



WORLD HEALTH ORGANIZATION

WHO/SDE/WSH/04.11

Management of wastes from immunisation campaign activities*

Practical guidelines for planners and managers

1. Objectives and structure of the document

The inadequate management of wastes generated by immunisation activities such as sharps and infectious non-sharp wastes can cause *direct* negative health impacts on the community and the personnel working during and after the campaign. In addition, pollution due to inadequate treatment and disposal of these wastes can cause *indirect* health effects in the community and impact the environment.

This document provides practical guidelines for planners, managers of health-care facilities or mobile vaccine team leaders to improve planning and coordination at the *central level* as well as waste management practices at the *local level* where immunisation activities are conducted. It is divided into four parts:

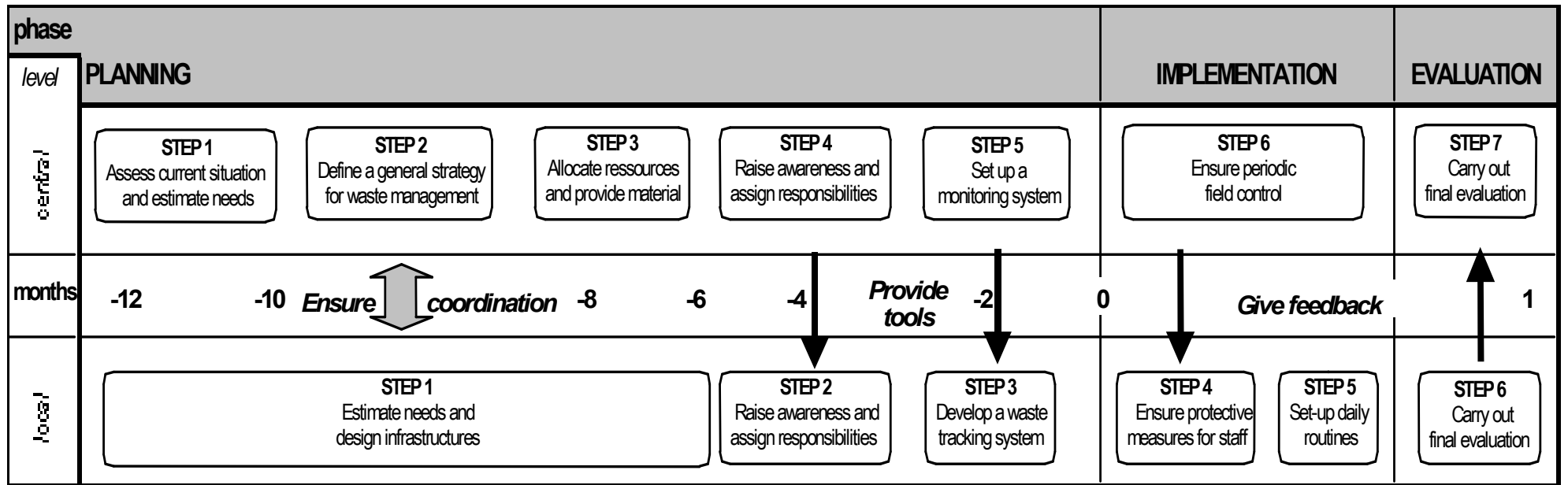
- *Elements of strategy* are presented hereafter for clarification purposes;
- A *chronological management plan* structured in checklist format recapitulates basic actions that have to be taken in order to cope with waste created during immunisation activities at both central and local levels;
- Specific *recommendations for practical waste management procedures* as well as a set of *toolboxes* are provided to assist users in the planning, follow up and monitoring of the management of wastes during the campaigns;
- A *glossary* summarizes the main terms used in this document.

2. Strategy for implementing a waste management plan

The chronological steps displayed in the figure below present the key elements that must be implemented in the waste management plan of an immunisation campaign, both at central level and in settings where campaigns are conducted (i.e. health-care facilities and mobile settings). The suggested strategy can be summarised by:

- careful planning at the central and local levels;
- clear assignment of responsibilities;
- adequate briefing and training of staff;
- daily monitoring so as to be able to take immediate corrective actions if necessary;
- final evaluation and recommendations for future activities.

*Box 4 addresses management of wastes in routine immunisation activities.



3. Guidelines for planners to implement a strategy at the *central level*

The following chronological checklist of actions provides guidelines to set up a waste management plan for an immunisation campaign as well as to coordinate and evaluate it during and after the implementation phase.

