



## **Revised National Tuberculosis Control Programme**

# **Environmental and Bio-medical Waste Management plan for RNTCP- II**



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## **Introduction**

The Revised National Programme is being implemented in the country since 1997. The basic unit of the programme is the Designated Microscopy Centre (DMC) which is a sputum microscopy lab set up for a population of about 100,000 in normal areas and for 50,000 population in tribal and hilly areas. Most of the waste generated under RNTCP is at these laboratories. At treatment centres, there is minimal amount of waste generated in the form of empty blister packs and used syringes (which are generated only in Category II cases, at the rate of 24 syringes per Category II patient treated). It has been estimated by an Environment Assessment study conducted for the RNTCP that the average quantum of waste generated in RNTCP centres is approximately 2.5 to 3.8 kg per day, which is relatively small.

Most of the technical guidelines and training modules were prepared in the early years of programme onset, and at that time the Bio-Medical waste management rules 2000 had not come into act. However at present the programme has technical instructions for waste disposal at the DMCs (laboratories), which constitute the major portion of waste generated under RNTCP at health centres. Under RNTCP-II, the programme will take measures to update the waste management guidelines for various categories of staff.

## **Legal and institutional framework**

The Environment Protection Act (EPA) of 1986 laid down the framework for all subsequent legislations pertaining to the environment in the country. India, together with Denmark, were among the first countries in the world to have such legislation in place.

Government of India (GoI) under its EPA (1986), passed the Biomedical Waste (Management and Handling) Rules in 1998 and a subsequent amendment followed in 2000. The rules form the legal framework for the collection, segregation, transportation, treatment and disposal of biomedical waste throughout the country. The SPCBs (State Pollution Control Boards) and PCCs (Pollution Control Committees) are empowered to validate and modify the Bio-Medical Rules based on the local conditions within the broad framework of the legislation. The SPCBs in the states and the Pollution Control Committees (PCCs) in the Union Territories, are monitoring the compliance to the rules in the respective states. The capacity of the SPCBs and PCCs for effective monitoring is slowly building.

In March 2002, the MOH&FW, GOI laid down the National Guidelines on Hospital Waste Management, which apart from covering the aspects included in the Bio-Medical Rules, also laid down recommendations for safety measures, training, management and administrative functions. In those states where State Health System Development Projects (SHSDP) have been implemented, the implementation of the Health Care Waste Management(HCWM) up to the CHC (Community Health Center) / FRU (First Referral Unit) level health care facilities and above, already exists.

Under RNTCP, guidelines have already been developed for disposal of the waste generated under RNTCP. To a great extent, the waste is presently being disposed off as per guidelines within the overall hospital waste management system existing in the health facility where the RNTCP services are being provided. However the system needs up-gradation and strengthening.

#### **Types of wastes generated by the RNTCP**

- Human/biological waste (sputum);
- Sharp waste (needles, glass slides etc.);
- Used blister packs, drug packaging material;
- Plastic waste (waste generated from disposable syringes, cups and glasses); and
- Laboratory and general waste such as liquid waste, broomsticks, and paper waste; and
- Construction waste (waste generated from civil work activities).

#### **Waste Management under RNTCP-- Current Practices**

The RNTCP is not a vertical programme, but it is integrated into the general health system of the states. Waste management is a component of overall facility management of the respective state health system institutions where RNTCP centres are located. Accordingly **the waste generated by RNTCP should not be viewed in isolation, but is to be integrated in the broad framework of the peripheral institutions' waste management practices.** The waste generated under RNTCP is at present being disposed of with other hospital waste as per the recommended procedures.

The sputum containers used for sputum collection would contain sputum which is potentially infectious and are disposed of by the following methods:

- A. After the sputum smears are examined, all sputum cups and broom sticks used are kept in a bucket containing 5% Phenol or freshly prepared 5% Hypochlorite solution. The bin/bucket should have a lid which is foot operated. Caps of the sputum cups are removed and cups, caps and broom sticks are completely immersed in the solution in a secure place for at least 18 hours. After this, they are discarded along with other hospital waste as per the method followed by the Health facility, either i. by incineration, wherever incinerators are available or ii. by burying in a special landfill site at a safe distance away from inhabited areas.
- B. Autoclaving in an autoclave, wherever it is available, or in a pressure cooker of 7 liters capacity with adequate amount of water to immerse the contents and boiled for at least 20 minutes. This is done at the end of each days laboratory work. After cooling, this material is then discarded as general waste along with other hospital waste as per the methods followed.

