

# Module

## Preventing Needlestick Injuries

*This module reviews techniques to prevent injuries and infection spread by needlesticks.*

# 4

**Objectives:**

After completing this module, participants will be able to:

- describe high-risk practices that contribute to needlesticks;
- design the equipment layout and patient flow for the immunization campaign sites that can decrease the risk of needlesticks; and
- discuss ways to dispose of medical waste that minimize needlestick injuries.

**Time:**

2 hours

**Key topics:**

- Needlesticks are preventable
- Reducing manual handling of injection equipment
- Dangers of recapping syringes
- Preparing and positioning the patients to be immunized
- Placement of needle-disposal boxes to minimize the handling of contaminated syringes and needles
- Preventing public access to used injection equipment and other sharps
- Methods of waste destruction: burning and incineration

**Trainer's aids:**

- Quiz (pages 60-63)
- Practical Exercises (pages 64 and 65)
- Case Studies (pages 66-73)

**Trainer preparation:**

- Obtain large pieces of paper and markers for Practical Exercise 1 (page 64).

## Preventing Needlestick Injuries

Needles frequently injure health workers and can inject small but dangerous amounts of blood infected with hepatitis B, hepatitis C, HIV, or other germs. Needlestick injuries that occur immediately after an injection are more likely to spread disease caused by blood-borne pathogens, but needlesticks from trash piles may cause injury and infection from germs in the environment. Needlesticks may occur through recapping or carrying used syringes and needles, through insecure positioning of the patient—particularly children—and through disposal practices that leave syringes and needles accessible to the public or to grazing animals. In this module we will review ways to prevent needlestick injuries.

### Minimize Handling of Needles and Syringes

Needlestick injuries can occur at any time, but they occur most frequently during and immediately after the injection. In general, the more that used or contaminated equipment is recapped, handled, or carried, the greater the risk of needlesticks. However, needlesticks are preventable, and there are simple steps health workers can follow to reduce the risk of needlesticks.

**Minimizing handling of injection equipment is key to preventing injuries;** however, it is often overlooked. Tips to minimize handling:

- Place a needle-disposal box at the immunization work area of every immunizer to permit immediate disposal of used syringes and needles.
- Do not manually remove the contaminated needle from the syringe.
- Do not walk around the immunization area or work site carrying used syringes.
- Do not recap syringes.
- Put the needle and syringe in the vial, in the patient, and in the disposal box without setting it down in between steps.
- Do not manually sort medical waste.

Most of the injections given in curative care are unnecessary. Therefore, the most important way to prevent blood-borne injections in the workplace is to stop unnecessary injections.

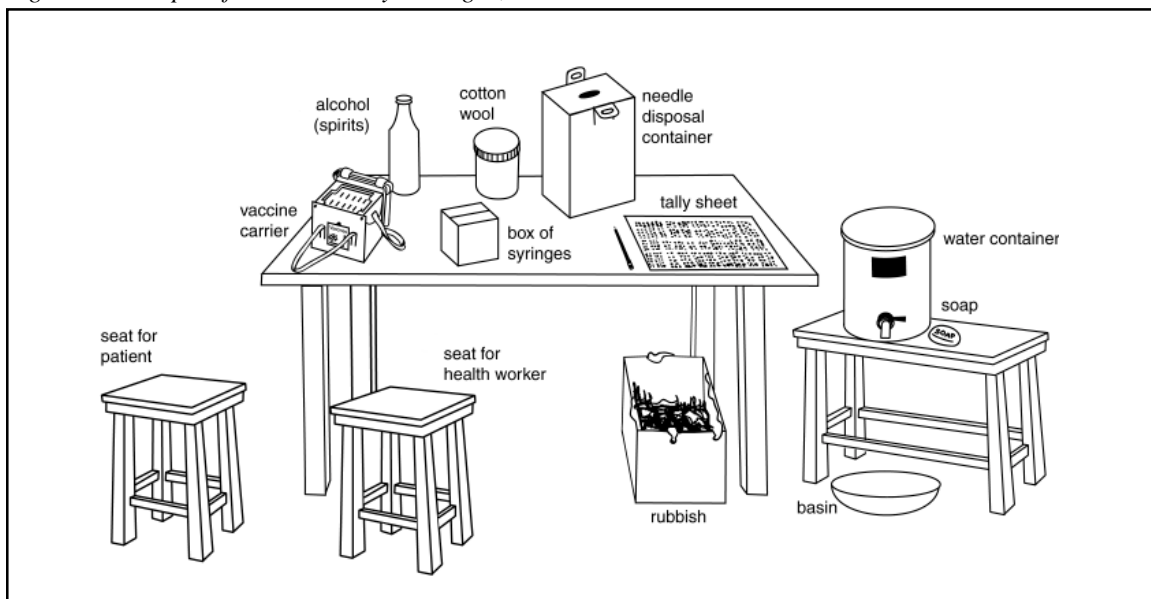
## Physical Layout of the Vaccination Work Area