STEP 1 : Assess current situation and estimate needs (1 to 2 months)

- Estimate quantities of waste to be generated and treated during the vaccination campaign (**see box 1**)
- Analyse current practices regarding segregation and handling of sharps in focal centres¹
- Review current status and location of health-care waste treatment and disposal system(s)
- Analyse capacities of the current system to cope with additional quantities of waste generated by the campaign
- Evaluate additional material, financial and human resource needs (**see box 1**)

STEP 2 : Define a strategy for waste management (1 to 3 months)

- Determine treatment and disposal options (off-site; exceptionally on-site)
- Define waste transportation and central sites for waste treatment
- Outline strategy in a document including results of initial assessments, estimation of needs, plan of action and timeframe
- Check national regulations addressing pollution control compliance for potential treatment facilities, in particular incinerators. Contact manufacturers for test results for emission of pollutants, or for small, locally built incinerators, check with regulations or regulators.
- Submit the document to local/national health authorities, involve health-care facilities and campaign partners for validation and support

STEP 3 : Allocate resources and provide material (1 to 9 months)

- Allocate financial and human resources according to the strategy
- Supply safety boxes and leak-proof containers or bags for waste packaging
- Provide personal equipment for waste handling and treatment
- Build and/or rehabilitate infrastructures and supply equipment for waste treatment and disposal at focal centres

STEP 4 : Raise awareness and assign responsibilities (2 months)

- Establish key contacts with health authority representatives
- Designate responsibilities for the supervision of the health-care waste management (HCWM) system
- Provide briefing to local authorities and managers of health-care facilities (**see box 2**)
- Give instructions to mobile team leaders if directly coordinated from central level

STEP 5 : Set up a monitoring system (2 months)

- Set up a central monitoring system to track sharps along the waste stream until final disposal
- Ensure a follow-up of stock positions for vaccines, syringes and safety boxes
- Provide registration forms to health-care facilities and mobile teams for self-monitoring (**see box 3**)

STEP 6 : Ensure supervision during the entire campaign

- Carry out regular missions to the field as part of routine monitoring of campaign performance
- Check daily waste management practices
- Verify registering procedures

STEP 7 : Carry out final evaluation (2 weeks)

- Implement final monitoring process
- Evaluate sustainability of the strategy used
- Write final evaluation report with recommendations for the next campaign

¹ *focal centres* are the local health-care facilities from which the immunisation teams depart for their daily activities.

4. Guidelines for managers to improve practices at the *local level*

The following chronological checklist of actions provides recommendations to set up a waste management plan for a health-care facility or a mobile team and to provide tools for its implementation.

STEP 1 : Estimate needs and design infrastructure (1 to 9 months)

- Estimate total quantities of wastes to be treated in the health-care facility during the campaign (**see box 1**)
- Calculate the total number of safety boxes and plastic bags required for segregation and packaging
- Design and secure storage area for wastes
- In health-care facilities, design infrastructure for additional wastes treatment and disposal if current capacity is insufficient

STEP 2 : Raise awareness and assign responsibilities (1 month)

- In health-care facilities, set up a supervision board with the head nurse, pharmacist and administrator
- Assign responsibilities to medical staff / vaccinators and ancillary staff
- Appoint a waste management operator
- Give briefing and provide instructions to medical staff / vaccinator on daily routine procedures (**see box 2**)
- Outline duties and responsibilities of health-care workers in job descriptions

STEP 3 : Develop a waste tracking system (1 month)

- Inventory of equipment provided
- Set up stock position forms for supplies
- Set up procedures for daily stock monitoring (**see box 3**)

STEP 4 : Take protective measures for staff

- Check that waste operators wear protective clothes (thick gloves, boots, trousers or apron, long sleeve shirt)
- Check that safe practices for waste segregation are displayed in charts at waste segregation points
- Provide washing facilities for personal hygiene (minimum: soap and water for hand hygiene)
- Set-up a response system for accidental injuries
- Ensure that storage and waste treatment areas are restricted to authorised personnel

STEP 5 : Set up daily routines

- Provide all vaccinators with adequate number of safety boxes and containers for the day (**see box 1**)
- Ensure immediate disposal of used syringes without recapping needles
- Ensure adequate segregation and hermetic packaging of sharps and infectious wastes
- Ensure immediate replacement of used bags and containers when 3/4 full
- Ensure secure storage and disposal of full boxes according to procedures selected
- Check stock positions according to number of vaccines carried out

STEP 6 : Implement final evaluation

- (See above “carry out final evaluation” for planners)

5. Recommendations for practical waste management procedures

Waste segregation and packaging

- Always segregate sharps from non-sharps at the source
- Immediately after use, discard entire syringe with needle into a safety box without recapping needles
- Put the safety boxes into plastic bags closed hermetically when full to avoid any leakage during transportation. Mark the bag clearly.
- Put empty vials into waste containers with plastic lining to avoid leakage. Seal and mark it clearly when full.

