

# HOSPITAL WASTE MANAGEMENT



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**LET THE WASTE OF THE  
“SICK” NOT CONTAMINATE  
THE LIVES OF  
“THE HEALTHY”.**

**K.PARK**



# **OBJECTIVES**

## **Definition**

**Classification of waste (WHO)**

**Source of Health Care Waste**

**Health care waste Management provision and study (Nepal Context)**

**Magnitude of problem in developing and developed countries**

**Problems associated with Health care waste**

**Generation/Segregation/Storage/Transportation/Treatment & Disposal of waste**

**Treatment technique & categorical treatment.**

# DEFINITION

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- ✦ Hospital waste are the waste produced in the course of health care activities during Treating, Diagnosing, and Immunizing Human being or animals or while doing Study/Research activities.
- ✦ 75-90% Non-Hazardous/General Waste
- ✦ 10-15% -Hazardous



# WHO CLASSIFICATION

Waste Categories	Description and Examples
1.General Waste	No risk to human health eg:office paper,wrapper,kitchen waste,general sweeping etc.
2.Pathological Waste	Human Tissue or fluid eg:body parts,blood,body fluids etc.
3.Sharps	Sharp waste eg:Needle,scaples,knives,blades etc.
4.Infectious waste	Which may transmit bacterial,viral or parasitica disease to human being,waste suspected to contain pathogen eg:labrotory culture,tissues(swabs)bandage etc.
5.Chemical waste	Eg:Labrotory reagent,disinfectants,Film Developer
6.Radio-active waste	Eg: unused liquid from radiotherapy or lab research,contaminated glasswares etc.

Waste Categories	Description with examples
7.Pharmaceutical Waste	Expired outdated drugs /chemicals
8.Pressurized container	Gas cylinder,aerosal cans etc
9.Genotoxic Waste	Waste Containing Cytotoxic Drugs(often Used In Cancer Therapy)

*As propageted by CDC,Atlanta under US classification,Pathological waste,and Sharp waste also come under 'INFECTIOUS WASTE'*

**\*\*Types and nature of hospital waste depends upon the service available in hospital and nature of the hospital.**



# SOURCE OF HEALTH CARE WASTE

- ✘ Governmental Hospital
- ✘ Private Hospital
- ✘ Nursing Homes
- ✘ Physician's Office
- ✘ Dentist Office
- ✘ Dispenseries
- ✘ Mortouries
- ✘ Blood Bank and collection center
- ✘ Animal Houses
- ✘ Labrotories
- ✘ Research Organizations

## NEPAL CONTEXT

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- ✦ NHRC & WHO published-:National guidelines for Health care waste management” in 2002 on behalf of ministry of health.
- ✦ Kathmandu Metropolitan City also have initiated an action plan in association with USAID for management of health care waste.



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- ✦ Kathmandu Metropolitan City & ENPHO have organized a study on biomedical waste in hospital located in Kathmandu.
  - ✦ Results: 1.72kg waste/day/patient
  - ✦ Out of which 26% of waste was infectious and hazardous waste.