Health workers should plan the layout of their work space so that:

- the vaccine carrier is in the shade of a roof or under a table;
- the immunizer is between the child and all needles or sharp objects;
- the immunizer can see the entrance hole of the needle-disposal container and avoid pricks when disposing of needles. Some individuals may stand when giving immunizations. Those who sit may want to place the needle-disposal box on the floor.
- the worker can dispose of used needles without setting them down or taking a step;
- only one child at a time is at her/his work space; and
- each immunizer should have her/his own needle-disposal container at busy sites.

Note that in Figure 8, handwashing equipment is nearby. Research has shown that busy health workers do not wash their hands unless soap and water are immediately available.

*Figure 8. Example of a conveniently arranged, indoor immunization table*



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Needlesticks can be prevented by setting up the work area carefully so that syringes can be immediately disposed of at the point of use, needles are not recapped, and no used injection equipment needs to be put down or picked up prior to disposal.

**Remember: Reduced handling of needles and syringes means fewer needlesticks.**

Part of setting up the clinic involves planning the patient flow. For an efficient clinic, keep the following guidelines in mind:

- Patients should enter in one area and exit in another (See Figure 9).
- For campaigns, separate registration tables from injection tables to help keep children calm.
- Try to arrange a shaded working space and a patient waiting area out of the hot sun.

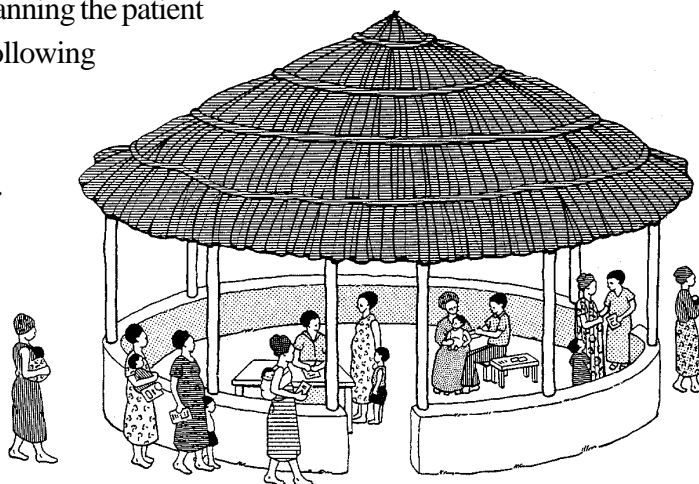


Figure 9. Separating entrances and exits to minimize crowding

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### Trainer's Note

- Conduct Practical Exercise 1 (page 64): “Arranging Immunization Stations to Prevent Needlestick Injuries.”