The other waste generated under RNTCP are presently being discarded as follows:

- Used blister packs are discarded as general waste along with other hospital waste. Outdated and unused drugs, if at all, are destroyed by breaking and then will be buried.

-Used glass slides with positive smears, are discarded by disposal in special landfill sites after treating them with 5% phenol or freshly made 5% hypochlorite solution or 10% bleach. Negative glass slides may be reused for malaria diagnosis, otherwise they are disposed of in a manner similar to positive slides.

### **Challenges for RNTCP II**

- Preventing the burning of plastics, especially those treated with chlorine producing chemicals;
- Safe destruction of needles and syringes;
- Safe disposal of sharps in a separate pit for sharps;
- Ensuring deep burial of used cups and slides; and
- Encouraging all health care workers involved in RNTCP to adopt Standard Precautions in handling the samples i.e. during collection and transportation, avoiding spillage etc.

### **Waste Management Plan during 2<sup>nd</sup> phase of RNTCP**

Waste generated under RNTCP will be discarded with the overall waste of the health facility in which services under RNTCP are provided. The staff involved in RNTCP services will be trained as per the guidelines to be followed, which will be incorporated in the training manuals for different category of staff. The plan will include organized waste collection, information dissemination and monitoring of disposal of the waste.

### **Disposal of the General Waste**

The empty blister packs, packaging material, disposable syringes (without needles), office and kitchen waste should be considered as general waste. It does not require any treatment and will be disposed off as general waste by segregating such material in black bags. The empty vials of streptomycin after washing with water may be reused if required or disposed off with general waste of the hospital.

### **Disposal of biomedical waste generated in the RNTCP laboratory**

Sputum cups and broom sticks: The use of cups made from bio-degradable polypropylene/polyethylene will be encouraged in the programme wherever such cups are available in the districts. RNTCP is including the specification as “made of polypropylene/ Polyethylene” for the sputum containers. The used cups and broom sticks will be disinfected first and will then be disposed off with other hospital waste by deep burial as per the existing facility within the overall waste management system in the health facility. Disinfection with chemicals or autoclaving/ pressure cooking prior to disposal will be stressed upon. The left over fluid after chemical disinfection will be drained off in the hospital drainage.

Used slides: For discarding the used slides, the slides will be disinfected by immersing in 5% phenol/ 40% phenolic compound diluted to 5%, for a minimum of 30 minutes and disposed off in the pit for sharps with other hospital waste sharps. Breaking of the slides is not recommended. The used chemical solution will be drained away in the hospital drain.

Used Syringes and Needles: The needles will be destroyed after use by using the available needle destroyer/ cutter. After disinfecting the needles and broken vials, the same will be disposed off in a pit/ tank made for sharps within the overall waste management system of the health facility providing RNTCP services.

Storage: No untreated biomedical waste will be kept stored beyond a period of 48 hours.

Maintenance of Records: The officer in charge of the health facility is responsible for maintaining a proper record of treatment and disposal of waste in the health facility. RNTCP will advise the states to submit yearly waste management reports.

## **Bio-Medical Waste Management for RNTCP-II**

### **Action Plan**

The RNTCP is implemented through the state health system and is just one of the many national programmes being implemented in any given health centre. The RNTCP forms a small component of a multi-pronged infrastructure, and exists at most centres in the form of a laboratory and/or DOT centre. The management of waste generated under RNTCP is to be seen as an integral component in the broad framework of the peripheral institutions' overall waste management activities. RNTCP would provide the required guidance, know-how and materials required. RNTCP would attempt to bring about the necessary 'attitude changes' in the staff handling bio-medical wastes through training and repeated reminders for compliance with BMW guidelines during supervisory activities. Similarly reporting on BMW management would be the responsibility of the peripheral institutions providing RNTCP services. RNTCP would assess gaps identified, or lack of compliance with the guidelines and advise states on corrective actions for any wrong practice identified.

The main modality of implementation of the BMWM action plan would be by imposing compliance with the technical guidelines for disposal of bio-medial wastes as per the revised RNTCP guidelines. Specifically the guidelines would encourage the use of bio-degradable plastic like polypropylene, discourage incineration of plastic waste, discourage dumping of slides and sharps in the open, adoption of universal precautions, and encourage waste reporting of centres to their prescribed authority.

### **1. Upgradation of existing training modules**

The existing training modules will be upgraded so that different categories of staff involved in RNTCP are made aware of the different waste management procedures. The Environmental Assessment carried out by the appointed consultants for Central TB Division has been completed and they have clearly delineated the portions to be incorporated for each category of staff (Annexure-1).

- a. Medical Officers are trained on the “Medical Officer’s modules 1-9”, which have been recently updated. The portions pertaining to BMWM will be incorporated as addenda.
- b. The laboratory personnel, namely laboratory technicians, are trained on the “Laboratory technician’s manual”. The lab supervisors (STLS) are trained on “STLS module” and “Lab technician’s manual”. The portions pertaining to BMWM will be incorporated in these modules during the on-going updating of the respective training material.
- c. The BMWM issues would be briefly addressed in the “STS module”, as these staff are not directly concerned with laboratory activities, but deal mainly with treatment activities. But since they visit all health centres for supervision, they will assist in reporting discrepancies.
- d. The MPW manual is used to train all categories of peripheral staff, mostly the ANMs, MPWs and also community volunteers such as AWWs. The portions pertaining to BMWM will be incorporated in the manual so as to improve knowledge of these staff on BMWM.

Universal Precautions:

All health care workers involved in RNTCP activities will be encouraged to adopt Universal Bio-safety Precautions when handling samples i.e. during collection and transportation, avoiding spillage etc (Annexure-2). The Universal Bio-safety Precautions will be included in the training modules.

*The updating of the training material is to be completed by March 2006.*

## **2. Training**

In future training of new staff involved in RNTCP will be done using the updated modules. The staff already trained under RNTCP will be updated/ sensitized by using the revised training modules.

Categories of staff to be trained:

The Laboratory technicians are the major category of staff who are responsible for waste generation and waste management in any given RNTCP service providing centre. In addition, there are a number of other staff who are involved in bio-medical waste management under RNTCP, including the Medical Officers who are in charge of the peripheral centres, the STLS who supervise these labs and the supporting staff who are responsible for cleaning and waste disposal. It is estimated that RNTCP has close to 10,000 laboratory technicians working in RNTCP DMCs at any given point in time, about 630 DTOs, more than 2000 each of MO-TCs, STS and STLS; and

10,000 to 12,000 Medical Officers who are responsible for the peripheral centres delivering RNTCP and an equal number of supporting staff.

Modality of implementing the training:

It is planned that RNTCP will hold an update training on bio-medical waste management for all state level staff (STO, Medical Officer of the State TB Cell, microbiologist of the STDC, and Medical Officer of the STDC) at NTI Bangalore in batches. Thereafter the STOs will hold similar update training for the DTOs. The DTOs will in turn train their staff in batches, so as to cover all medical officers in charge of DMCs, MO-TCs, all STLS, STS, LTs and some identified support staff from all RNTCP centres.

*The training on BMWM issues is planned to be completed by December 2006.*

### **3. Procurement arrangements**

Consumables and equipment:

RNTCP is in the process of incorporating changes into the list of laboratory consumables so as to facilitate implementation of the HCWM plan. The technical specifications of sputum cups are being specified as “made of polypropylene/polyethylene, wherever available locally”. Bio-medical waste disposal bags with the required specifications, will be procured. Existing needle cutters will be used wherever necessary. In exceptional situations, DTCSs may decide to purchase limited numbers of these out of the “Miscellaneous” budget head if not available from state health sources or from other national programmes like RCH, UIP, NACP, etc.

Civil works:

States will be encouraged to undertake proper selection of place for laboratory, sputum collection centres and disposal areas. The guidelines for civil works under RNTCP already takes care of these requirements. The states will be advised to follow these guidelines and wherever required (for upgradation of new DMCs), the upgradation may be carried out. The waste disposal pit and pit for sharps of the peripheral institution providing RNTCP services, will be used. Guidelines for waste and sharp disposal pits will be made available in RNTCP manuals.

### **4. Monitoring of the waste disposal**

Monitoring of the waste disposal generated under RNTCP, will be an on-going activity. Points on waste management will be included in the checklists for laboratory evaluations. Non-compliance with regulations will be reported by the supervisors. Central TB Division will advise states to submit yearly waste management reports to their prescribed authority.

**Disposal of sputum container with specimen and wooden sticks**

- Step 1: After the smears are examined, remove the lids from all the sputum cups.
- Step 2: Put the sputum cups, left over specimen, lids and wooden sticks in foot operated plastic bucket/bin with 5% phenol or phenolic compound diluted to 5%. The cups and lids should be fully immersed in the solution. Keep it overnight/ for about 12 hours.
- Step 3: Next day/ at the end of the day, drain off the phenol solution in to the drain.
- Step 4: Take out the sputum cup/lid/wooden sticks and put into a reusable metal or autoclave-able plastic container or red bag. The red bag should have a biohazard symbol and adequate strength so that it can withstand the load of waste and be made of non-PVC plastic material.
- Step 5: Put this container/bag into the autoclave with other autoclavable BMW and the contents should be autoclaved at 121°C at 15 psi pressure for 15 – 20 minutes. The autoclave shall comply with the standards stipulated in the rules. Under certain circumstances, if autoclaving is not possible, boil such waste in a pressure cooker of approximately 7 litre capacity containing adequate amount of water to submerge the contents and boiled for at least 20 minutes using any heating source, electrical or non-electrical. However the District Hospital/CHC/PHC etc. shall ultimately be expected to make the necessary arrangements to impart autoclaving treatment on regular basis.
- Step 6: After adequate cooling, the material can be safely transported to a common waste treatment facility for mutilation/shredding/disposal.

If a common waste treatment facility is not available in the area, the sputum cups/lids/ wooden sticks after autoclaving, can be buried in a deep burial pit (Annexure-3).

LTs and support staff handling biological waste should wear gloves (Standard/ Universal Infection Control Precautions – Annexure-2).

**Disposal of used Syringes/needles/broken vials**

- Step 1: Immediately after administering the injection, cauterize the needle on site using a suitable needle destroyer/cutter, followed by cutting of the plastic hub of the syringe without detaching the needle from the syringe.
- Step 2: Put the cauterized needles, broken vials and ampoules into a sturdy puncture proof white translucent plastic/cardboard container.

- Step 3: Segregate and store cut plastic syringes in a reusable metal or autoclave-able plastic container/ red bag. If a bag is used, its strength should be such that it can withstand the load of waste inside and be made of non-PVC plastic material.
- Step 4: Label both the container with biohazard symbol as stipulated in the Schedule III of the Biomedical Waste (Management and Handling) Rules 1998
- Step 5: Put both the containers in the prescribed bag and transport in a dedicated vehicle to the Common Waste Treatment Facility (CWTF) for autoclaving, mutilation/shredding, and/or disposal.
- Step 6: If a CWTF does not exist, put both sharp container (needles) and metal / plastic container / red bag (syringes) into an autoclave with other BMW, and autoclave at 121°C at 15 psi pressure for 15–20 minutes. Under certain circumstances if autoclaving is not possible, boil such waste in water for at least 20 minutes. However the District Hospital/CHC/PHC etc. should ultimately be expected to make the necessary arrangements to autoclave the waste on regular basis.
- Step 7: Dispose off the autoclaved waste as follows:
- (i) Dispose off the needles and broken vials into a sharps pit (Annexure-3); and
  - (ii) Send the syringes for shredding/mutilation or as a landfill in a deep burial pit (Annexure-3).

**Disposal of stained slides**

- Step 1: The slides should be put into a puncture proof container and red bag. The red bag should have a biohazard symbol and should be made of non-PVC plastic material. This bag/sharp container should then be put in to an autoclave or pressure cooker for autoclaving/boiling.
- Step 2 : Dispose off the autoclaved/ pressure boiled slides into a pit for sharps.

*Under no circumstances should the slides should be broken.*

## **Standard (Universal) Precautions**

In 1996, CDC developed a new system of standard precautions synthesizing the features of universal precautions and body substance isolation. Standard precautions are used in the care of all patients and apply to blood, all body fluids, secretions and excretions except sweat, regardless of whether they contain visible blood.

Standard precautions include:

- Hand washing;
- Barrier protection;
- Safe handling of sharp items;
- Safe handling of specimen (blood, etc.);
- Safe handling of spillage of blood/body fluid; and
- Use of disposable/sterile items.

### ***Hand washing***

This is an ideal safety precaution and gloves should not be regarded as a substitute for hand washing.

For General patient care (hand decontamination)

- Wash hands thoroughly in running water with soap without missing any area. For effective hand washing first wash palms and fingers followed by back hands, knuckles, thumbs, fingertips and wrists. Rinse and dry hand thoroughly.
- Wash hands immediately after accidental contamination with fluid, before eating and drinking and after removing gowns/coat/gloves.
- Leave soap bars in dry container to prevent contamination.

For Surgical care (surgical scrub)

- Wash hands up to the elbows.
- Scrub hands for minimum of 2 minutes.
- Prevent dripping down of water from unwashed area of arms to washed hands.
- Put on gowns and gloves after drying only.

### ***Barrier Protection***

Gloves

- Wear while collecting/handling blood specimens and blood soiled items.

