Training Manual

Giving Safe Injections:

Introducing Auto-Disable Syringes

October 2000

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How to Use This Manual

This manual is for health workers who inject vaccines. Each of the five modules covers a different lesson related to the safe injection of vaccine. The topics of the modules are:

These modules discuss the ways to give injectable vaccines without harming the recipient, the health worker, or the general population. Module 1 discusses how health workers can unknowingly spread diseases with injections contaminated by germs present in the blood, skin, and environment. Modules 2 and 3 review special issues in the safe selection and reconstitution of vaccines. Module 4 discusses how to arrange work stations and syringe disposal to prevent needlesticks to health workers and communities. Module 5 introduces the new auto-disable syringes.

The manual is designed to be presented by a trainer. It covers one topic per module: the sessions may be given together in a one-day course or taught separately. We recommend that trainers study the material ahead of time. In our pretest sessions, groups led by trainers unfamiliar with the material often read the module aloud, and consequently, were unable to cover the material in the time suggested on the first page of each module.

We invite trainers to pay particular attention to other features on the first page of each module. In addition to the suggested time needed to cover each session, this page summarizes the objectives of that module, the preparation required by the trainer, and a list of *Trainer's aids*. In the body of the module, trainers can then look for the highlighted boxes *(Trainer's notes)* that cue when to hand out materials, discuss the case studies, conduct a quiz, or hold a practice session. These aids reinforce learning through practice, review, and discussion.

In some settings, trainers are not available. Fortunately, health workers who read the material, complete the practical exercises, and take the quizzes can benefit from the manual by reviewing it alone or with fellow workers.

Module 1

The Health Impact of Unsafe Injections

This module reviews the impact of unsafe injections and discusses the responsibility of health workers to prevent disease and injuries caused by unsafe injections.

Objectives:

After completing this module, participants will be able to:

- describe why injections can be harmful;
- name the common ways injections create health risks;
- name three common blood-borne diseases transmitted by unsafe injections;
- explain why reducing unnecessary injections is key to improving injection safety;
- describe the responsibilities of health workers in improving injection safety;
- explain the importance of routine handwashing.

Time:

30 minutes

Key topics:

- The problem of unsafe injection
- Examples of unsafe practices
- Transmission of disease from unsafe injections
- Body fluids contain pathogens
- Health workers' obligation to do no harm
- Reduction of unnecessary injections

Trainer's aids:

Quiz (pages 10-13)

Trainer preparation:

- Review Module 1 in advance.

The Health Impact of Unsafe Injections

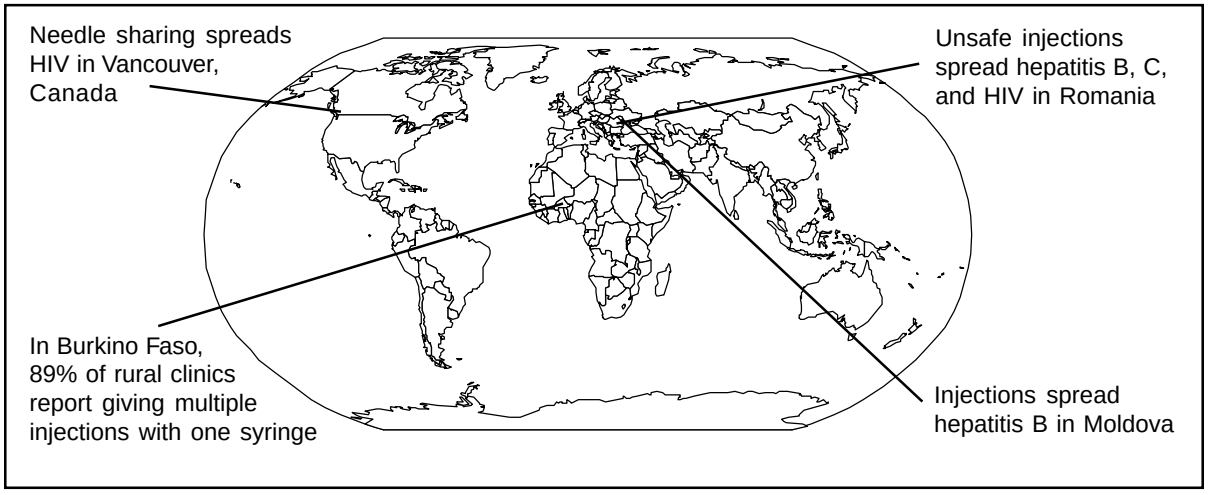
Unsafe Injections Cause Infections, Injuries, and Drug-Related Problems