### Other Tips that Help Prevent Needlesticks

#### Positioning children for injections

Unexpected motion at the time of injection can lead to accidental needlesticks. To prevent this, ***position the child securely*** before giving the injection. Have the adult sit and place the child on the lap with one arm behind the adult's back. Adults may tuck the child's legs between theirs to secure them, or hold the child's legs as shown in Figures 10 and 11. The adult should also hold the child's free arm (see Figure 12). Health workers cannot hold the child because they need both hands for the injection. Even though the child is securely positioned, ***always tell him/her when you are about to give them an injection.***

Figure 10. Dividing the thigh into three parts, to choose the middle part, of the upper, outer thigh for an intramuscular injection

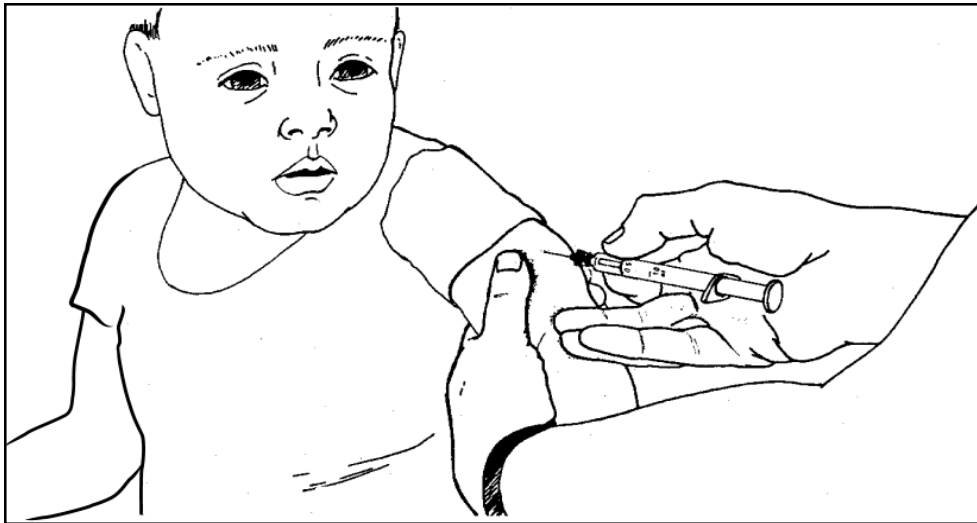


Figure 11. Giving an intramuscular injection: example of a securely positioned child



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Figure 12. Example of good subcutaneous injection technique but poor positioning  
The child could reach around with his free hand to grab the needle.



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## After an injection

Health workers sometimes recap, bend, or manually remove the needle from the syringe after use because they think that these practices are safe. These are well-meaning—but dangerous—practices that place the health worker at risk of accidental needlestick injury.

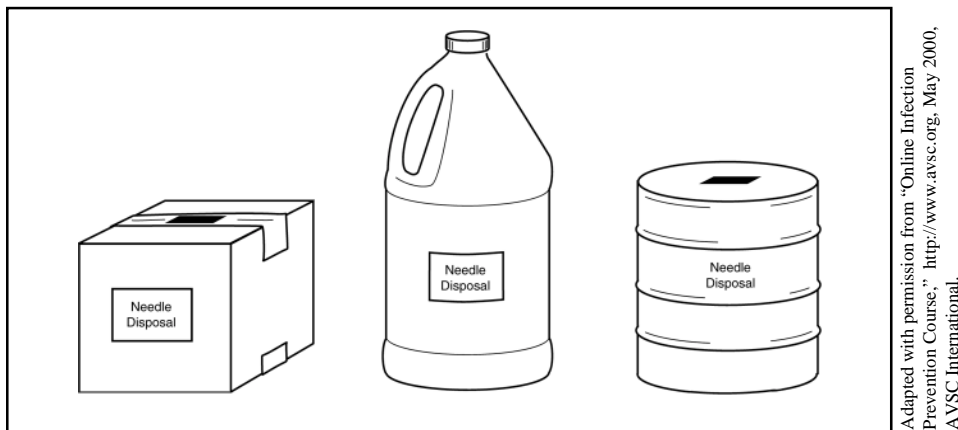
***Never recap, bend, or manually remove the needle from a used syringe.***

One-handed methods to remove and contain the needle could reduce the volume of sharps waste. Several approaches are now being explored. Evidence on their effectiveness is sought from groups experienced with their use.

