BIO MEDICAL WASTE MANAGEMENT
by
Dr. Moazzam Ali Khan
EMMERGENCE OF

- HIV AIDS
- HEP B
- INFECTIONS
HOSPITAL WASTE

- General Waste: 80%
- Bio Med. Waste: 15%
- Hazardous Waste: 5%
HOSPITAL WASTE MANAGEMENT

DEFINITIONS

1. **HOSPITAL WASTE** MEANS ALL WASTE COMING OUT OF HOSPITAL

2. **MEDICAL WASTE** MEANS ANY WASTE WHICH IS GENERATED IN THE DIAGNOSIS, TREATMENT OR IMMUNIZATION OF HUMAN BEINGS OR ANIMALS.

3. **INFECTIOUS WASTES** INCLUDE ALL KINDS OF WASTES WHICH MAY TRANSMIT VIRAL, BACTERIAL OR PARASITIC DISEASES TO HUMAN BEINGS.
HOSPITAL WASTE MANAGEMENT

- IN ADDITION INFECTIOUS MEDICAL WASTE ALSO INCLUDES ANIMAL IN WASTES FROM LABORATORIES, SLAUGHTER HOUSES, VETERINARY PRACTITIONERS AND SO ON.

4. PATHOLOGICAL WASTES INCLUDE HUMAN TISSUES, ORGANS, BODY PARTS AND BODY FLUIDS THAT ARE REMOVED DURING SURGERY OR AUTOPSY OR OTHER MEDICAL PROCEDURES AND SPECIMENS OF BODY FLUIDS AND THEIR CONTAINERS.
# SCHEDULE – I
## CATEGORIES OF BIO-MEDICAL WASTE

<table>
<thead>
<tr>
<th>OPTION</th>
<th>WASTE CATEGORY</th>
<th>TREATMENT &amp; DISPOSAL</th>
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<tbody>
<tr>
<td></td>
<td><strong>CATEGORY NO.1</strong></td>
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<tr>
<td></td>
<td><strong>HUMAN ANTATOMICAL WASTE</strong> <em>(HUMAN TISSUES, ORGANS BODY PARTS)</em></td>
<td><strong>INCINERATION /DEEP BURIAL</strong></td>
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<td><strong>CATEGORY NO. 2</strong></td>
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<td></td>
<td><strong>ANIMAL WASTE</strong> <em>(ANIMAL TISSUES, ORGANS, BODY PARTS CARCASSES, BLEEDING PARTS, FLUID, BLOOD &amp; EXPERIMENTAL ANIMAL USED IN RESEARCH WASTE GENERATED BY VETERINARY HOSPITALS COLLEGES, DISCHARGE FROM ANIMAL HOUSES)</em></td>
<td><strong>INCINERATION/ DEEP BURIAL</strong></td>
</tr>
<tr>
<td>OPTION</td>
<td>WASTE CATEGORY</td>
<td>TREATMENT &amp; DISPOSAL</td>
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<tr>
<td>CATEGORY NO. 3</td>
<td>MICROBIOLOGY AND BIOTECHNOLOGY WASTE (WASTES FROM LABORATORY CULTURES STOCKS OR SPECIMENS OF MICRO ORGANISMS LIVE OR ATTENUATED VACCINES, HUMAN AND ANIMAL CELL CULTURE 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)</td>
<td>INCINERATION / DEEP Burial</td>
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<tr>
<td>OPTION</td>
<td>WASTE CATEGORY</td>
<td>TREATMENT &amp; DISPOSAL</td>
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<tr>
<td>CATEGORY NO. 4</td>
<td><strong>WASTE SHARPS</strong> (NEEDLES, SYRINGES, SCALPELS BLADES, GLASS ETC. THAT MAY CAUSE PUNCTURE AND CUTS. (THIS INCLUDES BOTH USED AND UNUSED SHARPS))</td>
<td><strong>DISINFECTION (CHEMICAL TREATEMENT / AUTOCLAVING/MICROWAVING AND/SHREDDING.</strong></td>
</tr>
</tbody>
</table>
| CATEGORY NO. 5  | **DISCARDED MEDICINES AND CYTOTOXIC DRUGS**  
WASTES COMPRISING OF OUTDATED, CONTAMINATED AND DISCARDED MEDICINES) | **INCINERATION / DESTRUCTION AND DRUGS DISPOSAL IN SECURED LANDFILLS**                  |
## SCHEDULE – I
### CATEGORIES OF BIO-MEDICAL WASTE