The World Health Organization (WHO) estimates that at least 50 percent of the world's 12 billion injections administered each year are unsafe—posing serious health risks to recipients, health workers, and the public. Most injections are given for therapeutic purposes, rather than for immunizations. However, most of the injections given may be unnecessary, ineffective, or inappropriate (see Simonsen, 1999).

The most common, serious infections transmitted by unsafe injections are hepatitis B, hepatitis C, and HIV. WHO estimates that unsafe injections transmit 8-16 million hepatitis B virus infections, 2.3-4.7 million hepatitis C virus infections, and between 80,000-160,000 HIV infections each year. Unsafe injections can also transmit parasitic (malaria), fungal, bacterial, and other types of infections. Some infections, such as abscesses, may appear relatively quickly; however, other infections spread by used syringes may not be obvious for years or decades.

Poorly administered injections can also cause injuries or drug toxicities when the wrong injection site, drug, diluent, or dose are used.

Figure 1. Unsafe injection practices are a worldwide problem.



What is an Unsafe Injection?

Figure 2 lists some of the common injection practices that can cause harm.

Figure 2. Specific examples of unsafe injection practices.

Practices that can harm recipients:

- Re-using a syringe or needle
- Sterilization without supervision or monitoring of time, steam, and temperature indicators
- Changing the needle but re-using the syringe
- Giving an injection when there are safer alternatives
- Keeping freeze-dried vaccine more than 6 hours after reconstitution
- Attempting to sterilize injection equipment without prior cleaning
- Boiling and leaving injection materials in 10% bleach for 30 minutes prior to re-use
- Boiling injection equipment in an open pan
- Using only disinfectants on contaminated syringes to prepare them for re-use
- Loading syringes with multiple doses and injecting multiple persons
- Applying pressure to bleeding sites with used material or a finger
- Vaccinating infants in the buttocks
- Leaving a needle in the vial to withdraw additional doses
- Mixing (decanting) two partially opened vials of vaccine
- Flaming needles
- Mixing 10-dose vials of vaccine with a single-dose of diluent
- Using a jet injector with a re-usable nozzle
- Storing medication and vaccine in the same refrigerator
- Touching the needle

Practices that can harm health-care workers:

- Recapping needles
- Placing needles on a surface or carrying them any distance prior to disposal
- Sharpening blunt or blocked needles for re-use
- Reaching into a mass of used syringes or needles (for cleaning or sorting waste)

Practices that can harm the community:

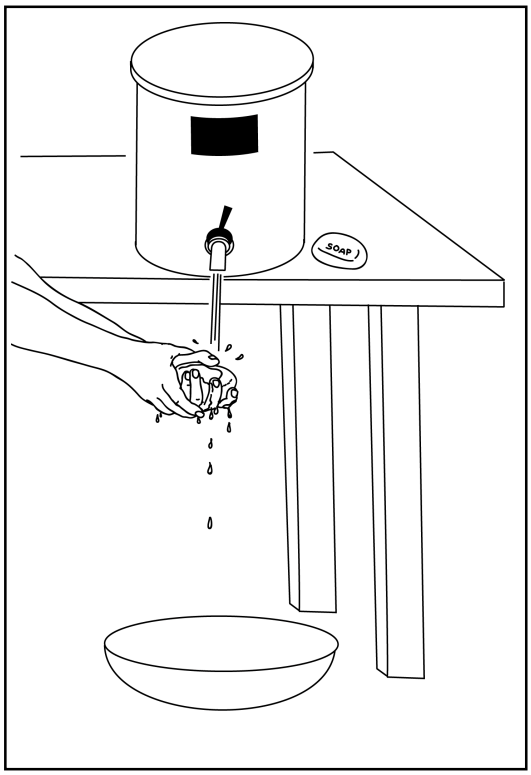
- Leaving used syringes in areas where children can play with them
- Giving or selling used syringes to vendors who will resell them
- Leaving used syringes in areas accessible to the public

Assume All Body Fluids Contain Pathogens

In this manual, *pathogens* and *germs* refer to microorganisms that can cause disease. The term *body fluids* or *body substances* refers to secretions such as blood, saliva, vomit, mucous, sputum, feces, urine, semen, vaginal secretions, pus, sweat, or tears.