### Safe Disposal of Injection Equipment and Other Sharps

To further prevent needlesticks after use, syringes, needles, and other contaminated sharps should be immediately placed in a leak-proof, puncture-proof container. These containers are called *needle-disposal boxes*, *sharps containers*, or *safety boxes*. Medical waste that might cut or puncture the skin should be separated from paper and other waste and placed inside the disposal box. For example, after use, needles and syringes, broken vaccine vials, lancets, and broken ampules should be thrown inside the disposal box that is located within reach of the health worker. These boxes should be used only once. The practice of opening them to reach inside and pull out syringes is dangerous.

Figure 13. Needle-disposal boxes



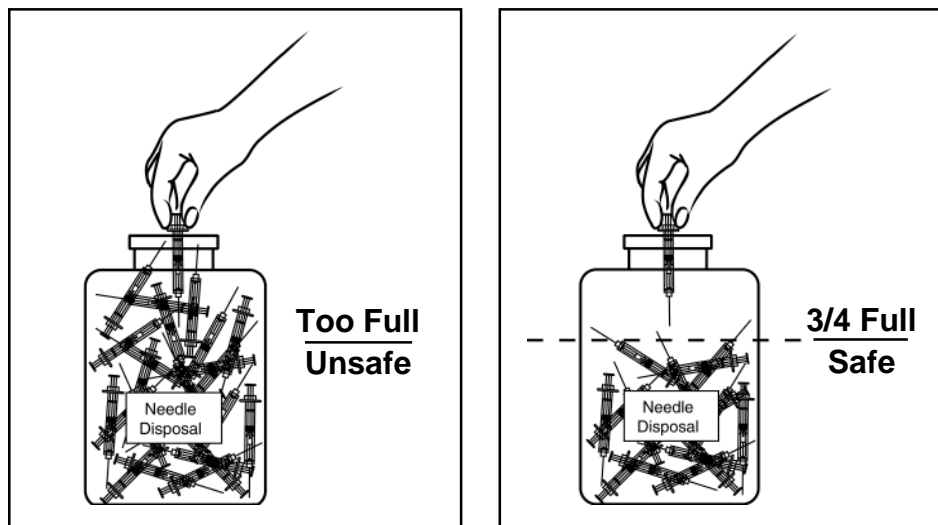
To prevent needlesticks during transport or storage, needle-disposal boxes should be:

- puncture proof and leak proof,
- labeled with a warning that can be understood by local people, and
- sealed so they remain closed when stacked.

### **Do not fill needle-disposal boxes completely full.**

When only three-quarters full, needle-disposal boxes should be sealed and discarded to prevent needlesticks that occur when the lid is pushed down against an overly-full box, or when people must put their hands too close to the points of contaminated needles. Needle-disposal boxes should be filled only once and discarded immediately to minimize risk of needlesticks by workers who empty them.

*Figure 14. Filling needle-disposal boxes more than three-quarters full may cause needlesticks*



### **Transporting contaminated waste**

Transporting contaminated waste can expose others to disease and injury. Consider the following points when transporting waste:

- Delays in the disposal of contaminated needles may increase the occurrence of accidents. Containers should be collected for incineration or other forms of destruction (burn and bury) as soon as possible at the end of the immunization session.
- Contaminated needles should not be transferred from container to container.

- If containers are transported in a vehicle and the containers leak, the vehicle should be disinfected with a bleach/water solution (1 to 100 ratio) before being used for other purposes. This solution should be prepared the day of use because bleach (sodium hypochlorite) is rapidly inactivated.
- Do not allow people to sit on top of needle-disposal containers during transport. The containers may break open under their weight and turn the sitter into a pin cushion!