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<thead>
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<th>WASTE CATEGORY</th>
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<tbody>
<tr>
<td>CATEGORY NO. 6</td>
<td>Solid waste including blood and body fluids</td>
<td>Auto clave/Chemical Treatment/ Burial</td>
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<tr>
<td>CATEGORY NO. 7</td>
<td>SOLID WASTE (DISPOSABLE ITEMS)</td>
<td>Auto clave/Chemical Treatment/ Burial</td>
</tr>
<tr>
<td>OPTION</td>
<td>WASTE CATEGORY</td>
<td>TREATMENT &amp; DISPOSAL</td>
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</tr>
<tr>
<td>CATEGORY NO. 8</td>
<td>LIQUID WASTE WASTE GENERATED FROM LABORATORY AND WASHING, CLEANING, HOUSEKEEPING AND DISINFECTING ACTIVITIES.</td>
<td>DISINFECTION BY CHEMICAL TREATMENT AND DISCHARGE INTO DRAINS</td>
</tr>
<tr>
<td>CATEGORY NO. 9</td>
<td>INCINERATION ASH (ASH FROM INCINERATION OF ANY BIO-MEDICAL WASTE)</td>
<td>DISPOSAL IN MUNICIPAL LANDFILL</td>
</tr>
<tr>
<td>CATEGORY NO. 10</td>
<td>CHEMICAL WASTE (CHEMICAL USED IN PRODUCTION OF BIOLOGICALS, CHEMICALS USED IN DISINFECTION, AS INSECTICIDES, ETC.)</td>
<td>CHEMICAL TREATMENT AND DISCHARGE INTO DRAINS FOR LIQUIDS AND SECURED LANDFILL FOR SOLIDS.</td>
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</table>
TREATMENT OPTIONS

i. CHEMICAL TREATMENT USING AT LEAST 1 % HYPOCHLORITE SOLUTION OR ANY OTHER EQUIVALENT CHEMICAL REAGENT. IT MUST BE ENSURED THAT CHEMICAL TREATMENT ENSURES DISINFECTION.

ii. MULTILATION/SHREDDING MUST BE SUCH SO AS TO PREVENT UNAUTHORISED REUSE.

iii. THERE SHALL BE NO CHEMICAL PRETREATMENT BEFORE INCINERATION.

iv. CHLORINATED PLASTIC SHALL NOT BE INCINERATED.

v. DEEP BURIAL SHALL BE AN OPTION AVAILABLE ONLY IN TOWNS WITH POPULATION LESS THAN FIVE LAKHS
### SCHEDULE II
(COLOUR CODING AND TYPE OF CONTAINER FOR DISPONAL OF BIO-MEDICAL WASTE)

<table>
<thead>
<tr>
<th>COLOUR CODING</th>
<th>TYPE OF CONTAINER</th>
<th>WASTE CATEGORY</th>
<th>TREATMENT OPTIONS AS PER SCHEDULE I</th>
</tr>
</thead>
<tbody>
<tr>
<td>YELLOW</td>
<td>PLASTIC BAG</td>
<td>CAT 1, CAT 2, AND CAT 5</td>
<td>INCINERATION/DEEP BURIAL</td>
</tr>
<tr>
<td>RED</td>
<td>DISINFECTED CONTAINER/PLASTIC BAG</td>
<td>CAT 3, CAT 6</td>
<td>AUTOCLAVING/MICROWAVING CHEMICAL TREATMENT</td>
</tr>
<tr>
<td>BLUE/WHITE TRANSUCENT</td>
<td>PLASTIC BAG/PUuncture PROOF CONTAINER</td>
<td>CAT 4, CAT 7</td>
<td>AUTOCLAVING/ MICKROWIVING CHEMICAL TREATMENT</td>
</tr>
</tbody>
</table>
SCHEDULE II
(COLOUR CODING AND TYPE OF CONTAINER FOR DISPOSAL OF BIO-MEDICAL WASTE)

- COLOUR CODING OF WASTE CATEGORIES WITH MULTIPLE OPTIONS AS DEFINED IN SCHEDULE I SHALL BE SELECTED DEPENDING ON TREATMENT OPTION CHOSEN, WHICH SHALL BE AS SPECIFIED IN SCHEDULE I.

