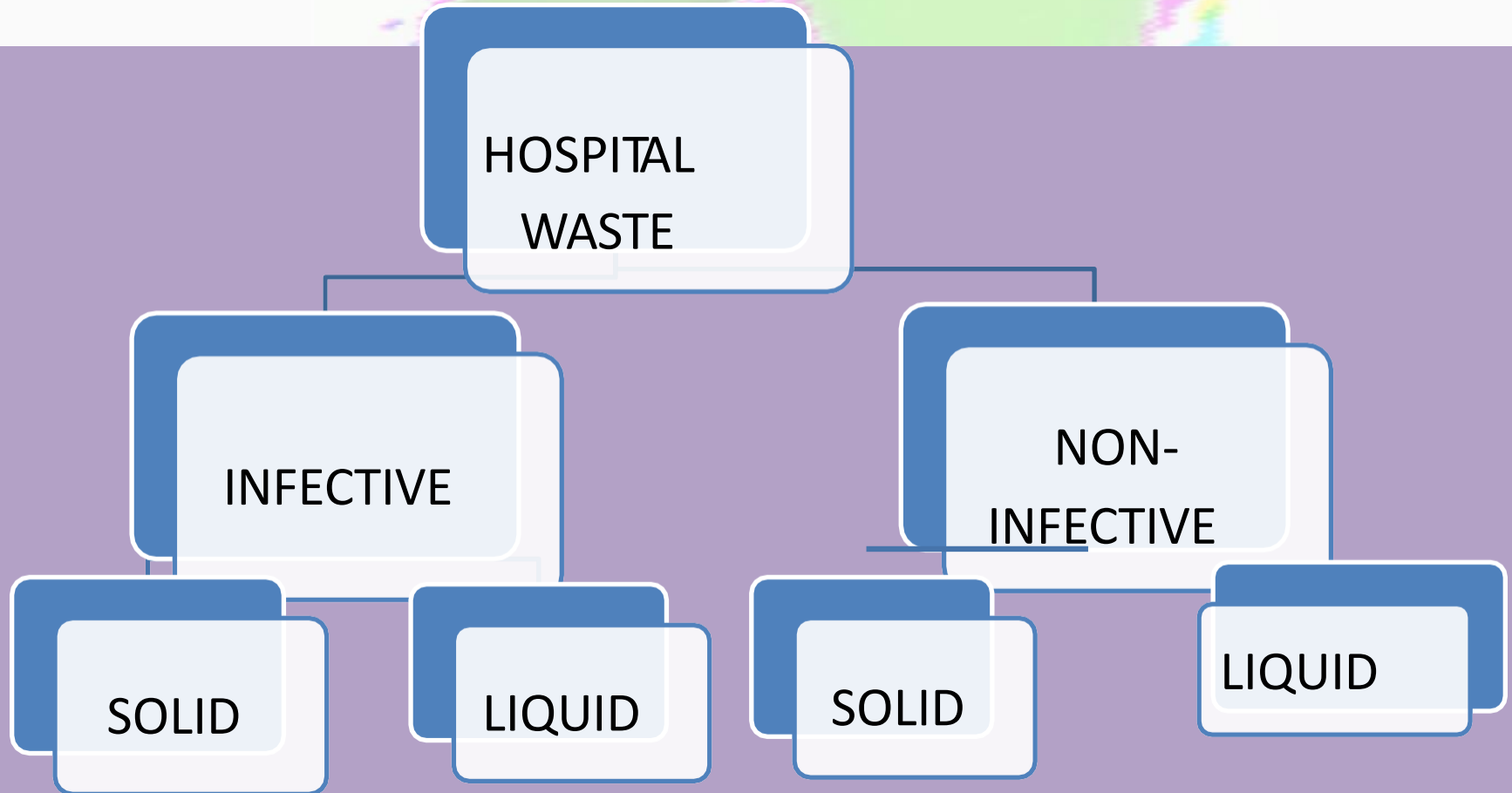


Definition

According to Bio-Medical Waste(Management & Handling) Rules, 2016 of India, Bio-medical waste means-