### Health Workers' Responsibility for Cleaning the Outreach Site

If health workers are giving immunizations at an outreach clinic or site, they should not leave any materials behind that could harm people or animals. Health workers should never save used syringes to count later in order to estimate of the number of children immunized.

Before leaving the immunization outreach site, health workers should:

- Remove all empty or discarded vials from the immunization work site.
- Remove all syringes or needles at the immunization work site.
- Make sure all single-use injection equipment is disposed of in needle-disposal boxes that are sealed and taken to the holding site for destruction by burning, incineration, or burial.

Figure 15. Never sort broken vials and medical waste by hand



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**Destroying syringes: no easy options, no good solutions**

Unfortunately, there are no easy, non-polluting methods that destroy syringes or needles. Injection equipment can be decontaminated by placing it in bleach and water prior to burial. Decontamination removes blood-borne pathogens. However, once the material is buried, it will be contaminated by other germs. People who step on needles will remain at risk for injury and other infections such as tetanus. Two other options that destroy syringes and needles after disposal are incineration and burning.

**Incineration**

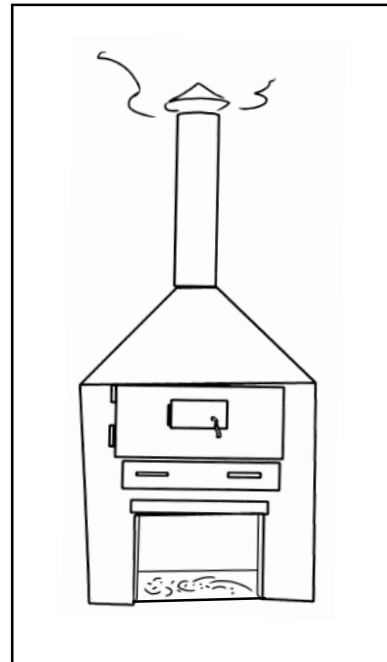
Incineration can completely destroy needles and syringes by burning at temperatures above 800°Celsius. The high temperatures kill microorganisms and reduce the volume of waste to a minimum. Properly functioning incinerators ensure the most complete destruction of syringes and needles, and produce less air pollution than burning at lower temperatures. Because they require special facilities and personnel, some hospitals use incinerators located at cement factories to destroy their wastes. Needle-disposal boxes can sometimes be destroyed by commercial or public incinerators.

**Burning**

“Burning” refers to the combustion of injection equipment at lower temperatures that may or may not completely destroy them. Adding kerosene and igniting medical waste is an example of burning. Burning is commonly done in an open field or in a protected hearth.

To facilitate burning, some cardboard or fiberboard safety boxes instruct persons to open holes in the cardboard at specially marked sites when the box is assembled. Do this before sharps are placed in the box. These holes allow air to get inside the box during burning and aid the destruction of the syringes.

Figure 16. Incinerator



### ***Open burning***

Open burning of contaminated sharps in a pit is the least preferred, most toxic option. Open burning is not recommended, because it scatters waste. If waste is placed in an open pit, the pit should not be so deep that people have to crawl down into the pit to start the fire. They could be pricked by the remaining stubs of needles.

However, if open burning must be done, health workers should:

- fence off and clear the area in which open burning takes place;
- warn people to stay away and avoid smoke and fumes from the fire;
- carry the waste to the site just before burning;
- burn the waste in small, designated areas;
- prevent animals or people from accessing the site;
- make sure the fire is completely out before leaving the site; and
- prevent waste from scattering and littering the surrounding areas.

### ***Burning in metal drum or hearth***

This is another way to dispose of used injection equipment and contaminated needles. Needle-disposal boxes can be placed in a metal container. When the container is three-quarters full, fuel can be poured in, the waste ignited, and the materials burned until the fire goes out on its own. The remains should then be buried.

### **Burying debris after burning or incineration.**

The remains of injection equipment and needle-disposal boxes should be buried after burning. Bury debris in a pit at least one meter deep, in a controlled area for burying waste, or a similar location where people do not have access and will not dig to plant crops or establish latrines.