- Wear while disposing of waste material.
- Remove before handling door knobs, telephone, pen, or performing office work.
- Discard if cracked, discoloured or punctured.
- Discard if blood spills on them.
- Don't reuse disposable gloves.
- Wash hands when gloves are removed or changed.

#### Masks

- Wear masks and protective glasses if splashing or spraying of blood/ body fluids is expected.
- Masks of cotton wool, gauze, or paper are ineffective. Only specially designed paper masks with synthetic material designed for filtering out aerosols are protective.

#### Caps

- Cover hair completely in aseptic units, operating rooms or performing selected invasive procedure.

#### Gown and aprons

- Wear clean clothes, made of a material which is easy to clean.
- Change after exposure to blood and body fluids.
- Wear gown or apron of plastic water resistant paper when splashes of blood or other body fluids are likely to occur e.g. during surgery, obstetric procedures, invasive procedures, post mortem and embalming.

#### Occlusive bandage

- Cover all skin defects e.g. cuts, scratches or other breaks, with a waterproof dressing before patient care.

#### ***Safe handling of sharps***

- Take extra care to avoid autoinoculation.
- Discard all chipped or cracked glassware in appropriate containers.
- Never use hands to pick up broken glass. Use a brush and pan.
- Don't manipulate disposable needles. Never bend, break, recap or remove needle from syringe.
- Dispose of your own sharps. Don't pass used sharps directly from one person to another.

- Discarded needles are to be placed in puncture proof rigid containers (plastic or cardboard boxes) after disinfection in freshly made 5% phenol/ 5% sodium hypochlorite solution. Use a needle shredder if available for needles or needles along with syringe nozzle.
- Send sharp disposal containers for disposal when three-quarters full.

***Safe handling of specimen***

- Collect specimens, specially blood and body fluids, in pre-sterilized containers properly sealed to prevent leakage or spillage.
- Use autoclaved/pre-sterilized disposable syringes and needles for vene-puncture, and lancets/cutting needles for finger pricks.
- Cover cuts in hands properly with water proof adhesive bandages.
- Wear disposable gloves while collecting blood/body fluids and maintain proper asepsis.
- Wash hands thoroughly with soap and water, particularly after handling specimens.

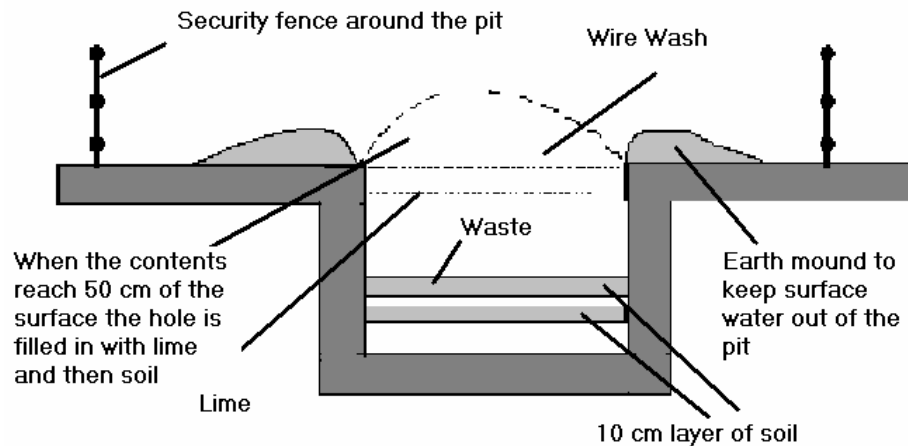
***Safe handling of blood/body fluids spills***

- Cover spills of infected or potentially infected material on the floor with paper towel/blotting paper/newspaper.
- Pour freshly made 5% phenol/ 5% sodium hypochlorite solution on and around the spill area and cover with paper for at least 30 minutes.
- After 30 minutes, remove paper with gloved hands and discard in general waste.

***Use of disposable sterile items***

- Ensure proper handling of disposable/sterile item before/during use.
- There should be no re-circulation of disposable items.

### Design for Deep Burial Pits



### Pit for onsite disposal of Sharps

The treated needles/broken vials should be disposed in a circular or rectangular pit as shown in figure below. Such rectangular or circular pit can be dug and lined with brick, masonry or concrete rings. The pit should be covered with a heavy concrete slab, which is penetrated by a galvanized steel pipe projecting about 1.5 meters above the slab, with an internal diameter of up to 50mm or 1.5 times the length of vials, whichever is more. The top opening of the steel pipe shall have a provision of locking after the treated waste sharps has been disposed in. when the pit is full it can be sealed completely, after another has been prepared.