## MAGNITUDE OF THE PROBLEM

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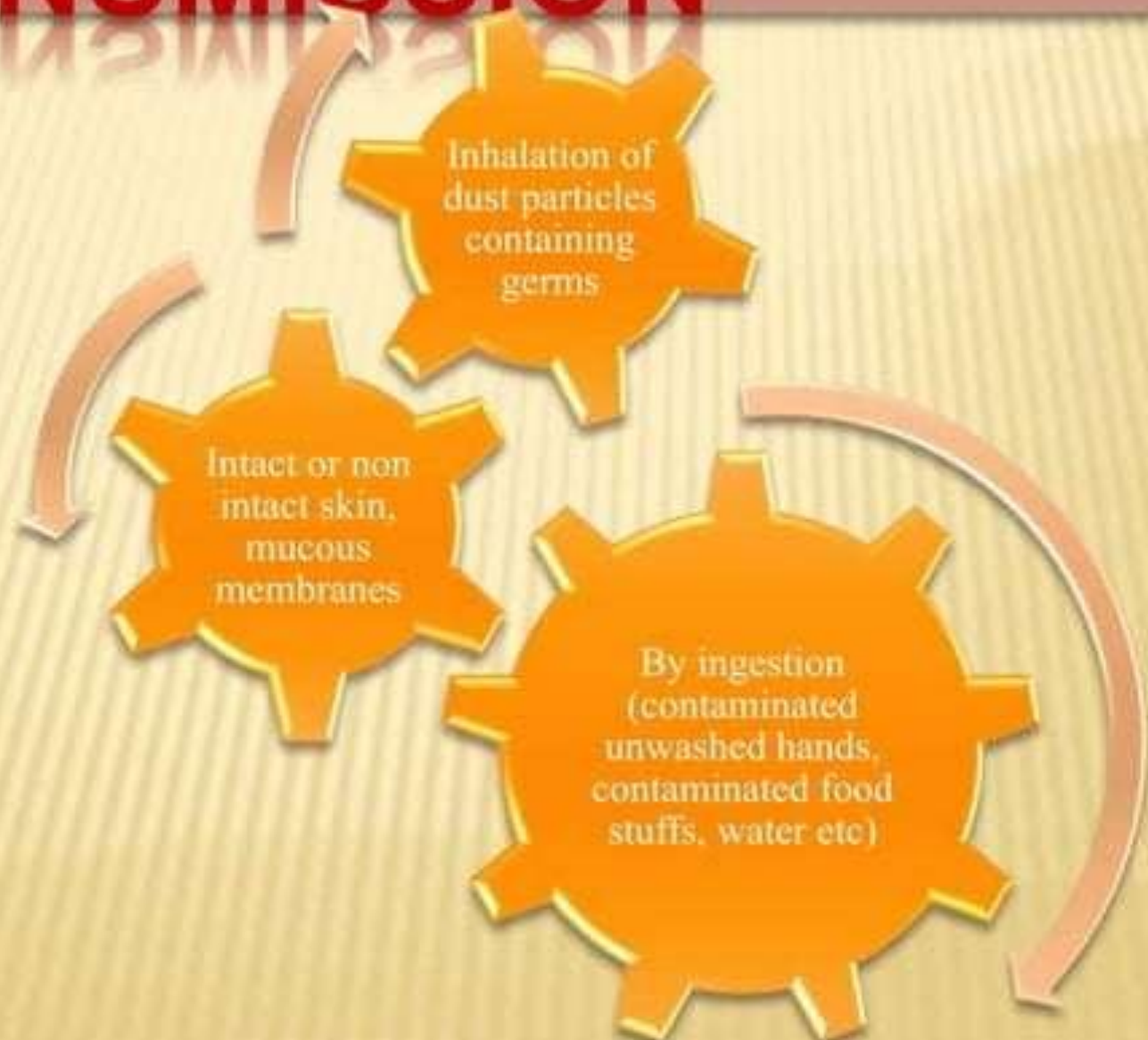
- GLOBALLY- Developed countries generate 1 to 5 kg/bed/day
- Developing countries: meager data, but figures are lower.  
1-2kg/pt./day
- WHO Report: 85% non hazardous waste
  - : 10% infective waste
  - : 5% non-infectious but hazardous.  
(Chemical, pharmaceutical and radioactive)
- INDIA:-No national level study
  - local or regional level study shows hospitals