Some people recommend covering the site with concrete when the pit is full to prevent digging at the site in the future.

### **Trainer's Note**

- Review Key Points of Module 4.
- Conduct Quiz (pages 60-63).
- Conduct Practical Exercise 2 (page 65) “Improving Medical Waste Disposal.”
- Review Case Studies (pages 66-73).

## Key Points

- Needlestick injuries can occur at any time during an injection, but they occur most frequently during and immediately after the injection.
- Always prepare and position young children securely before giving an injection so they do not grab needles, or kick unexpectedly.
- Always tell patients when you are about to give them an injection.
- Do not recap, bend, or break needles before disposal. Do not manually remove the needle from the syringe.
- After injections, discard syringes and needles at the point of use; do not walk around with used equipment.
- Needle-disposal boxes should be closed, sealed, and labeled when they are three-quarters full.
- Needle-disposal boxes should be puncture-proof and used only once.
- Burning is one way to destroy needle-disposal boxes.
- Well-functioning incinerators that burn above 800°C ensure the most complete destruction of syringes and needles. Burning at high temperatures can produce less air pollution than burning at lower temperatures.

# Quiz

## Quiz Questions

1. Why is it important for an adult to hold a child securely for an injection?
2. Is the following statement true or false?  
“Everyone who handles used, contaminated injection equipment is at risk of infection and injury.”
3. Is the following statement true or false? “If injection equipment and other sharps need to be stored at a facility before they are burned, they should be placed in a big pile behind the clinic.”
4. Proper disposal of injection equipment and other sharps:
  - A. Minimizes the spread of infections.
  - B. Reduces the risk of injury from needlesticks.
  - C. Improves the appearance of a facility.
  - D. All of the above.
5. Proper disposal of used syringes, needles, and other sharps includes:
  - A. Always breaking or bending the needle before disposal to prevent re-use.
  - B. Placing the needle and attached syringe in a puncture-proof container.
  - C. Waiting until sharps containers are full before throwing them away.
  - D. Removing the needle from the syringe with two hands.
  - E. None of the above.

### Trainer's Note

Discuss these questions together to stimulate classroom discussion. After the discussion for each question, repeat the correct answer. At the end of the quiz, review this module's Key Points again.

6. The biggest reduction in transmission of blood-borne infections through unsafe injections can be achieved through:
  - A. Eliminating unnecessary injections.
  - B. Burning syringes completely to the point of destruction.
  - C. Using only sterile needles and syringes in immunization programs.
7. What steps can make open burning safer?
8. Describe the procedures for burning injection equipment and other sharps in a metal container.

## Quiz Answers

1. Why is it important for an adult to hold a child securely for an injection?

*A child must be held securely to prevent unexpected movements that could cause accidental needlesticks. Children often kick or try to grab the needle and, thus, prick themselves or contaminate the needle.*

2. Is the following statement true or false? “Everyone who handles used, contaminated injection equipment is at risk of infection and injury.”

*True.*

3. Is the following statement true or false? “If injection equipment and other sharps need to be stored at a facility before they are burned, they should be placed in a big pile behind the clinic.”

*False. Place waste in a container in a closed area that is protected from the public.*

4. Proper disposal of injection equipment and other sharps:

*D. All of the above.*

5. Proper disposal of used syringes, needles, and other sharps includes:

*B. Placing the needle and attached syringe in a puncture-proof container.*

6. The biggest reduction in transmission of blood-borne infections through unsafe injections can be achieved through:

*A. Eliminating unnecessary injections.*

*While all three practices are important, the greatest number of infections will be prevented by eliminating unnecessary injections (see Module 1 for more information).*

7. What steps can make open burning safer?

*Open burning is not recommended because it scatters waste and is dangerous. However, if open burning must be done, carry the waste to the site just before burning, and burn it in a small, designated area. Avoid smoke and fumes from the fire, and make sure the fire is completely out before leaving the site. Any remains should be buried in the dirt after burning, in a location where people cannot access them.*