Waste treatment and final disposal²

In health-care facilities (located in *low density* populated area)

- sharp boxes and containers (of empty / expired vials): off-site transportation for treatment to a larger facility or secure on-site burial. Empty or expired vials, if not recycled for glass should be crushed into a pit for volume reduction. Glass should never be incinerated as it clogged incinerator or may explode. If recycled, vial should be disinfected before using chlorine or by boiling.

In health-care facilities (located in *high density* populated area)

- Sharps boxes and containers (of empty / expired vials): off-site transportation to larger centre with treatment facility, municipal incinerator or to sanitary landfill after disinfection.

In provisional or mobile settings

- Always ensure off-site transportation of all wastes to the health centre of reference for treatment. Label the wastes, use adequate registering and delivery forms and store in secure area
- On-site treatment / disposal should be avoided as much as possible

²

In the absence of data, the practice of removing needles after injections to collect sharps waste separately was not addressed. Disassembling injection equipment might cause needle-stick injuries. In addition, it is unclear whether removing needles might produce splatters and aerosols as needle cutters do. Thus, safety evaluations are needed before this practice can be recommended.

6. Glossary

| Term | Definition |
|------------------------------|---|
| Focal centre | health-care facility from which immunisation mobile teams organize their activities and where they can return waste on a daily basis. |
| Disposal | intentional burial, deposit, discharge, dumping, placing or release of any waste material into air or water or on land. |
| Encapsulation | pre-treatment consisting of filling containers with waste, adding an immobilizing material (mortar, bituminous sand, clay material) and sealing it before disposing of it in a landfill site or burying it in a small burial pit. |
| Incineration | the controlled incineration of solid, liquid or gaseous combustible wastes in a specific facility (incinerator) at a minimum of 800°C to produce gases and residues containing little or no combustible material and minimise the creation of toxic air pollutants such as dioxin. |
| Infectious health-care waste | discarded materials from health-care activities which have the potential of transmitting infectious agents to humans such as sharps, empty or unused vaccine doses or any equipment that has been in contact with blood and its derivatives, tissues, tissue fluids, or wastes from infection isolation wards. |
| Sanitary landfill | characterised by the controlled and organised deposit of wastes which is then covered regularly (daily) by the staff present on site. Appropriate engineering preparations of the site and a favourable geological setting (providing an isolation of wastes from the environment) are required. |
| Segregation | the systematic separation of waste into designated categories. |
| Sharps | sharps are a subcategory of infectious health-care waste and include objects that are sharp and can cause injuries such as syringe needles, scalpels, infusion sets, knives, blades, broken glass. |
| Storage | the placement of waste in a suitable location or facility where isolation, environmental and health protection as well as human control (e.g. limitation of access) are provided. This is done with the intention that the waste will be subsequently retrieved for treatment and conditioning and/or disposal. |
| Treatment | any method, technique or process for altering the biological, chemical or physical characteristics of waste to reduce the hazards it presents and facilitate, or reduce the costs of, disposal. Basic treatment objectives include volume reduction, disinfection and neutralisation. |

7. Additional sources of information

For additional information:

<http://www.healthcarewaste.org>

http://webpreview.who.int/entity/immunisation_safety/publications/waste_management/en/index.html

The reference book “safe management of wastes from health-care activities” (WHO, 1999) is also available via internet at the following address:

[www.who.int/water_sanitation_health/Environmental_sanit/expected_publications_in_health .htm](http://www.who.int/water_sanitation_health/Environmental_sanit/expected_publications_in_health.htm)