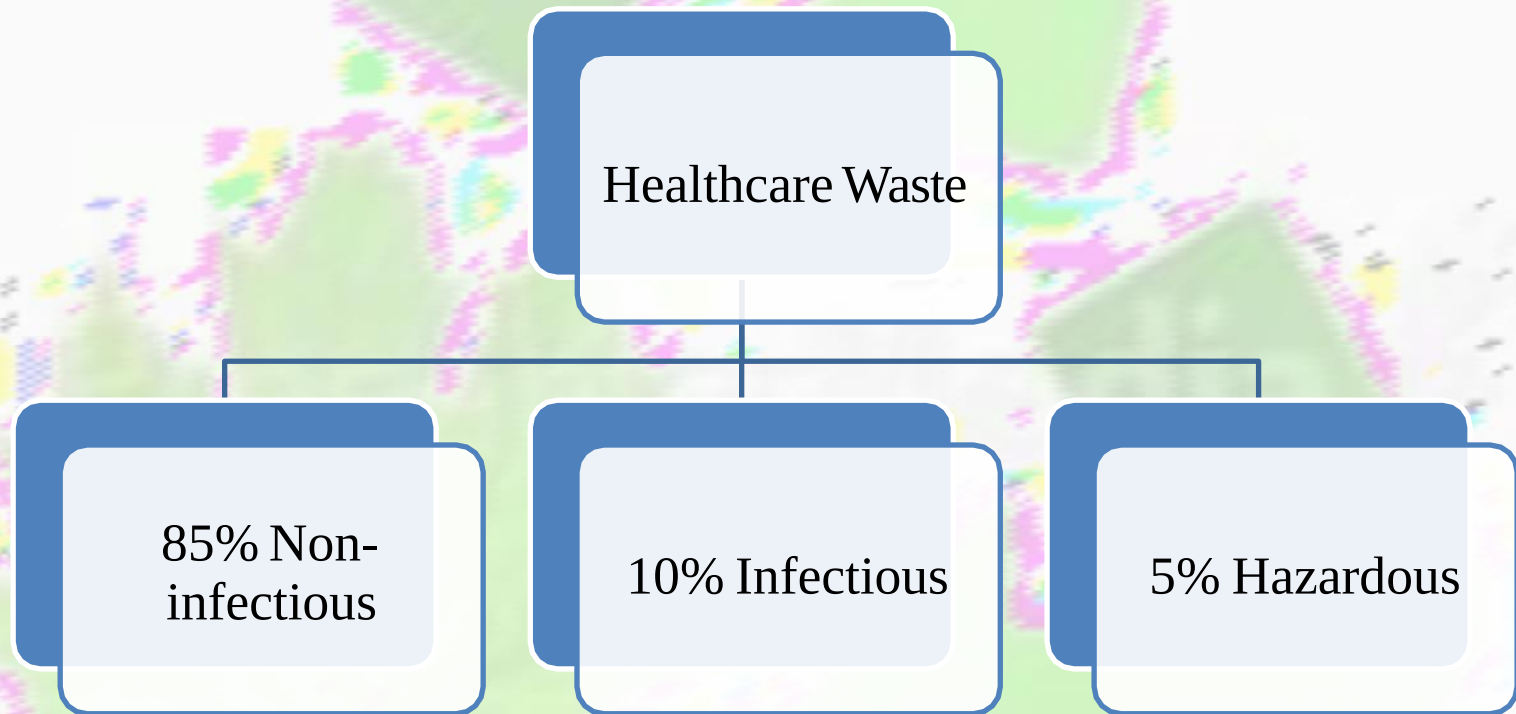
“means any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps, including the categories mentioned in Schedule I appended to these rules..”

Bio-medical Waste



Healthcare waste characterization

WHO



Bio-Medical Waste Management Rules, 2016.

SCHEDULE I, Part-1

Biomedical wastes categories and their segregation, collection, treatment, processing and disposal options

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Yellow	(a) Human Anatomical Waste: Human tissues, organs, body parts and fetus below the viability period (as per the Medical Termination of Pregnancy Act 1971, amended from time to time).	Yellow coloured non-chlorinated plastic bags	Incineration or Plasma Pyrolysis or deep burial*
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***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.**

Classification of Bio-Medical Waste

**INFECTIOUS
WASTE.**

**PATHOLOGICAL
WASTE.**

SHARPS.

**PHARMACEUTIC
AL WASTE.**

**GENOTOXIC
WASTE.**

**CHEMICAL
WASTE.**

**WASTES WITH
HIGH CONTENT OF
HEAVY METALS.**

**PRESSURIZED
CONTAINERS**

**RADIOACTIVE
WASTE**

Classification of bio-medical Waste

Infectious waste:

Waste suspected to contain pathogens e.g. laboratory cultures, waste from Isolation wards, tissue(swabs), materials or equipments that have been in contact with infected patients, excreta.