8. Describe the procedures for burning injection equipment and other sharps in a metal container.

*Needle-disposal boxes can be placed in a metal container. When the container is three-quarters full, fuel can be poured on it, then ignited, and the materials burned until the fire goes out on its own. The remains should then be buried.*

# Practical Exercise #1

## Arranging Immunization Stations to Prevent Needlestick Injuries

1. Divide the participants into groups of three.
2. Provide each group with one big piece of paper and one pen or marker.
3. Ask participants to imagine a safe immunization work site, to imagine the movement of patients and health workers at the site, and to think through practices to prevent needlestick injuries and safely dispose of syringes and needles. Participants should discuss these ideas within their small groups.
4. Ask participants to describe within their groups the layout of the safe immunization work site, showing the location of the work table, the vaccine carrier, the needle-disposal container, the health worker's and the patient's chair, and other important objects.
5. Ask participants to use the large piece of paper as a safe immunization work site "table top." Have them draw supplies and equipment directly on the table top in an arrangement that maintains safe injection practices. Supplies that should be drawn include:
  - Needle-disposal box
  - Syringes and needles
  - Vaccine carrier
  - Opened vials of vaccine
  - 70% alcohol
  - Cotton wool
  - Tally sheets or registries and pens
  - Rubbish container for paper waste
6. After each group has set up their safe immunization site and work table, ask them to present and discuss these arrangements with the other participants, including:
  - the reasons for the location of various supplies such as vials of vaccines and the injection equipment on the work table;
  - where the health workers and the patients are positioned;
  - the flow of health worker and patient movement in the site, and the way this reduces needlestick injuries; and
  - the location of the needle-disposal boxes.



## Practical Exercise #2

### Improving Medical Waste Disposal

1. Ask participants to break up into groups of three.
2. Ask them to discuss what materials they use for needle-disposal boxes during their immunization campaigns. If they are not familiar with needle-disposal boxes, ask them to design a needle-disposal box using resources or materials that are easily available to them in their immunization campaign site.
3. After designing their needle-disposal box, ask each group to describe in detail what they will do with the needle-disposal box at the end of the immunization campaign.
4. Each group should discuss with the larger group their needle-disposal box and their process for its safe disposal.
5. After each group has presented, conduct an open discussion of best disposal practices. Discuss realistic problems that the health workers have in the field. Brainstorm practical, safe ways of disposing of syringes and needles, using available resources.

# Case Study #1

## The Recapping Quandary

Your clinic has a special container for disposing of needles and syringes. The container is located in the vaccination room, since that is where most injections are given. Occasionally, patients need to be given injections in the treatment room, which is down the hall from the vaccination room. When this occurs, the nurses recap the hypodermic needles, carry them down the hall to the vaccination room, and deposit them in the needle-disposal box.

### Question for Discussion

**What should be done differently to reduce the risk of infections at your clinic?**

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### Answer to Case Study #1 Question

What should be done differently to reduce the risk of infections at your clinic?

*Recapping causes more needlesticks than any other single procedure. It must be avoided.*

- *To reduce the risk of infection to health workers, needles should not be recapped before disposal.*
- *Puncture-proof needle-disposal boxes should be placed at every point where needles and syringes are used. The uncapped needle and syringe should be immediately disposed of in a puncture-proof container.*

## Case Study #2

### The Pile of Debris

All waste from the district hospital is gathered and thrown into piles behind the main hospital building. Every six months, the hospital director hires some laborers to shovel the waste into trucks and cart it off to the closest dump, which is located in a neighboring town.

Frequently, people pick through the waste looking for items that they can use or sell. Children also play near the waste, and dogs commonly are seen poking their noses in the piles.