To give injections safely, healthworkers should understand that any body substance may contain pathogens that spread disease. Some body substances contain more germs than others—one can assume that feces contain more germs than tears. Other substances may vary from day to day in the presence and quantity of germs they contain. Blood from an individual may be sterile one day (i.e., contain no organisms) but swarm with millions of pathogens days later, if the person is sick.

Figure 3. Washing hands—a simple act to protect health workers and patients



Adapted with permission from *Immunization in Practice*. WHO/EPI/TRAM/98.12

Because our eyes cannot see who is carrying dangerous, infectious germs, health workers should treat all blood and body substances as if they contained pathogens. At a minimum, this means health workers should never use any item that has come into contact with blood or other body fluids. Health workers should wash their hands carefully after touching body fluids by using water from a tap or water poured from a pitcher, soap if available, and scrubbing thoroughly until all visible dirt is gone.

The body substances of animals also contain germs. For example, hepatitis E is a newly identified virus that can live in infected pigs, sheep, goats, rodents, cattle, and monkeys. When it has caused disease in humans, it has killed up to 10% of pregnant women who were infected. This infection can spread if fingers or objects that touch the virus are then placed in the mouth, and it is likely that injected viruses could cause infection as well.

Some vaccination campaigns try to attract crowds by offering immunizations to both people and their animals. Outreach efforts that vaccinate humans and animals at the same time must strictly separate syringes, needles, personnel, sterilizers, and supply containers to avoid spreading pathogens from animals to humans and vice versa.

Assume the Skin and the Environment Contain Germs

In addition to body fluids, hands tend to be highly contaminated with germs. Prior to arriving at work, a health worker may have placed his fingers on small, bleeding cuts acquired during the morning shave or haircut, blown his nose, shaken hands to greet a sick aunt, wiped a small child's bottom, slaughtered an animal, or handed money to the bus driver. These small tasks all can transfer unseen but infectious pathogens. When the health worker arrives at the immunization clinic and opens vials or separates cotton into cotton balls, the germs on his or her hands may be transferred to the tops of vaccine vials, or to the injection site via fingers or cotton. The needle can easily pick up these germs, push them into a vial, or carry them from the skin onto the needle and deposit them beneath the skin.

Unsafe Injections Can Spread Pathogens More Efficiently than Breathing, Swallowing, or Sex

Humans survive in environments full of germs because the skin is an excellent outer barrier, and the immune system is an excellent inner barrier. The body has many mechanisms that prevent germs from passing through the lungs, the skin, reproductive organs, mouth, or stomach. But injections can carry germs directly past these protective barriers. They do so when germs are:

- transferred from fingers or objects to the needle;
- present on the skin, picked up by a needle, and carried under the skin;
- in the medication to be injected; or are
- inside the syringe barrels or needles that were previously used, inadequately cleaned, or incompletely sterilized.

Injections can carry large numbers of pathogens into sterile parts of the body. Diseases that normally are spread when one person coughs germs out and another breathes them in, when one swallows

germs, or when fingers carry pathogens to the nose, can almost always be spread more efficiently by injection. **Remember: injections can carry pathogens from body fluids or from the environment into the body. Unsafe injections can kill.**

This manual is written at a time in history when millions of persons have weakened immune systems. It is a time when water is increasingly scarce to clean hands, clean equipment, and sterilize injection devices. Billions of injections are given each year with increasing numbers given by parents, salesmen, street children, and folk practitioners who give injections with no understanding of the dangers involved. In our lifetimes, dozens of new pathogens have been recognized. It is a time in history when more and more injections are given in worsening conditions to weakened individuals. The stage is set for unsafe injections to cause epidemics of both established and emerging infections.

This manual has been developed to remind health workers to take simple steps to prevent these complex tragedies. These modules guide workers to abide by WHO principles for safe injections: give injections that harm neither the recipient, the care-giver, nor the community.