Pathological waste:

Human tissues or fluids e.g. body parts, blood and other body fluids, foetuses.

Classification of bio-medical Waste

Sharps:

Sharp waste e.g. needles, infusion sets, scalpels, knives, blades, broken glass



Pharmaceutical wastes:

Waste containing pharmaceuticals e.g. pharmaceuticals that are expired or no longer needed, items contaminated by or containing pharmaceuticals (bottles, boxes)

Classification of bio-medical Waste

Geno toxic waste:

waste containing substances with genotoxic properties
e.g. waste containing cytotoxic drugs (often used in cancer therapy), genotoxic chemicals.

Chemical waste:

Waste containing chemical substances e.g. laboratory reagents,, film developer, disinfectants that are expired are no longer needed, solvents.

Wastes with high contents of heavy metals:

Batteries, broken thermometers, blood pressure gauges etc.

Classification of bio-medical Waste

Pressurized containers:

Gas cylinders, gas cartridges, aerosol cans.

Radioactive waste:

Waste containing radioactive substances e.g. unused liquids from radiotherapy or laboratory research, contaminated glassware, packages, or absorbent paper, urine and excreta from patients treated or tested with unsealed radionuclides; sealed sources.

Sources of Biomedical or Health care waste

- Government Hospital
- Private Hospital
- Nursing Homes
- Physician's Office/clinics
- Dentist Office/clinics
- Dispensaries
- Primary health centres,
- Medical research & training establishments
- Mortuaries
- Blood Bank and collection centres
- Animal Houses, Slaughter houses
- Laboratories
- Research Organizations
- Vaccinating centres
- Bio- technology institutions/ Production units