# CATEGORIES OF PERSONS EXPOSED TO RISK OF INFECTION





# ROUTES OF TRANSMISSION



# PROBLEM ASSOCIATED WITH BIOMEDICAL WASTE

ORGANISM	DISEASES CAUSED	RELATED WASTE ITEM
<b><u>VIRUSES</u></b> HIV, Hepatitis B, Hepatitis A,C, Arboviruses, Enteroviruses, Herpes Virus	AIDS, Infectious Hepatitis, Infectious Hepatitis, Dengue, Japanese encephalitis, Ocular infection, Genital Infection	Infected needles, body Fluids, Human excreta, Blood, body fluids. Eye secretion, genital Secretion
<b><u>BACTERIA</u></b> 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.
<b><u>PARASITES</u></b> Wucheraria Bancrofti, Plasmodium	Cutaneous leishmaniasis, Filariasis Kala Azar, Malaria	Human excreta, blood and body fluids in poorly managed sewage system of



# GENERATION, SEGREGATION, COLLECTION, STORAGE, TRANSPORTATION AND TREATMENT OF WASTE

SOPs for this system may differ from Hospital to Hospital/Nation wise.

## × 1. Generation:

Type	Site of Generation	Disposal By
Non-Hazardous waste/General waste	Office, Kitchen, Administration, Hostels, Stores, Rest rooms etc	Municipal/Public Authority
Hazardous (Infectious & toxic waste)	Wards, Treatment room, Dressing room, OT, ICU, Labour room, Labrotory, Dialysis room, CT scan, Radio-imaging etc	Hospital itself

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✦ 2. Segregation:

Done at point of Generation of waste and put in separate coloured bags. Color coding varies from nation to nation. For eg. In AIIMS hospital, New delhi, Following color code bags are practised.



# GENERAL WASTE

## WASTE DISPOSAL



**KITCHEN WASTE/FOOD**



**BLACK BIN**



**WRAPPERS**

# INFECTIOUS WASTE/PATHOLOGICAL WASTE

## WASTE DISPOSAL



Swab stick  
decontaminated



SWABS



soiled linen,  
contaminated  
gowns,  
drapes



Human anatomical  
waste-placenta



Dressing



Bandages



YELLOW BIN





# SHARP AND DISPOSABLE WASTES

**INFECTIONIOUS WASTE**

All infectious, non sharp plastic waste

Uncollected

Plastic culture plates & tubes

Drabs

IV cath

The infographic features a central blue bin with a biohazard symbol. Surrounding it are images of various waste items: a petri dish, a bandage with a blood stain, a syringe, a pair of gloves, and an IV catheter. A pink box labeled 'Uncollected' is also present. A green box at the top is labeled 'INFECTIONIOUS WASTE'. Arrows point from the waste items to the bin.

# SEGREGATE MEDICAL WASTE

**WHITE**  
BAG OR CONTAINER



**YELLOW**  
BAG OR CONTAINER



**BLACK**  
BAG OR CONTAINER



Waste Management & Recycling Services  
45, P. O. Box 1000, Kottayam - 686 001  
Kerala, India - 686 001  
Phone: 0471-2511111  
www: www.waste.com





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- ✦ 3. Collection of waste:
  - ✦ Centralized sanitation staffs or any other sanitation staffs should collect the waste during morning afternoon or evening under the supervision of nursing staff and sanitation supervisor; documentation should be done in register; Garbage bin should be cleaned and disinfected regularly.

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- ✘ 4. Storage of Waste:
  - ✘ Waste should not be stored in the generation area for more than a period of 4-6 hours.
  - ✘ It is responsibility of paramedic/sanitation staff to check for segregation
  - ✘ Waste collected in various areas should be transported for disposal/Treatment.



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- ✘ Transportation:

- ✘ There should be separate corridor and lift in hospital to carry and transport waste.
- ✘ General waste are deposited at municipal dumps.
- ✘ Waste for autoclaving and incineration are dumped at separate site for external transport (should have separate coloured plastic bag for these waste)
- ✘ Transportation should be done in sealed container/sanitation supervisor should ensure for leakage.