Responsibilities of the Health Worker: First, Do No Harm

Health workers should not cause harm through their actions. Patients depend on them to make themselves and their children healthier, not sicker. For example, health workers should:

- Give only necessary injections.
- Use a sterile syringe and sterile needle for every immunization, or do not immunize.
- Arrange the workspace and disposal practices to prevent needlesticks (more on this in Module 4).

Give only necessary injections.

Most vaccinators give curative injections as well as immunizations. While immunizations are necessary, most curative injections, unfortunately, are not. For example, routine injections should not be used to give multivitamins or to treat conditions like colds, influenza, or diarrhea.

Reduce unnecessary injections.

Review the clinic registry to see what injections are given in your clinic for the most common symptoms and diagnoses. Ask your supervisor to find the national recommendations for treatment for those conditions. Discuss as a team whether avoidable injections are being given in your clinic and how to reduce them.

Why unnecessary injections are sometimes given.

- Patients and health workers may not know when problems can be treated more effectively and safely with oral medications or other therapies.
- Health workers or patients may falsely believe that injections are necessary, and may mistakenly believe that injections are always more effective than oral medications.
- Some health workers may think that patients want an injection, even when they don't.
- Some patients may demand injections, even against the advice of their health care providers.
- Some clinics make more money if they give an injection than if they give a pill.

These pressures to give injections can cause harm without anyone intending to do so. The more injections a patient receives, the more likely it is that some of them will be unsafe. Health staff can prevent problems by giving injections only when they are necessary. If a health worker gives an injection when it is not necessary, the health worker may give a patient an incurable, fatal disease; may waste money; and may make a patient expect injections at every visit.

Use a sterile syringe and sterile needle for every immunization—or do not immunize.

Infections, including hepatitis B, hepatitis C, and less commonly, HIV, can be spread when needles and syringes are re-used without sterilization. Effective sterilization in field settings requires first, cleaning the equipment to remove all visible dirt or blood, and second, using indicators to monitor temperature, steam, and time. These indicators (for example, TST Control Spots) ensure that the conditions necessary to sterilize have been met. Boiling, on the other hand, does not sterilize needles. Another common practice, changing the needle but re-using the syringe, is also unsafe.

Widespread problems ensuring the use of sterile needles and syringes led to the WHO-UNICEF-UNFPA joint statement on the use of auto-disable syringes. It states that the auto-disable syringe is the equipment of choice for administering vaccines, both in routine immunization and mass campaigns.

Why re-use of non-sterile syringes and needles sometimes occurs.

Re-use of contaminated injection equipment occurs (1) when there is an inadequate supply of injection equipment, (2) when health workers do not understand the dangers of re-using equipment, (3) when sterilization is unmonitored or injection technique is unsupervised, and (4) when disposal and distribution practices allow public access to injection equipment.

Arrange the workspace and disposal process to prevent needlesticks.

Needlesticks (also called needlepricks) transmit fewer infections than does the use of contaminated equipment, but prevention of needlesticks is still important. Health workers who use, carry, or recap needles; who manually disassemble or clean needles; or who dispose of needles are at risk of disease through needlesticks. Minimize handling of injection equipment to reduce the risk of needlestick injuries.

The public may also receive needlesticks if syringes are dumped in open public areas. It is important to dispose of used syringes and needles and other medical supplies in areas protected from people and animals, both to prevent injuries and to prevent scavenging of needles that can lead to re-use.

Trainer's Note

- **Review Key Points of Module 1.**
- **Conduct Quiz (page 10).**

Key Points

- Unsafe and unnecessary injections spread disease.
- Over half of all injections in resource-poor countries are unsafe.
- Health workers can prevent unsafe injections by **reducing the unnecessary use** of injectable medications.
- Re-use of syringes and needles can spread blood-borne diseases, including hepatitis B, hepatitis C, and HIV.
- Common examples of unsafe injections or situations that can lead to unsafe injections (See Figure 2, page 3):
  - giving an injection when it is not necessary,
  - lacking sufficient injection supplies for the number of persons requiring injections,
  - sterilizing single-use syringes for re-use, and
  - changing the needle on a used syringe and re-using the syringe.
- Most importantly, health workers have a professional commitment to **first, do no harm.**

Quiz

Quiz Questions

1. What is an unsafe injection?

2. What types of infections can be caused by unsafe injections?

3. What are some common examples of unsafe injection practices?

4. What are two ways that health workers can improve injection safety?

Trainer's Note

Give this quiz orally 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.