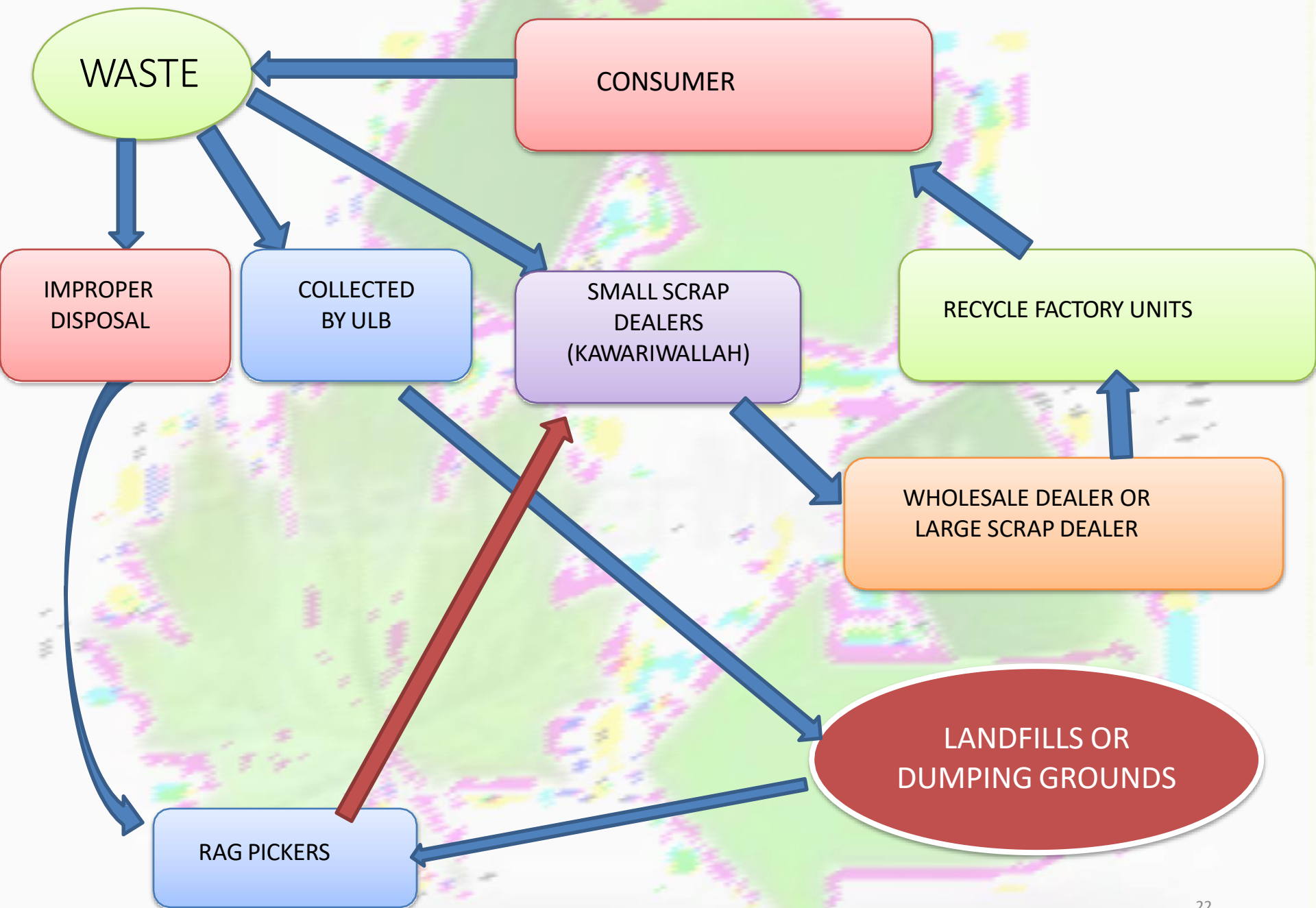
Need for BMW Management

- Nosocomial infections in patients from poor infection control practices and poor waste management.
- Drugs which have been disposed of, being repacked and sold off to unsuspecting buyers.
- Risk of air, water and soil pollution directly due to waste, or due to defective incineration emissions and ash.
- Risk of infection outside hospital for waste handlers and scavengers, other peoples.

Need of BMW Management in Hospitals???



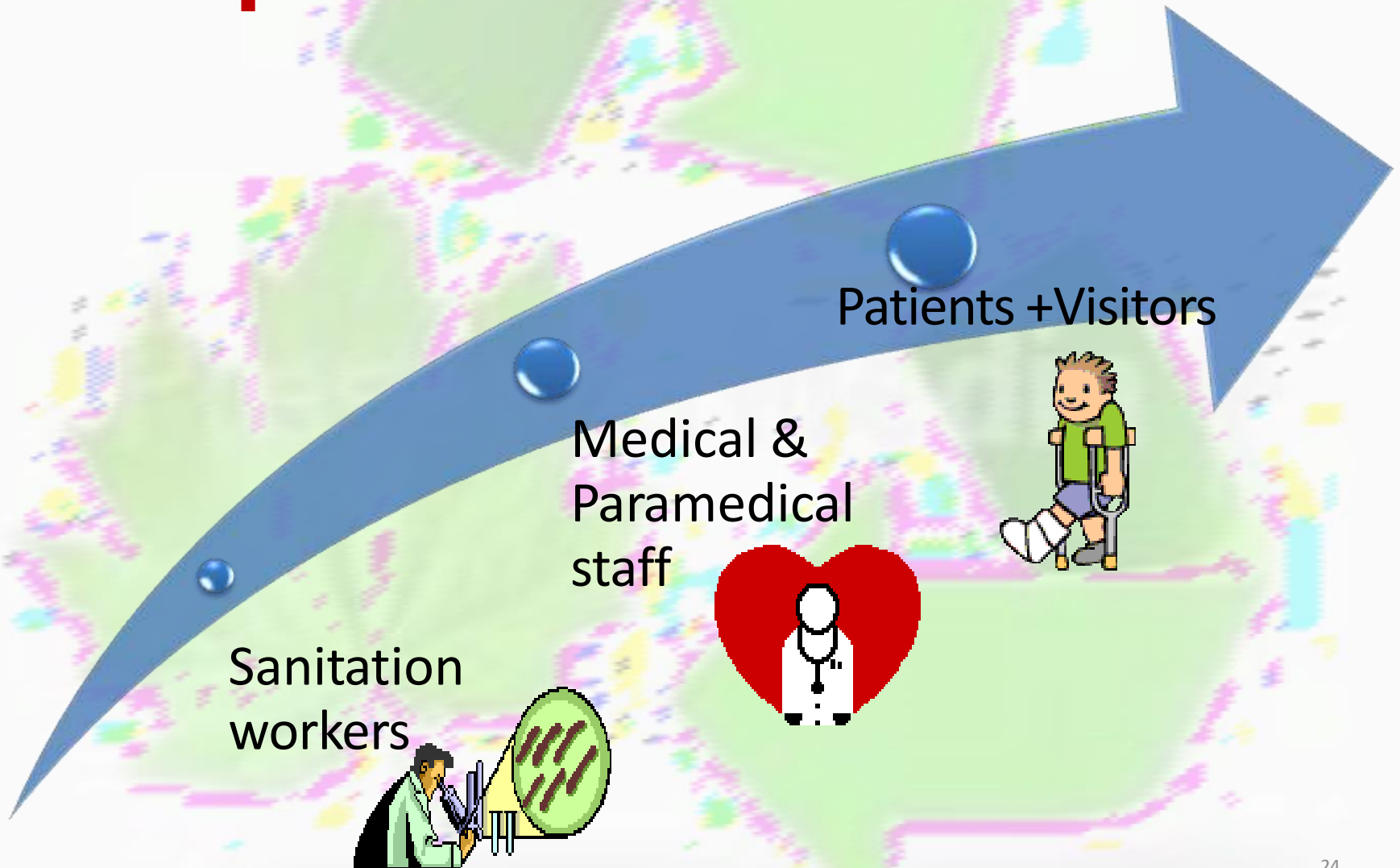
Health care waste is a risk to all, it affects us in different ways