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- ✦ Treatment & Disposal:
  - ✦ General waste should be dumped at municipal dumping site. Sanitation officer should be responsible for proper coordination between municipal and hospital.
  - ✦ Use of label/symbole is useful in identifying waste for treatment .eg: Risk of corrosion, Danger of Infection, Toxic hazards, Glass Hazards, Radioactive materials etc.



# **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 & DISPOSAL TECHNOLOGIES

- ✘ 1. Incineration
- ✘ 2. Chemical Disinfection
- ✘ 3. Wet and dry thermal treatment
- ✘ 4. Microwave irradiation
- ✘ 5. Land disposal
- ✘ 6. Inertization



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✘ 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.





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- ✦ Types of Incinerators:
    - ✦ -Double chambered(for infectious waste)
    - ✦ Single chambered (if double chamber not affordable)
    - ✦ --Rotatory Kilns(for genotoxic waste)

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- ✦ 2. Chemical disinfection:
  - ✦ Commonly Used for treatment of liquid infectious waste eg. blood, urine, stool and hospital sewage
  - ✦ Chemicals are added to waste to kill or inactivate the pathogen it contains.



### 3. Wet and Dry thermal treatment:

- ✘ Wet thermal treatment/steam disinfection is based on exposure of infectious waste to high temperature and high pressure steam similar to process of autoclaving, 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.

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- ✦ 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.



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- ✘ Land Disposal:

- ✘ A. Open Dumps: risk for public health

- ✘ B. Sanitary landfills: designed and constructed to prevent contamination of soil, surface, ground water and direct contact with public.

## ✘ 5. 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.



# CATEGORIES OF BIOMEDICAL WASTE SCHEDULE – I

WASTE CATEGORY	TYPE OF WASTE	TREATMENT AND DISPOSAL OPTION
Category No. 1	Human Anatomical Waste (Human tissues, organs, body parts)	Incineration@ / deep burial*
Category No. 2	Animal Waste (Animal tissues, organs, body parts, carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals and colleges, discharge from hospitals, animal houses)	Incineration@ / deep burial*
Category No. 3	Microbiology & Biotechnology Waste (Wastes from laboratory cultures, stocks or specimen of live micro organisms 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 and devices used for transfer of cultures)	Local autoclaving/ microwaving / incineration@

<p><b>Category No. 4</b></p>	<p><b>Waste Sharps (Needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps)</b></p>	<p><b>Disinfecting (chemical treatment@@ / autoclaving / microwaving</b></p>
<p><b>Category No. 5</b></p>	<p><b>Discarded Medicine and Cytotoxic drugs (Wastes comprising of outdated, contaminated and discarded medicines)</b></p>	<p><b>Incineration@ / destruction and drugs disposal in secured landfills</b></p>
<p><b>Category No. 6</b></p>	<p><b>Soiled Waste (Items contaminated with body fluids including cotton, dressings, soiled plaster casts, lines, bedding and other materials contaminated with blood.)</b></p>	<p><b>Incineration@ / autoclaving / microwaving</b></p>
<p><b>Category No. 7</b></p>	<p><b>Solid Waste (Waste generated from disposable items other than the waste sharps such as tubing, catheters, intravenous sets, etc.)</b></p>	<p><b>Disinfecting by chemical treatment@@ / autoclaving / microwaving</b></p>



<p><b>Category No. 8</b></p>	<p><b>Liquid Waste (Waste generated from the laboratory and washing, cleaning, house keeping and disinfecting activities)</b></p>	<p><b>Disinfecting by chemical treatment@@ and discharge into drains</b></p>
<p><b>Category No. 9</b></p>	<p><b>Incineration Ash (Ash from incineration of any biomedical waste)</b></p>	<p><b>Disposal in municipal landfill</b></p>
<p><b>Category No.10</b></p>	<p><b>Chemical Waste (Chemicals used in production of biologicals, chemicals used in disinfecting, as insecticides, etc.)</b></p>	<p><b>Chemical treatment @@ and discharge into drains for liquids and secured landfill for solids.</b></p>