#### Questions for Discussion

1. **Who is at risk of infection from these practices?**
2. **How can the waste-disposal problems here be solved?**

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## Answers to Case Study #2 Questions

1. Who is at risk of infection from these practices?

*The staff who dispose of the waste, the laborers who cart the waste away, and members of the community in the neighboring town who scavenge or play in the waste are all at risk. The animals also are at risk for some infections, as are those who slaughter or eat the animals.*

2. How can the waste-disposal problems here be solved?

*The waste-disposal problems here can be reduced by:*

- *Having health care workers dispose of contaminated needles and medical waste separately from general waste to reduce the amount of waste requiring special handling, and to eliminate dangerous manual handling later on.*
- *Building an incinerator or digging a pit to burn or bury the medical waste.*
- *Reducing the number of unnecessary injections.*
- *Ensuring that people and animals do not have access to the waste while it is stored at the hospital, and removing it more often than every six months.*

## Case Study #3

### The Pit at the Turtle Clinic

Ms. Gomez is a new district supervisor making her first visit to the Turtle Clinic. The night guard asks to speak with her to explain his concerns about waste disposal. Upon visiting the waste-disposal site, Ms. Gomez finds a large pit that is less than half full, with a layer of leaves and other garden debris visible.

While talking to the night guard, she sees a gardener dump a wheelbarrow full of branches, leaves, and other debris into the pit. Then, against the outside of the fence, she finds a pile of what looks like recently dumped medical waste, complete with bloody dressings and exposed needles attached to IV tubing.

#### Questions for Discussion

1. **What are the waste-disposal issues here?**
2. **What should be done about this situation?**

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### Answers to Case Study #3 Questions

1. What are the waste-disposal issues here?

*The incorrect waste-disposal practices here are:*

- *dumping medical waste outside of the fence instead of in the pit; and*
- *dumping needles and syringes with other waste.*

2. What should be done about this situation?

*Ms. Gomez should discuss the problem with the night guard and work with the clinic physicians, other staff, and community members to make waste disposal safer and to follow up to make sure the new practices are maintained.*

## Case Study #4

### The Missing Syringe Barrels

Ms. Oludara is a nurse-midwife at the Yaro Clinic, a small but busy maternal/child health clinic. She recently attended an infection-prevention training course where she realized that she did not know where medical waste was disposed of at her clinic. Upon returning to the clinic, Ms. Oludara discovers that the area designated for waste disposal is a shallow pit among the trees behind the

clinic. She notices that there are many plungers for the syringes but not the barrels. She questions the doctors, midwives, and housekeeping staff, but no one can explain what is happening to the syringe barrels. The providers say that after using the syringes and needles, they manually remove the needles, place them in empty bottles, and throw the syringes in the trash can. Ms. Oludara then asks the man who collects and disposes of the medical waste about the barrels. He tells her that he once saw some teenage girls who lived near the clinic collecting the syringe barrels to use as rollers for their hair. He had thought it was a clever idea.

#### Questions for Discussion

1. **What are the waste-disposal issues here? Who is at risk of infection or injury, and why?**
2. **What should be done about this situation?**

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## Answers to Case Study #4 Questions

1. What are the waste-disposal issues here? Who is at risk of infection or injury, and why?

*The incorrect practices here are:*

- *the manual removal of needles from contaminated syringes;*
- *the disposal of medical waste in a shallow pit and garbage cans that are easily accessible to the community; and*
- *the use of blood-containing devices for beauty aids.*

*The clinic staff and members of the community (including the teenage girls who scavenge in the pit and the people to whom they give the syringe barrels) are at risk of infection if they come into contact with pathogenic organisms.*

2. What should be done about this situation?

*Ms. Oludara should inform the staff of the situation and discuss the safe use and disposal of needles and syringes. The clinic should then develop a plan to:*

- *improve the waste-disposal site so that it is not accessible to members of the community;*
- *appropriately incinerate, burn, or bury the needles and syringes so that both the needles and syringes are no longer usable;*
- *explain to scavengers why they are restricting access to the medical waste.*

**Notes:**