Routes of transmission



Categories of persons exposed to risk of infection



Problem associated with BMW

ORGANISM	DISEASES CAUSED	RELATED WASTE ITEM
<u>VIRUSES</u> HIV, Hepatitis B, Hepatitis A,C, Arboviruses, Enteroviruses	AIDS, Infectious Hepatitis, Infectious Hepatitis, Dengue, Japanese encephalitis, tick-borne fevers, etc.	Infected needles, body Fluids, Human excreta, soiled linen, Blood, body fluids.
<u>BACTERIA</u> Salmonella typhi, Vibrio cholerae, Clostridium Tetani, Pseudomonas, Streptococcus	Typhoid, Cholera, Tetanus Wound infections, septicemia, rheumatic fever, endocarditis, skin and soft tissue infections	Human excreta and body fluid in landfills and hospital wards, Sharps such as needles, surgical blades in hospital waste.
<u>PARASITES</u> Wucheraria Bancrofti, Plasmodium	Cutaneous leishmaniasis, Kala Azar, Malaria	Human excreta, blood and body fluids in poorly managed sewage system of hospitals.

BMW

B



Begin a system



Make it effective



Work for its
success

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graph TD; A[BIOMEDICAL WASTE] --- B[PLANNING]; A --- C[ORGANIZING]; A --- D[IMPLEMENTING]
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BIOMEDICAL
WASTE

PLANNING

ORGANIZING

IMPLEMENTING

BMW Management

OBJECTIVES

- To minimize the production/generation of infective waste.
- Recycle the waste after treating to the extent possible.
- Treat the waste by safe and environment friendly/acceptable methods.
- Adequate care in handling to prevent healthcare-associated infections.
- Safety precautions during handling the BMW.