| | | | | | | | | | | |
|---|--|--|------------------------------|----------|---|-----------|------------------------------------|-----------------------|---|----------------------------------|
| Box 1 : | estimating needs for waste management | | | | | | | | | |
| Initial remarks | | | | | | | | | | |
| Immunisation activities are planned according to the total number of children to be immunised. You must have a good estimation of this number in each focal centre. | | | | | | | | | | |
| 1. Calculating the total number of safety boxes to be used during the campaign at central level | | | | | | | | | | |
| For planning purposes, it is necessary to calculate the total number of safety boxes to be used during the campaign. The following tables give you an indication on how to proceed. | | | | | | | | | | |
| Calculate the number of syringes to be used | | | | | Calculate the number of safety boxes necessary for the campaign | | | | | |
| Nb of children to be immunised | + safety margin (10%) | ≡ | total number of syringes [S] | / | capacity (sharps/box) [C] | ≡ | theoretical nb | + safety margin (20%) | ≡ | total number of safety boxes [B] |
| | | | | | | | | | | |
| 2. Calculating the daily production of safety boxes to be used at or returned to the focal centre | | | | | | | | | | |
| The disposal of the safety boxes on a daily basis must be ensured in each focal centre. The calculation of the daily production of safety boxes helps you in organizing the everyday logistics that must be planned in each focal centre. | | | | | | | | | | |
| Number of vaccinators | V = | | | | | | | | | |
| Number of vaccines performed per vaccinator per day | ld = | | | | between 100 and 250 | | | | | |
| Total number of syringes used daily | Sd = | | | | Sd = V * ld | | | | | |
| Capacity of a safety box | C = | | | | 100 or 400 | | | | | |
| Daily number of safety boxes to be disposed of at the focal centre | Bd = | | | | Bd = Sd / C (boxes/day) | | | | | |
| 3. Estimating the costs for waste treatment and disposal for the entire campaign | | | | | | | | | | |
| 3.1. Sharp collection costs | | | | | | | | | | |
| | Item | Cost / box | x | Nb boxes | ≡ | Total | | | | |
| | safety boxes | | | | | | Total | | | |
| 3.2. Waste handling costs | | | | | | | | | | |
| | Item | Cost / unit | x | Nb units | ≡ | Sub-Total | | | | |
| | protective clothes | | | | | | | | | |
| | plastic bags | | | | | | | | | |
| | adhesive tape | | | | | | | | | |
| | etc... | | | | | | Total | | | |
| 3.3. Minimal investment costs for waste treatment and disposal equipment | | | | | | | | | | |
| | Small incinerator (drum) in rural facility | (ratio plan 10 \$ / 1000 syringes disposed of) | | | (S / 1'000) * 10 | Total | | | | |
| | Brick incinerator in secondary facility | (ratio plan 15 \$ / 1000 syringes disposed of) | | | (S / 1'000) * 15 | Total | | | | |
| Other treatment and disposal costs may vary greatly according to local conditions | | | | | | | | | | |
| 3.4. Minimal recurrent costs | | | | | | | | | | |
| Human resources | | | | | | | | | | |
| | nb of workers | x | daily rate (\$ / day) | x | nb of days | ≡ | Sub-Total | | | |
| | | | | | | | | | | |
| Combustible (wood, fuel...) | | | | | | | | | | |
| | quantity used / day | x | unit price (\$) | x | nb of days | ≡ | Sub-Total | | | |
| | | | | | | | | Total | | |
| | | | | | | | Total treatment and disposal costs | | | |

Box 2: **Instruction sheet for waste manipulation**

This sheet provides practical instructions for the management of sharps, used (empty) as well as expired vials on a daily basis.

It must be distributed and explained before the start of the campaign by managers or team leaders to *vaccinators* and *waste handlers* (ancillary medical staff or volunteers) who are directly in contact with wastes generated by immunisation activities.

Instructions for vaccinators

The most important point regarding health-care waste management at this level is to *segregate wastes* properly into two categories:

1. Sharps: needles (with the syringe)

- Prepare sufficient number of sharps safety boxes for the day
- Discard *immediately after vaccination* the entire syringe and needle in the safety box without recapping
- When the sharps safety box is 3/4 full, put it aside and make sure that waste handlers close, seal it with adhesive tape and mark* it before putting it in a plastic bag

2. Infectious non-sharps: empty and expired vials

- Prepare sufficient numbers of waste containers with plastic lining for the day
- Put *empty* vaccine flasks and cotton swabs in the waste container
- Once nearly full, put it aside and make sure that waste handlers close, seal it with adhesive tape and mark* it before taking it away to the storage or disposal area

- Generally, wash hands frequently with soap

*The marking system should enable you to identify the team (if there are several using the same waste treatment facility, by using a letter coding such as "A", "B"...) and know how many boxes have been used (a sheet with numbers in sequence that are ticked off when used is suggested).

Instructions for waste handlers

The most important point regarding health-care waste management is to *make sure wastes are properly packed, marked, stored and finally disposed of*. It is also your responsibility to ensure that there are no wastes lying around the vaccination, storage or disposal areas.

- Always wear protective clothes (minimum: gloves, boots, trousers or apron)
- Before eating and at the end of the day, wash your hands with soap

1. The vaccination area

Sharp boxes

- When a sharps safety box is 3/4 full, close it carefully and seal it with adhesive tape
- Put the sharps safety boxes in a plastic bag (to avoid problems in case of leakage)
- When a plastic bag is 3/4 full, close it, seal it with adhesive tape and mark* it according to instructions given
- Place plastic bags carefully in the storage area or take them to the disposal system if ready to process waste immediately

Infectious non-sharps: empty and expired vials

- When a waste container is 3/4 full, close it carefully, seal it with adhesive tape and mark* it according to instructions given

2. The storage area

- The storage area should always be dry and restricted to authorised personnel only. Make sure no one else can access it (fence/lock) !
- If any problems are observed such as bags or boxes damaged (during transport; due to water infiltration or presence of rodents...) inform your team leader

3. The disposal system

Dispose of wastes according to instructions given by the team leader

* The marking system should enable you to identify the team (if there are several using the same waste treatment facility, by using a letter coding such as "A", "B"...) and know how many boxes have been used (a sheet with numbers in sequence that are ticked off when used is suggested).

| | |
|----------------|---|
| Box 3 : | Stock management and waste control at focal centre |
|----------------|---|

This box helps you monitor your stocks on a daily basis by simple calculations. The daily control is an important task in order to track wastes in and out of the facility / mobile setting.

| | |
|---------------------------------|-----------------|
| Name of facility | Location |
| Name of person in charge | |

| | |
|-------------|-------------------------|
| date | Name of recorder |
|-------------|-------------------------|

| | | |
|-------------------------------------|------------------------------|-------------------------|
| Total number of syringes | S | |
| Total number of safety boxes | B safety box capacity | C syringes / box |

| | | | nb of injections performed | nb of sharp boxes used | approximate nb of syringes used |
|-------------------------|-------------|--------------|----------------------------|------------------------|---------------------------------|
| Name of recorder | date | | | | |
| | | | ld | Bd | Sd = Bd x C |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | TOTAL | Tl | TB | TS |

| | | | |
|--|--|--|--|
| | | | |
|--|--|--|--|

1. Check *daily* that there is a good equivalence between :

| | | | | | |
|--|----|-----|----|--|--|
| | | | | | |
| | ld | and | Sd | | |

2. At the end of the campaign, check that there is a good equivalence between :

| | | | | | |
|------------------------|---|----|-----|---|--|
| | | | | | |
| unused syringes | + | TS | and | S | |
| unused boxes | + | TB | and | B | |

Box 4: instruction sheet for routine immunisation activities

This sheet provides *additional* guidelines focusing specifically on health-care waste management (HCWM) plans to be set up during *routine immunisation activities* (RIA). A comprehensive approach is required for RIA to ensure safe and sustainable management and disposal.

Actually, no long-term improvement with comprehensive coverage can be expected in health-care waste management from RIA without tackling this problem at the national level. Therefore, a *national strategy* and *plan of action* for HCWM should be developed, in which management of immunization waste is tied into the HCWM activities of other sources (curative activities). Local initiatives can also improve the situation. This box describes key elements for planning and organising such a strategy.

Additional key points to be reviewed during the planning phase (assessment of the current situation)

- Analyse current national policy, check if laws or by-laws exist regulating the management of hazardous wastes, including health-care wastes
- Analyse current national / regional HCWM plans and technical guidelines (if they exist)
- Check if the health budget includes specific amounts for HCWM
- Verify that the medical and non medical staff is trained, at least to segregate, collect and dispose of all kinds of sharps properly
- Verify that a simple and clear procedure is used for sharps segregation, collection, packaging, handling and disposal in all the health-care facilities
- Verify in the health-care facilities that management procedures for sharps waste (if they exist) are respected

Organising the management of sharps at the national level

- Ideally, develop a national HCWM policy, including plans at the regional level³. Sharps management and disposal may be considered as a priority in such a plan, as this waste is likely to generate the greatest risks.
- Develop national technical guidelines for HCWM (at least for the management of sharps). Develop a budget in the national health budget and allocate specific funds for HCWM at the local, regional and national levels
- Develop routine monitoring procedures, including controls of staff practices

³ Refer to WHO guidelines developed in the following documents: Aide-Mémoire for a national strategy for health-care waste management and Guidelines for developing national plans of action to improve HCWM in emerging countries.

Ensuring sustainability in the management of sharps

- Ensure that national technical guidelines reach all the health-care facilities of the country
- Advocate/ Develop advocacy material for HCWM
- Stimulate the local economy and involve the private sector in HCWM activities such as manufacturing of safety boxes and developing health-care waste treatment plans
- Set up cost recovery procedures in the health-care facilities for safety box supply and HCW treatment
- Identify and develop pilot projects to test and develop HCWM plans at the regional level

Select options according to the recommendations on www.healthcarewaste.org.