- WASTE COLLECTION BAGS FOR WASTE TYPES NEEDING INCINERATION SHALL NOT BE MADE OF CHLORINATED PLASTICS.

- CATEGORIES 8 & 10 (LIQUID) DO NOT REQUIRE CONTAINERS/BAGS.

- CATEGORY 3 IF DISINFECTED LOCALLY NEED NOT BE PUT IN CONTAINERS/BAGS.
SEGREGATION

• SEGREGATION IS THE KEY TO ANY WASTE MANAGEMENT SCHEME, BY SEGREGATION DIFFERENT CATEGORIES OF WASTE ARE-SORTED AND PLACED IN DIFFERENT CONTAINERS OR BAGS.

• SEGREGATION AT SOURCE IS AN IMPORTANT STEP IT ALLOWS SPECIAL ATTENTION TO BE GIVEN TO SMALL QUANTITIES OF WASTE SEGREGATION

• SEGREGATION AT SOURCE SHOULD BE DONE AS EARLY AS POSSIBLE

• ALL THE MATERIALS REQUIRED FOR B.M.W. MANAGEMENT SHOULD BE AVAILABLE ALL 3 SHIFTS AND 365 DAYS
POINTS FOR EFFICIENT FUNCTIONING

1. EFFECTIVE RULES FORMATION AND TO SEE THEY ARE FOLLOWED BY PROPER TRACKING.

2. EARLY AND PROPER SEGREGATION, TO SEPARATE ONLY INFECTIOUS MATERIALS
POINTS FOR EFFICIENT FUNCTIONING

3. PROPER COLOUR CODING AND TYPES OF CONTAINERS FOR SHARPS – LABELLING WITH, PLACE OF ORIGIN.

4. PROPER TRAINING OF STAFF, PROPER SAFETY GEAR RECORD KEEPING

5. PROPER METHOD OF TRANSPORTATION.
POINTS FOR EFFICIENT FUNCTIONING

6. PROPER HANDLING AND TREATING THE BIO MEDICAL WASTE AT CENTRAL TREATMENT FACILITY IN INCINERATOR & AUTOCLAVE

7. EVALUATION, TRACKING, CHECKING, RECORD KEEPING
CHAIN OF MEDICAL WASTE

PATIENT

WO

AYABAI

LABOUR

TOGETHER WE WORK

SWM

WARD BOY

DOCTOR

NURSE
Treatment Technologies

- Double-chamber pyrolytic incinerators specially designed to burn infectious health-care waste

- Single-chamber furnaces with static grate, used only if pyrolytic incinerators are not affordable

- Rotary kilns operating at high temperature, capable of causing decomposition of genotoxic substances and heat-resistant chemicals.
Treatment Technologies

✓ Disinfection
  ▪ Chemical disinfection: used for treating liquid waste
  ▪ Thermal disinfection: generally used for treating solid waste

✓ Sterilization
  ▪ Steam sterilization: autoclave used to disinfect waste.
  ▪ Microwave irradiation: uses radiant energy to heat moisture within the waste
Treatment Technologies

✓ Plasma arc technology
  - Operates on principles of an electrical arc struck between two electrodes.
  - There is no burning and no formation of ash.

✓ Landfill
  - Open dumps: not recommended
  - Sanitary landfills: Disposing of certain types of health-care waste (infectious waste and small quantities of pharmaceutical waste) in sanitary landfills is acceptable.
Treatment Technologies

Decrease in number of medical incinerators (USA)

Increased market share of non incineration technology (USA)

- Incineration
- Steam/Autoclave
- Mech/Chem. Microwaving
- Microwaving
JINNAH HOSPITAL
In Jinnah Hospital there are three primary storages for solid waste.

1. In Officers Colony.
2. In Staff Colony.
3. In front of School Of Nursing.
Staff Colony Primary Storage
Officers Colony Primary Storage
School of Nursing Primary Storage
LIAQUAT NATIONAL HOSPITAL
Parking Area
Residential Area
INCINERATION AREA
Incinerator of Liaquat National Hospital
Incinerator of Abbasi Shaheed Hospital