STEPS IN THE MANAGEMENT OF BIOMEDICAL WASTE





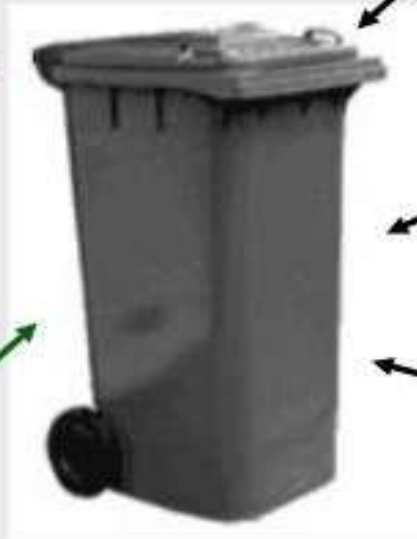
WASTE DISPOSAL



PAPER



KITCHEN WASTE/FOOD



BLACK BIN



WRAPPERS



WASTE DISPOSAL



Swab stick
decontaminated



SWABS



soiled linen,
contaminated
gowns,
drapes

Pathology waste



Human anatomical
waste-placenta



Dressing

Bandages



YELLOW BIN



WASTE DISPOSAL



Plastic culture plates & tubes



All infectious, non sharp plastic waste



Urine bag



Drains



I/V sets

DISPOSAL OF SHARPS

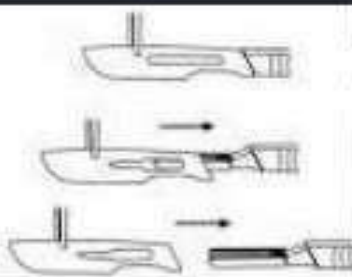
Destroy
needle



Cut syringe
tip



Decontaminate in twin
bucket having 1% bleach



SHARPS including
catheter guide wires





Inspection & Re-segregation



Label for Bio-medical waste containers/bags

BIOHAZARD SYMBOL



BIOHAZARD

CYTOTOXIC HAZARD SYMBOL



CYTOTOXIC

HANDLE WITH CARE

Note : Label shall be non-washable and prominently visible.

Treatment and disposal of BMW

As per biomedical waste management rules, 2016:

Bio-medical waste shall be treated and disposed of in accordance with Schedule I, and in compliance with the standards provided in Schedule-II by the health care facilities and common bio-medical waste treatment facility.

Bio-Medical Waste Management Rules, 2016.

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Yellow	(c) Soiled Waste: Items contaminated with blood, body fluids like dressings, plaster casts, cotton swabs and bags containing residual or discarded blood and blood components.	Yellow coloured non-chlorinated plastic bags	Incineration or Plasma Pyrolysis or deep burial* In absence of above facilities, autoclaving or micro-waving/ hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent for energy recovery.
	(d) Expired or Discarded Medicines: Pharmaceutical waste like antibiotics, cytotoxic drugs including all items contaminated with cytotoxic drugs along with glass or plastic ampoules, vials etc.	Yellow coloured non-chlorinated plastic bags or containers	Expired `cytotoxic drugs and items contaminated with cytotoxic drugs to be returned back to the manufacturer or supplier for incineration at temperature >1200 OC or to common bio-medical waste treatment facility or hazardous waste treatment, storage and disposal facility for incineration at >12000C Or Encapsulation or Plasma Pyrolysis at >12000C. All other discarded medicines shall be either sent back to manufacturer or disposed by incineration.

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Yellow	(g) Discarded linen, mattresses, beddings contaminated with blood or body fluid.	Non-chlorinated yellow plastic bags or suitable packing material	Non- chlorinated chemical disinfection followed by incineration or Plasma Pyrolysis or for energy recovery. In absence of above facilities, shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent for energy recovery or incineration or Plasma Pyrolysis.
	(h) Microbiology, Biotechnology and other clinical laboratory waste: Blood bags, Laboratory cultures, stocks or specimens of microorganisms, live or attenuated vaccines, human and animal cell cultures used in research, industrial laboratories, production of biological, residual toxins, dishes and devices used for cultures.	Autoclave safe plastic bags or containers	Pre-treat to sterilize with nonchlorinated chemicals on-site as per National AIDS Control Organisation or World Health Organisation guidelines thereafter for Incineration. ⁴²

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Treatment & disposal technologies for Bio-medical waste

- ☐ Incineration
- ☐ Chemical disinfection
- ☐ Wet and dry thermal treatment
- ☐ Microwave irradiation
- ☐ Land disposal
- ☐ Inertization

Treatment & disposal technologies for Bio-medical waste

Incineration:

- High temperature dry oxidation process that reduce organic and combustible waste into inorganic incombustible matter. Resulting in significant reduction in waste volume and weight.
- Process is selected to treat waste that cannot be recycled, reused or can be disposed in land.

Types of Incinerators:

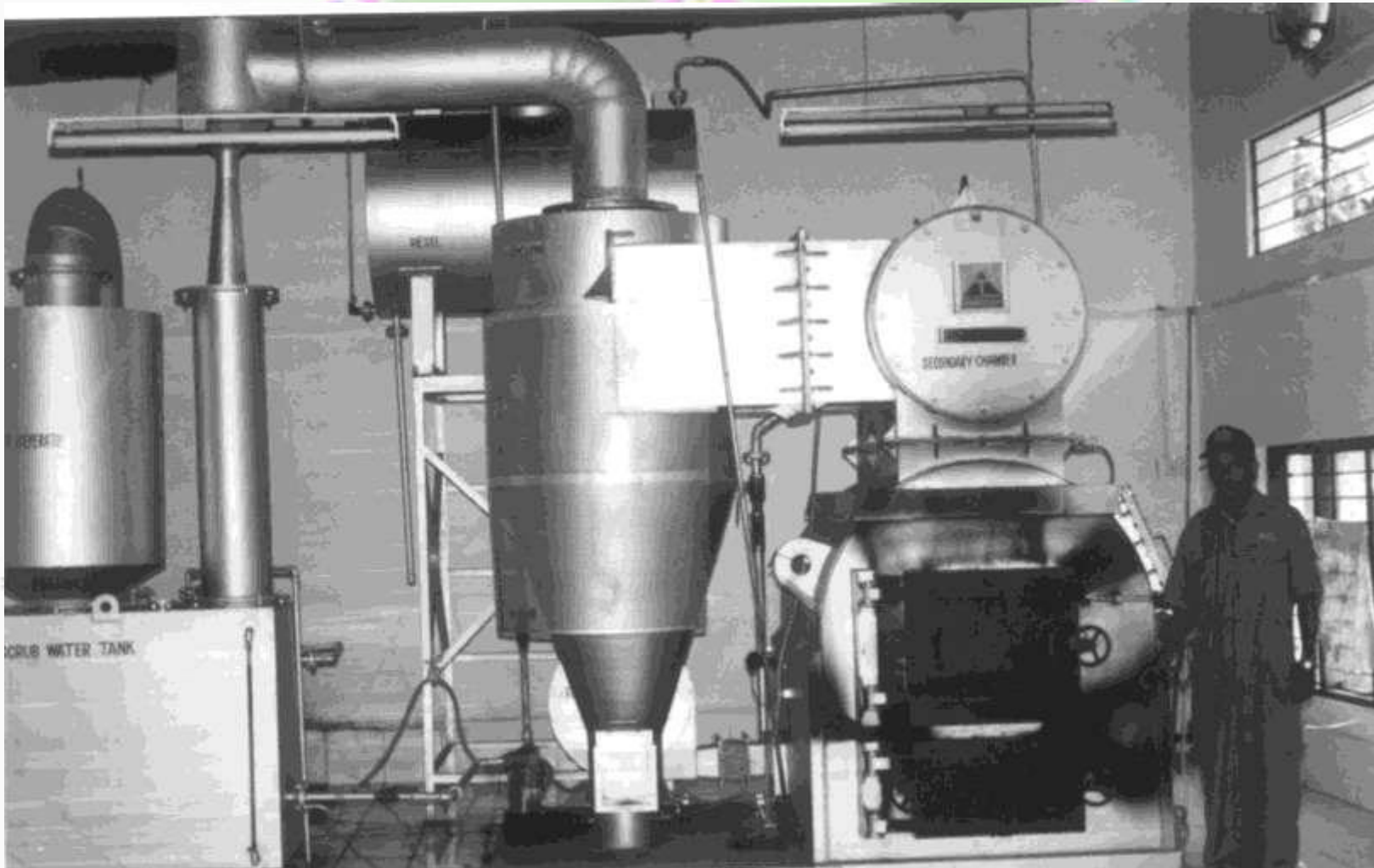
- Double chamber pyrolytic (for infectious waste)
- Single chamber furnaces with static grate (if double chamber not affordable)
- Rotatory Kilns (for genotoxic substances & heat resistant chemicals)



Incineration



Bio-medical wastes destruction by double chambered incinerator



Incinerator ash disposal



Treatment & disposal technologies for Bio-medical waste

Chemical disinfection:

- Commonly Used for treatment of liquid infectious waste e.g. blood, urine, stool and hospital sewage
- Chemicals are added to waste to kill or inactivate the pathogen it contains.

Bio-medical plastic wastes disinfection by Sodium hypochlorite

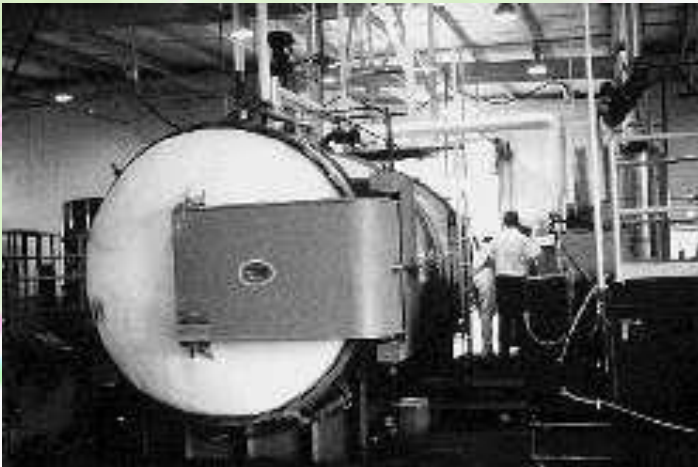


Treatment & disposal technologies for Bio-medical waste

Wet and Dry thermal treatment:

- Wet thermal treatment/steam disinfection is based on exposure of shredded infectious waste to high temperature, high pressure steam and is similar to process of autoclaving.
This is inappropriate for treating anatomical waste, chemical and pharmaceutical waste.
- Screw feed technology: Dry thermal treatment in which waste is shredded and heated in rotating auger. 80% volume and 20-35 weight is reduced, suitable for infectious waste and sharps.

Thermal processes



Treatment & disposal technologies for Bio-medical waste

Microwave irradiation:

- Microwave of frequency 2450MHZ and wave length 12.24cm used to destroy the microorganism. water contained in the waste is rapidly heated by microwave and infectious components are destroyed by heat conduction.

Treatment & disposal technologies for Bio-medical waste

Land disposal:

A. Open Dumps:

Risk for public health.

Health care waste should not be deposited on or around open dumps.

B. Sanitary landfills:

designed and constructed to prevent contamination of soil, surface, ground water and direct contact with public.

Land disposal facility for cities & towns with population less than 5 lacs



Treatment & disposal technologies for Bio-medical waste

Inertization:

- Process of mixing waste with cement and other substances before disposal in order to minimize the risk of toxic substance migrating into surface water or ground water and to prevent scavenging.
- Proportion of 65% waste 15% lime, 15% cement and 5% water is used.

Sharp storage & disposal



BIO-MEDICAL WASTE MANAGEMENT IN INDIA, Rules

- Bio-Medical Waste (Management and Handling) Rule 1998, prescribed by the Ministry of Environment and Forests, Govt. of India, came into force on 20th July, 1998.
- This rule applied to those who generate, collect, receive, store, dispose, treat or handle bio-medical waste, types of waste and treatment and disposal options under Rule 1998.
- Thus bio-medical waste should be segregated into containers/bags at the point of generation of waste.

Amendments in the rule 1998

- 1st Amendment Rules vide S.O.201(E) Dated 06/03/2000
- 2nd Amendment Rules vide S.O.1069(E) Dated 17/09/2003

- **THE AUTHORIZATION IS REQUIRED FOR**
 - **Generation/Collection/Reception/Storage**
 - **Transportation**
 - **Treatment/Disposal**
 - **or any other form of handling.**

New BIO-Medical Waste Management Rules

- Government of India, Ministry of Environment, Forest and Climate Change, has notified the new Bio-Medical Waste Management Rules, 2016 on 28th March, 2016 under the Environment (Protection) Act, 1986 to replace the earlier Rules (1998) and the amendments there of.
- **Published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i)] New Delhi, the 28th March, 2016**
- They shall come into force on the date of their publication in the official Gazette.

BIO-Medical Waste Management Rules 2016

Application:

These rules are applicable to all persons who generate, collect, receive, store, transport, treat, dispose, or handle bio medical waste in any form including hospitals, nursing homes, clinics, dispensaries, veterinary institutions, animal houses, pathological laboratories, blood banks, ayush hospitals, clinical establishments, research or educational institutions, health camps, medical or surgical camps, vaccination camps, blood donation camps, first aid rooms of schools, forensic laboratories and research labs.

These new Rules are more.....

- Comprehensive in nature
- These contain important features of BMW (M & H) Rules, 1998
- Several new provisions have been added in the new Rules.
- Contain:
Rules-18
Schedule-01 to 04
Form-01 to 05

Major Difference between BMW Rules 1998 & 2016

	1998	2016
1	Occupiers with more than 1000 beds required to obtain authorisation	Every occupier generating BMW, Including health camp or ayush requires to obtain authorisation
2	Operator duties absent	Duties of the operator listed
3	Biomedical waste divided in ten categories	Biomedical waste divided in 4 categories
4	Rules restricted to HCEs with more than 1000 beds	Treatment and disposal of BMW made mandatory for all the HCEs
5	No format for annual report	A format for annual report appended with the rules
6	Shudule I, II, III, IV, V	Change of Shudule I, II, III, IV

CONCLUSION

Lets make this world a better place to live in.

Plz Manage waste properly.



Thank You!