5. Why is it so important to eliminate unnecessary injections?

6. What is an important responsibility of the health worker?

7. What type of syringe does WHO, UNICEF, and UNFPA recommend for immunization?

8. Indicate the level of risk for each of the following practices:

	Very Dangerous	Some Risk	Good Practice
Allowing the public access to discarded syringes			
Holding cotton wool on the bleeding injection site			
Not washing hands between injections			
Re-using needles and syringes after the last sterile syringe has been used in an immunization campaign			
Changing the needle and re-using the syringe in an immunization campaign			

9. Please discuss how each of the following practices can be improved:
   - A doctor washes his hands by dipping them in a basin of water before examining a patient.
   - Staff wash their hands by thoroughly scrubbing hard-to-reach areas for 10 to 15 seconds at the end of an immunization session.

Quiz Answers

1. What is an unsafe injection?

   An unsafe injection is an injection that harms the recipient, the provider, or that results in waste that is dangerous for other people. Unsafe injections can cause disease, injury, and death.

2. What types of infections can be caused by unsafe injections?

   Unsafe injections can transmit infections including hepatitis B, hepatitis C, and HIV. They can also cause abscesses at the injection site, parasitic infections (malaria), fungal infections, bacterial infections, and many other types of infections.

3. What are some common examples of unsafe injection practices?

   - *Giving an injection when it is not necessary.*
   - *Lacking sufficient injection supplies for the number of persons requiring injections.*
   - *Re-using singe use, disposable syringes and needles.*
   - *Sterilizing equipment without first cleansing it.*
   - *Changing needles on a used syringe and re-using the syringe.*

   (See Figure 2 on page 3 for additional examples.)

4. What are two ways that health workers can improve injection safety?

   Health workers can improve injection safety by: (1) reducing unnecessary injections (not using injectable vitamins, not using injections when an oral medication is available, not giving injections for viral conditions like colds and the flu); and (2) educating patients about the risks of unsafe injection practices and the necessary precautions required for safe injection.

5. Why is it so important to eliminate unnecessary injections?

   Most of the injections given in the world are unnecessary. An unnecessary injection does no good and may cause harm to the patient. The more injections a patient receives, the more likely it is that some of them will be unsafe. Unnecessary injections also are expensive to the clinic and the patient.

6. What is an important responsibility of the health worker?

   An important responsibility of the health worker is to first, do no harm. No health worker should bring harm to another person through his or her actions.

7. What type of syringe does WHO, UNICEF, and UNFPA recommend for immunization?

   The auto-disable syringe, since it is designed to prevent re-use of injection equipment.

8. Indicate the level of risk for each of the following practices:

	Very Dangerous	Some Risk	Good Practice
Allowing public access to discarded syringes • *This encourages re-use.*	x		
Holding cotton wool on the bleeding injection site • *This has some risk because blood from one child can be transmitted on a health worker's finger to the open site of another child. It's best to have parents or older children hold cotton wool with their own fingers.*		x	
Not washing hands between injections • *Hands should be washed periodically during the session, as hands can easily become contaminated.*		x	
Re-using needles and syringes after the last sterile syringe has been used in an immunization campaign • *This is an extremely dangerous practice and cannot be justified.*	x		
Changing the needle and re-using the syringe in an immunization campaign • *This is an extremely dangerous practice and cannot be justified.*	x		

9. Please discuss how each of the following practices can be improved:

- A doctor washes his hands by dipping them in a basin of water before examining a patient.

Hands can be contaminated when dipped into a basin of water. Standing water can easily become contaminated, even if antiseptic is added. In the absence of running water at a clinic, a staff member should pour water over another's hands to rinse. The rinse water should be discarded.

- Staff wash their hands by thoroughly scrubbing hard-to-reach areas for 10 to 15 seconds at the end of an immunization session.

Staff could also wash their hands prior to beginning work and often during work time when hands are contaminated.

Notes: