19 Health Care Waste

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Health Care Waste

Health workers do their best to help people stay healthy. But if waste from health care is not handled safely, it can spread illness to the health workers and the surrounding community.

Health care waste includes waste from clinics, hospitals, laboratories, blood banks, dental clinics, birth centers and animal hospitals. It also includes waste from **vaccination programs** (also called immunization campaigns) and medical aid missions, and waste produced from caring for the sick at home.

Most waste from health care is ordinary waste like paper, cardboard, and food scraps. But some health care waste is contaminated with blood or body fluids that may carry harmful germs and spread disease. Used needles and other sharp tools **(sharps)** can cause injury and spread disease. Some health care waste, such as plastics, contain toxic chemicals. When waste that carries harmful germs or toxic chemicals is mixed with ordinary waste, the mixed waste becomes a threat to all who handle it. That is why separation of waste in the place where it is created is so important.

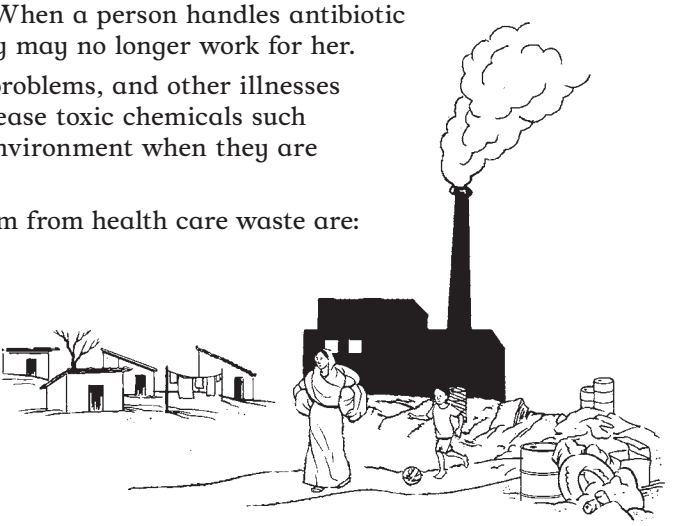
Safe handling of health care waste uses the same basic methods used to dispose of other solid wastes (see Chapter 18). But wastes contaminated with body fluids and germs must be **disinfected** and disposed of in ways that protect the health of people and the environment.

Health Problems from Health Care Waste

Any waste can cause health problems if not carefully disposed of. But health care waste can cause particular health problems such as:

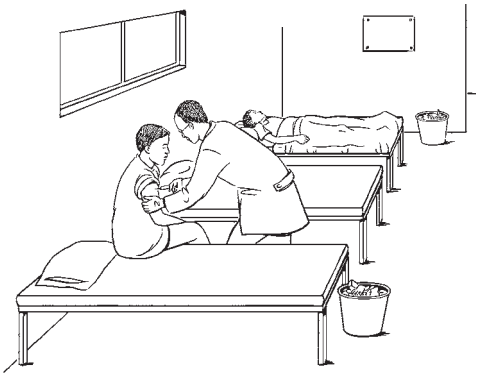
- hepatitis B and C, tetanus, HIV, and serious skin infections from used needles and sharp instruments.
- allergies, skin rashes, eye irritations, asthma and other breathing difficulties from breathing in disinfectants, detergents, medicines, and laboratory chemicals.
- **antibiotic resistance.** When a person handles antibiotic medicines often, they may no longer work for her.
- cancer, respiratory problems, and other illnesses from wastes that release toxic chemicals such as dioxins into the environment when they are burned.

People most at risk of harm from health care waste are:



people who live near where health care waste is dumped or burned

people who remove trash from health centers and those who collect, recycle, or sell trash from dump sites and landfills



workers and patients in health centers

Sangu's story

Sangu was born in a small village in India. After years of drought and crop failure, she and her mother and baby brother moved to the city in search of a better life. They lived with her mother's family on a steep hill over a dump site. Other children showed Sangu how to pick out things to sell from the dump site. Before school every morning, she collected scraps of tin, glass bottles, plastic bags, and other things. Sangu used the money she made to buy lunch and hot tea after school.

Life was hard in the city, and Sangu's mother was soon working away from the house all day. Sangu had to take care of her baby brother and could no longer go to school. Every day she spent many hours sorting through garbage at the dump with her brother in a sling on her back.

Sometimes Sangu found bloody bandages, needles, and other hospital waste mixed in with the rest of the trash. Sangu's thin sandals did not protect her from sharp things in the trash. Broken glass and rusted metal would sometimes cut her feet and ankles. One day a syringe needle pierced her sandal and went right into her foot. Soon after, Sangu got very sick with fever, tiredness, and a swollen sore throat.

Sangu felt better after some weeks. But several months later she began to feel sick again. She was tired all the time, had fevers and sores in her mouth, lost her appetite, and grew very thin. Her mother and family worried about her, but they had no money to take her to a doctor. Finally, her mother borrowed money from a cousin and took Sangu to the health center. The doctor listened to Sangu's story, examined her, and then took some blood for a blood test.

The next day, they returned to the clinic and the doctor told Sangu's mother that Sangu had HIV. She needed medicine, but her family had no money to take her to the hospital where she could get it and the attention she needed. With great sadness, Sangu's mother took her home. Sangu rested in bed, but everyone knew she would not recover. A few months later, Sangu died.

Why did Sangu die?

Sangu died from AIDS after she was infected by stepping on a contaminated **syringe** needle.

Her illness and death were caused by an environmental problem: poor disposal of health care waste; and a social problem: poverty.

What could have prevented Sangu's death?

Because many different social problems contribute to poverty, poverty can be difficult to solve. These questions show some of the problems:

- Why was Sangu not in school?
- Why did Sangu need to collect waste to earn money?
- Why did Sangu not have good shoes to protect her feet?
- Why was she not able to get health care and medicine?

Thin shoes, no money to get medicine or health care, and a desperate need to earn money, combined with the malnutrition and other problems that are a part of poverty are some of the answers to these questions. Finding solutions to social problems like these may take a long time.

Health care waste affects many people, including those too poor to go to a health center.

The environmental problem may be easier to solve in the short term. We can begin by asking these questions:

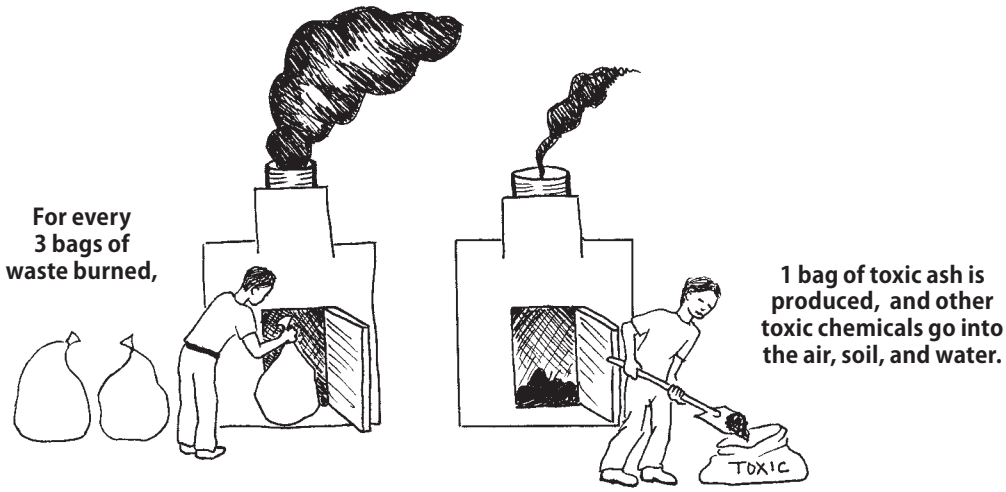
- Why was harmful health care waste mixed in with other trash that could be recycled or reused?
- Why was so much harmful waste dumped in the open, rather than disposed of safely?

Responsible management of health care waste can improve living conditions for everyone, especially those forced by poverty to live on scraps.

The Problem of Burning Waste

To destroy health care waste and the germs it carries, many clinics and hospitals burn it in an **incinerator** (an enclosed, high-heat fire). Burning health care waste seems like an easy solution because different kinds of waste can be collected and simply thrown into the incinerator. But burning waste this way creates more health problems than it solves.

Burning waste, either in an open fire or an incinerator, releases toxic chemicals into the air as smoke, and into the soil and groundwater as ashes. Wastes containing mercury, lead, and other heavy metals release these poisons into the environment when they are burned.



Plastics used to make IV and blood bags, tubes, and some syringes produce highly toxic chemicals called **dioxins** and **furans** when they are burned. These chemicals have no color or smell and can cause cancer, make both women and men infertile (unable to make a baby), and lead to other serious health problems (see Chapter 16 and Chapter 20).

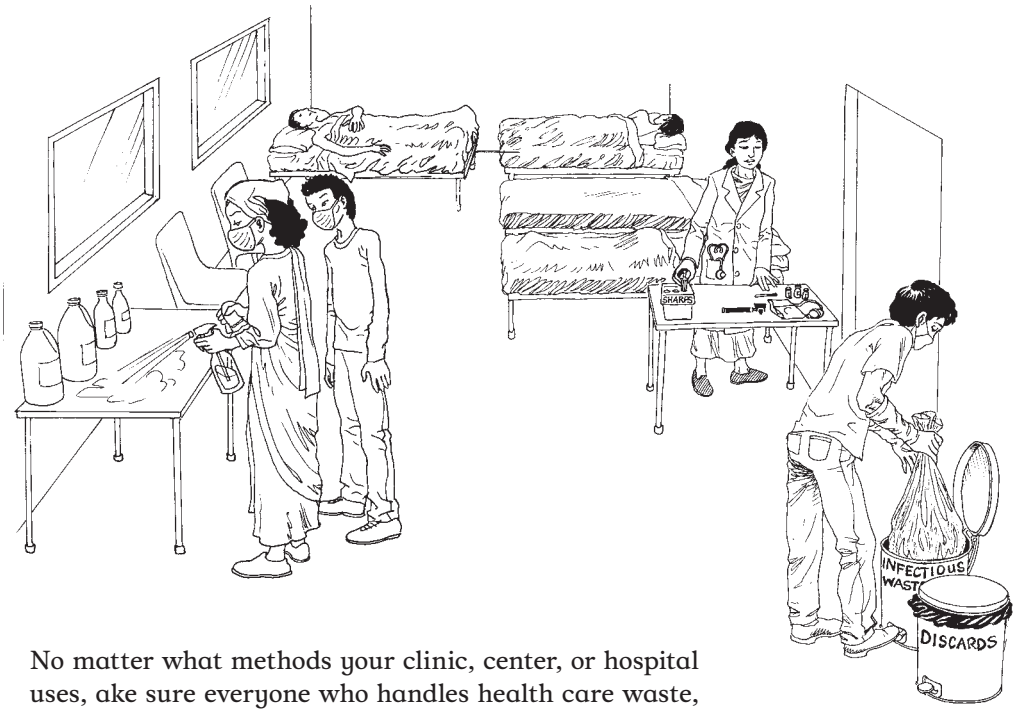
Sometimes incinerators do not burn hot enough or long enough to burn waste completely. Some incinerators are built to handle particular wastes, such as immunization wastes, but end up being used to burn medicines, pesticides, and other toxic materials.

Often, the first steps in safely handling health care waste are to separate materials that can be recycled or reused, then to disinfect waste that carries harmful germs. By using safer alternatives to incineration, the health worker's oath to "do no harm" can be applied even to the difficult task of getting rid of waste.

Preventing Harm from Health Care Waste

Whether in a small health post, a larger clinic, or in the home, medical tools and health care waste must be managed safely to prevent harm.

- **Reduce** the amount of waste by choosing medical supplies carefully.
- **Separate** wastes where they are created.
- **Disinfect** wastes that carry germs.
- **Treat** chemical wastes to make them less harmful.
- **Safely store and transport** waste.
- **Dispose** of health care wastes in the least harmful way possible.
- **Train** everyone who handles health care waste about safe methods.



No matter what methods your clinic, center, or hospital uses, ake sure everyone who handles health care waste, especially new people, understands what needs to be done and why. Often, people will bring up new ideas that can make work easier and safer for everyone. Some clinics have a team of people who are responsible for training and checking safe practices (see pages 443 to 446).

Reducing waste

Using fewer and less harmful materials will reduce the amount of harmful health care waste. When choosing materials for your clinic, think about what kind of waste will be produced, how harmful it will be, and how you will dispose of it.

To reduce the amount of harmful waste:

- Avoid using disposable items if a reusable choice is available and safe to use. (Syringes and needles should not be reused, see page 434.)
- Use non-mercury thermometers if they are available. They cost more but are more durable and less dangerous if they break.
- Do not buy more medicines than you need, and use them only when necessary.
- Use pills instead of injections.
- Use non-plastic items when possible.
- Use the least toxic products to clean and disinfect whenever possible.
- Look for IV bags, tubing, and other materials made without PVC. They are cheap and available in some places, and are always safer for patients and the community.

Separating waste

Separating waste where it is created is another important step in safe handling of health care waste.

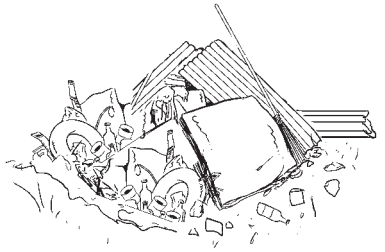
Separating wastes greatly reduces risks to health center workers and to people who collect, sell, and recycle waste. Separation also reduces the amount of waste that must be treated or buried later and reduces the cost of waste management.

Food waste from the health center can be composted and used in gardens.

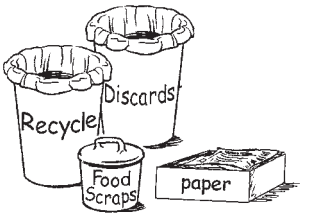
Separating waste into colored containers

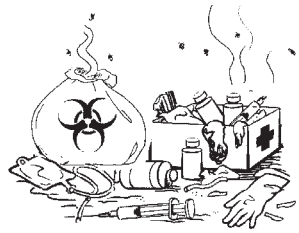
Many health centers separate wastes into different colored containers at the places where waste is created. For this to be a useful method, everyone in the health center needs to understand which waste goes into which color container. Different countries use different colors for each type of waste. For example, in some countries the color red means "danger." So containers for used needles and other sharp tools, and other harmful or toxic wastes are red or marked with red paint, marker, or tape.

More than half of all waste from health centers is just like household waste: paper, cardboard, bottles, cans, and kitchen scraps. When this waste is separated out, it is much easier to manage the harmful waste.

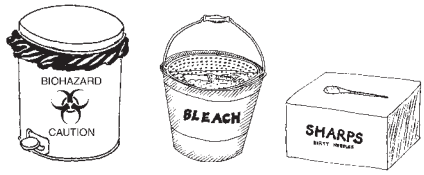


Regular waste can be put into bags and bins and, as much as possible, recycled, turned into compost, or reused.





Harmful waste should be separated and treated carefully (see chart on page 436).

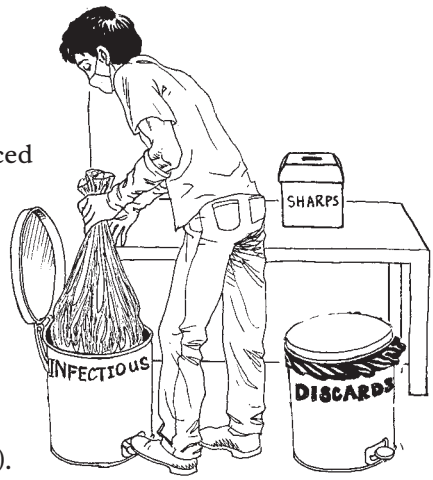


Containers should be:

- placed close to where waste is created.
- clearly marked with colors and symbols.
- strong enough so they do not leak or break.
- easy to seal and transport without risk of spills, leaks, or breaks.
- big enough to hold a full day's waste when only 3/4 full.

It is best to use containers and bags that are the same color for the same kind of waste. If this is not possible, mark them with colored tape or paint. Always using the same colors can help workers who do not read — and even those who do — remember which containers are for regular waste and which are for harmful wastes.

Storing and transporting waste



Health care waste needs to be stored carefully until it can be safely taken to its final disposal site. Health care waste containers should be placed where waste is created and disinfected, never in hallways, bathrooms, or other places where people might spill them or fill them with mixed waste.

Seal waste bins and bags when they are 3/4 full. Bins and bags 3/4 full are less likely to spill or break, and will reduce the chances of injury to a worker picking them up. Never put used needles and other sharp instruments in bags (see page 434). If a bag breaks or leaks, put it inside another bag. Store sealed bags in a closed room until they can be removed from the site. The room should be secure so people who collect trash to sell it cannot get to it.

Health care waste can be stored safely only for a short time. Soon it begins to smell bad and can spread infection as it decays. It is best to remove waste daily. Never store waste for more than 3 days. Your nose will tell you when you have waited too long!

Use carts or trolleys that are easy to clean to remove waste from the center. It is safest to clean carts after each use, and to use carts that have no sharp edges that could damage bags or containers during loading or unloading.

Prevent harm when handling waste:

- Wear protective clothing to reduce risks from needles or other sharp tools, germs, or splashes from blood, other liquids or chemicals (see Appendix A).
- Immediately after they are used, put used needles and other sharp tools in sharps boxes. Do not put sharp things in bags or with other waste.
- Wash hands after handling waste, and before and after working with every patient.
- Never carry uncovered (uncapped) needles.
- Do not let waste touch your skin. If protective clothing gets soaked through with contaminated wastes, take it off immediately, and wash yourself with lots of soap and water.
- Protective clothing only protects if it is clean. After each use or at the end of each shift, wash or disinfect (see page 428) gloves, aprons, glasses, and masks. This will protect the next person who uses them.

If your center does not have protective clothing, use available materials for protection. For example, use plastic garbage bags to make protective aprons, pants, masks, and hats. Some protection is better than none at all.

Disinfecting Waste

Disinfection means killing germs that cause infection. As much as possible, health care waste should be disinfected in the same place where it is created. The most common ways to disinfect are to use chemicals (such as **chlorine bleach**, **hydrogen peroxide**, or other chemicals) or heat (boiling, steaming, **pressure steaming**, **autoclave**, or **microwave**).

After waste is disinfected, it can be safely buried.

What is sterilizing and what is disinfecting?

Some health care manuals use the word **sterilizing** rather than **disinfecting.** Sterilizing and disinfecting are not the same and many people confuse them.

Sterilizing means killing all of the germs on something. It is very difficult to do this.
Disinfecting means killing enough of the germs on something so that it will not transmit infection.

Many people use the word sterilization for proper treatment of health care equipment, and the word disinfection when talking about cleaning floors and other surfaces with 'disinfecting cleaners.' But there are different levels of disinfection.

The treatments described in this book are **'high-level disinfection'** which means killing almost all the germs on something. For this reason, we use the word disinfection for all of the methods in this book.

What wastes need to be disinfected?

Any materials in a health center that are contaminated with blood, body fluids, or feces, or that have been in close contact with a person with a contagious disease, need to be disinfected to prevent the spread of infection and disease.

Wastes that need disinfection:

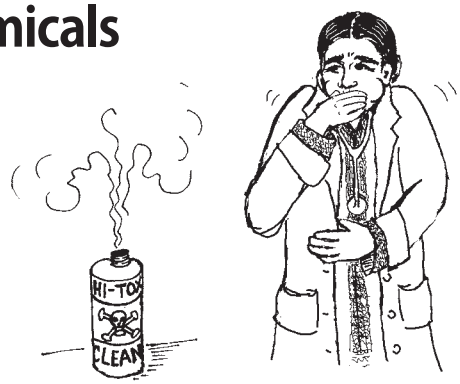
- used needles and other sharp tools
- blood and other body fluids

- bandages, swabs, and other wastes that carry body fluids
- other items contaminated with blood, body fluids, or feces
- feces from people with infectious disease (such as cholera)
- bedding and bedpans from all people

Wastes that do not need disinfection:

- body parts
- wastewater from disinfection and cleaning
- chemicals from disinfection, cleaning, and laboratory tests
- food waste
- any materials not contaminated with blood or body fluids (cardboard, paper, plastics, glass, metal)

Disinfecting with Chemicals



Chemical fumes can be harmful!

All chemicals used to disinfect can be harmful and need to be used with great care. Some chemicals commonly used to disinfect include hydrogen peroxide (6%), chlorine bleach, ethanol (70%), and isopropyl alcohol (70% to 90%).

Many common cleaning and disinfecting products contain **glutaraldehyde** or **formaldehyde**. Regular exposure to glutaraldehyde and formaldehyde can cause cancer and death. These chemicals should not be used. (See pages 430 to 432 for safer ways to disinfect with chemicals, and page 440 for safe disposal of chemicals.)

Many health centers use these guidelines for safety when using chemicals:

- Use chemical disinfectants outside, or in well-ventilated rooms where there is a good exhaust fan.
- Use only the amount of chemical disinfectant needed to do the job.
- Wear gloves, safety glasses, a mask, and protective clothing to protect your skin, eyes, and breathing when using or disposing of chemicals (see Appendix A).
- Store disinfecting chemicals in their proper containers. Label the containers. Do not reuse those containers for anything else.
- Do not store or mix chemicals in water buckets, or containers or bottles that may be used for food or drinks.
- Keep chemical containers tightly closed and stored upright. Check them for breaks, leaks, and weak spots.

Wastes that do not need chemical disinfection

It is often thought that body parts need to be disinfected with chemicals. But body parts, including the **placenta** (afterbirth) and umbilical cord, are most easily disposed of by putting them in a latrine or burying them deep in the ground. In many communities, burying the afterbirth is an important ritual. If it is done safely, burial is also a good way to protect the community from germs that may grow in the afterbirth or other body parts. (See pages 436 to 440 for safe methods for disposing of waste.)

Disinfecting with safer chemicals

When choosing a product, ask: Is it harmful? Is it difficult to dispose of safely?

Some health centers use cleaning products that contain harmful chemicals, such as glutaraldehyde, to disinfect and clean (see page 440). But surfaces in health centers can be kept clean and germ-free by using less dangerous and less costly cleaning products. Hot water and soap is effective for routine cleaning of surfaces such as floors, walls, and furniture.

In areas where people with infectious diseases wait or are treated, it is important to use a stronger disinfectant to prevent the spread of disease. Hydrogen peroxide solutions that contain orange oil and other natural oils are effective for disinfecting floors and surfaces. They do not cause health problems and do not have to be treated before disposal. A safe disinfecting solution can also be made with vinegar and hydrogen peroxide.

How to make a safe disinfecting solution

Mix together equal amounts of white vinegar and hydrogen peroxide. (A 3% peroxide solution is common, but 6% is better.) Mix only as much as you need for one day. Keep it in a closed container.

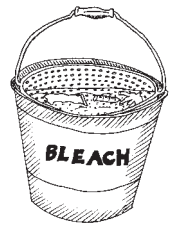
Pour a small amount of the mixture on a wiping cloth and scrub the surface to be disinfected with strong rubbing motion.

This mixture is best for use on tabletops, bed railings, and other surfaces.

Disinfecting with bleach

Many health centers use bleach to disinfect surfaces such as walls, floors, and tables. Care must be taken when disinfecting with bleach because it can cause harm to your skin and eyes if it splashes on you, and the fumes are dangerous when breathed in. Adding white vinegar to the bleach makes it an even more effective disinfectant.

How to make a disinfecting solution of 5% bleach



If your bleach says:	Use:	
5% available chlorine	Only bleach	bleach
10% available chlorine	Add 1 part bleach to 1 part water	bleach + water
15% available chlorine	Add 1 part bleach to 2 parts water	bleach + water + water

If you add 1 cup of white vinegar to a gallon of 5% bleach solution, it will disinfect better. Mix just enough solution for one day. Do not use it again the next day. It will not be strong enough to kill germs any more. To get rid of used bleach, see page 439.

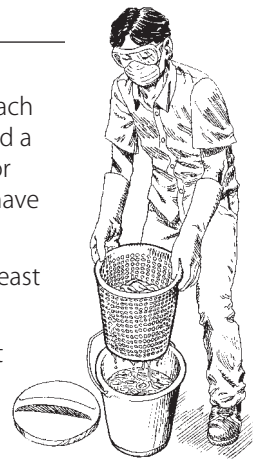
Use a bleach bucket

Keep a bleach bucket wherever there is infectious waste such as used bandages, cotton swabs, gloves, and blood bags. Prepare the bleach bucket every day, or before each shift if you make a lot of waste. You may want one bleach bucket for waste to be disposed of and a different one for disinfecting tools and equipment to be reused.

The bucket should always contain enough bleach solution to completely cover the materials. The materials must stay in the bleach for at least 10 minutes. Keep a tight-fitting cover on the bleach bucket to prevent spills, and to keep the bleach solution strong enough to disinfect. Uncovered, the chlorine will evaporate away.

Gloves, syringes, IV bottles, tubing, and other things that are not intended to be reused should be cut into pieces after taking them out of the bleach bucket.

How to make a bleach bucket



One way to safely disinfect with bleach is to use a bleach bucket. A bleach bucket has 2 parts: a bucket or container that holds bleach solution, and a smaller inner container or basket with many small holes like a strainer or loose woven basket that holds the wastes. A bleach bucket must also have a tight-fitting cover. To prepare a bleach bucket:

Make a 5% bleach solution (see above). The main bucket should be at least ½ full of the bleach solution.

Place the smaller container, strainer, or basket inside the main bucket so the bleach solution passes through the holes. Make sure the inner container does not float on top of the solution, but that the bleach solution passes though the holes so it completely covers the waste materials.

IMPORTANT: Bleach should never be mixed with other chemicals, especially ammonia. Bleach and ammonia mixed together will produce a toxic gas that can cause death if breathed in, and enough heat to cause an explosion. Always wash carefully after handling bleach.

Laundry

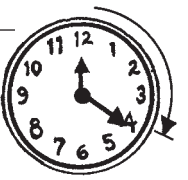
In the past, many hospitals used carbolic acid to sterilize sheets. This is only necessary for the sheets of people being treated for burns. To disinfect bed linens and clothes, soak them in a bleach bucket for 10 minutes before washing with hot water and soap. Use gloves when taking them out of the bleach.

Disinfecting with Heat

Many health centers use autoclaves or microwaves (see page 433) to disinfect syringes, other medical tools, and some waste. If you have no autoclave or microwave, then boiling, steaming, or pressure steaming materials for at least 20 minutes will disinfect them. Disposable wastes should **not** be disinfected with tools that will be used again, because it is difficult to keep the reusable tools clean when you separate them after disinfection.

Wear gloves and a mask to cut plastic and cloth items such as catheters, IV bags, tubing, large bandages, and so on into small pieces.

How to make sure items are disinfected



For boiling, steaming, and pressure steaming, start to count the 20 minutes after the water is fully boiling. Do not add anything new to the pot once you begin to count. After 20 minutes, turn off the heat and let it cool.

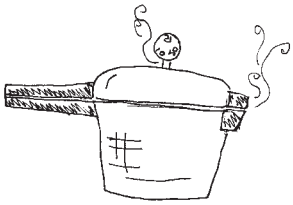
Materials that will be reused after they are boiled or steamed must be removed using sterile gloves or tongs, placed right away inside a disinfected container, and then sealed. The boiled water can be safely poured down a drain.

Boiling

You can use boiling to disinfect metal, rubber or plastic tools, and cloth. After you wash and rinse the tools, put them in the pot, cover the tools with water, bring the water to a boil, and boil for 20 minutes.

Steaming

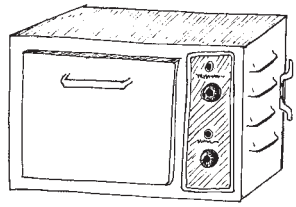
You can use steaming to disinfect gloves, masks, and things made of metal and plastic. The water does not need to cover everything in the pot, but you must use enough water to keep steam coming for 20 minutes. The pot should have a lid that fits tightly.



Pressure steaming

Use pressure steaming to disinfect metal, rubber, plastic, and cloth. Wash and rinse the materials to be disinfected and put them in the pressure cooker with water. Close the lid and heat it on the stove. After it boils, cook at 15 to 20 pounds of pressure for 20 minutes.

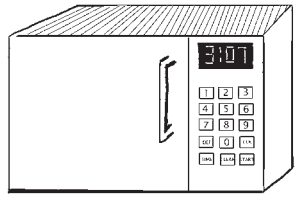
Autoclave



An autoclave is a small machine that disinfects things using steam heat and pressure. Autoclaves have been used for many years to disinfect medical instruments. They are used more and more to treat waste as well.

It is safest to use 2 separate machines — one for reusable instruments and one for waste. For health centers with very small amounts of waste to be disinfected, a pressure steamer is less expensive and works as well as an autoclave. It is possible to build gas, kerosene, or solar-powered autoclaves for areas with no electricity.

Microwave ovens



Microwave ovens heat the moisture in objects placed inside them. The heat, together with the amount of time an object is in the microwave oven, leads to disinfection. Because microwave ovens vary greatly in power, use care when disinfecting with this method. To make sure of high level disinfection:

1. Put the waste in a non-metal container with enough water to cover it.
2. Put a loose-fitting cover over the top of the container to reduce the loss of water during heating.
3. Microwave waste materials for at least 20 minutes.
4. Let the container cool before opening. Dispose of any microwaved liquid waste in a leaching pit (see page 439) or you can safely pour it down the drain.

IMPORTANT: Do not put metal objects in a microwave oven. It can ruin the machine.

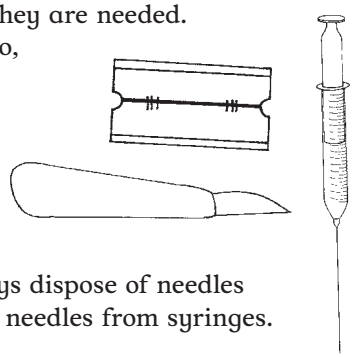
After Disinfection

No matter what kind of disinfection you use (chemical or heat), disinfected waste should be safely stored in bags or disposed of right after disinfection. Keep waste away from patients, and make sure that infected waste does not get mixed with disinfected waste.

Treatment and Disposal of Sharps

Many health problems from health care waste are caused by sharps. Needles, blades, lancets, and other sharp objects can cause wounds and infections, so they need to be handled with great care. Outside the health center, sharps may put the people who collect and recycle waste in danger.

To reduce sharps waste, use injections only when they are needed. (For information about when to inject and when not to, see *Where There Is No Doctor,* pages 65 to 74.)



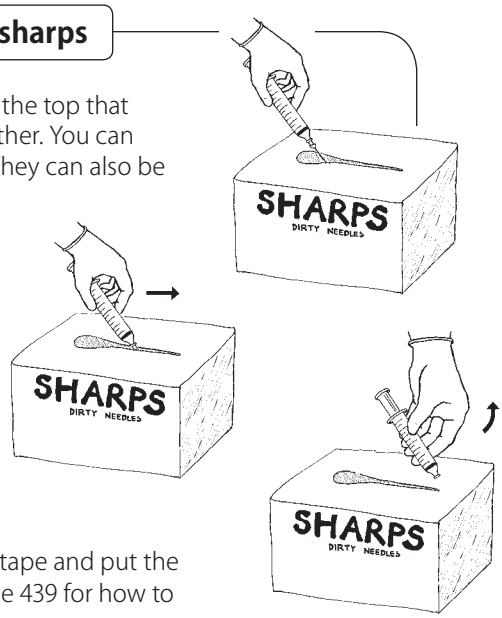
Safe disposal of needles and syringes

After injections, needles should be removed from syringes and put into a sharps container right away. Putting caps back on needles is dangerous and best avoided. Unless you are using reusable syringes, always dispose of needles where they are used. There are many ways to remove needles from syringes. Any method should:

- use only one hand, to prevent needle sticks.
- dispose of needles in a hard container that they cannot poke through.
- be easy and comfortable for health workers to use.

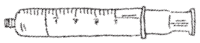
How to make a keyhole box to dispose of sharps

A keyhole box is a metal box with a long slot in the top that is wide on one end and gets narrower on the other. You can buy them or have a metal worker make them. They can also be made from coffee cans or other rigid metal containers. What is important is that they let you remove needles from syringes without touching the needles.



1. When you have finished using a disposable syringe, put the needle into the slot and slide it down to the narrowest point.
2. Now pull up on the syringe and the needle will fall off into the box. Put the syringe in a waste container.
3. When the sharps container is ¾ full, seal it with tape and put the box into a sharps pit or a sharps drum. (See page 439 for how to safely bury sharps waste.)

Kinds of syringes



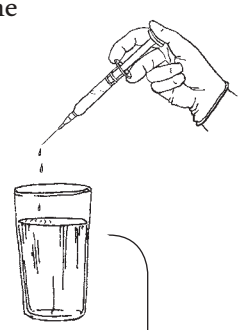
Reusable syringes can be used again and again. Reusable syringes make less waste and can save money, but they must be washed very carefully and disinfected after every use. **Never** use a syringe without washing and disinfecting it first. HIV, hepatitis, and other diseases are spread easily if needles and syringes are not carefully disinfected between uses.

Disposable syringes are made to be thrown out with the needle attached after one use. Some disposable syringes can be taken apart, boiled or steamed, and reused several times. This is not recommended, because if the syringe or needle is not completely disinfected it can spread disease.

Auto-disabled syringes become locked or cover the needle after the syringe is used, so that it cannot be reused. However, auto-disabled syringes still have a needle inside, so they still have the danger of needle-stick accidents inside or outside of the health center.

For safe disposal methods, see pages 438 to 439.

IMPORTANT: Never reuse a syringe and needle without cleaning and disinfecting first!



How to wash and disinfect a syringe and needle for reuse

Using a needle more than once can spread HIV or other diseases unless it is properly cleaned and disinfected, and so is best avoided. But many communities do not have enough syringes and needles to afford to dispose of them after a single use. For this reason, we include information on how to wash and disinfect a syringe and needle for reuse.

1. Put on a pair of heavy gloves to protect your hands from germs.
2. Draw 5% bleach solution (see page 431) up through the needle into the syringe barrel.
3. Squirt out the bleach solution.
4. Repeat several times. Rinse everything several times with clean water.
5. Take the syringe apart and boil or steam the syringe and needle (see page 432).

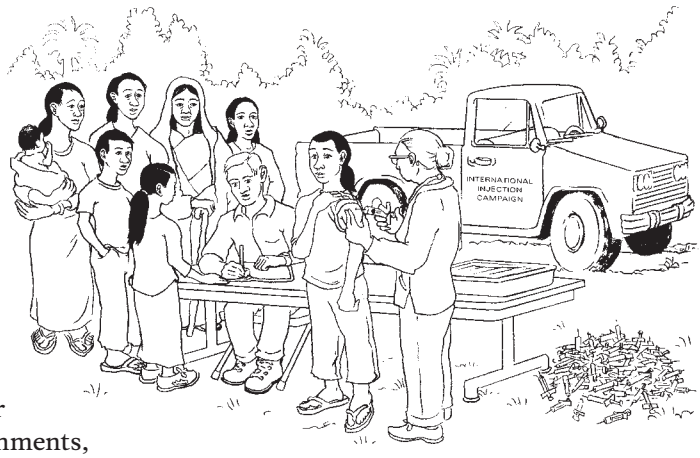
Disposing of Infectious Waste

The chart on this page shows when and how to disinfect and dispose of infectious wastes in small health centers. Some health centers may not be able to use all of these methods, or may have their own, better ways to treat wastes. The important thing to prevent infection is to use a system that everyone in the health center understands and follows.

IMPORTANT: Follow all laws on how to get rid of health care waste.

Separate by type	SHARPS Needles, blades, lancets, broken glass, other sharp objects	ITEMS CONTAMINATED WITH BLOOD OR BODY FLUIDS Blood bags, dialysis kits, syringe barrels, gloves, masks, bandages, cotton swabs, other wastes	BLOOD, BODY FLUIDS, FECES Liquid blood, fluids from suction canisters, feces, and other contaminated body wastes	BODY PARTS Amputated limbs, tissues, skin tags
Separate using colored containers	 put in sharps container	 or  put in colored bag or container / carefully cut or shred waste and put in bleach bucket	 put in colored bag or container	 put in colored bag or container with tight-fitting cover
Seal containers	when ¾ full, seal container with tape	when ¾ full, seal bag or container / or / keep tight-fitting cover on bleach bucket	seal bag or cover container with tight-fitting cover	when ¾ full, seal bag or container
Disinfection or safe burial	or drop into a sharps pit / put container into a drum	or disinfect using a heat method / leave in bleach bucket for at least 10 minutes, then drain	wearing protective clothing, carefully add bleach to container and let stand for 10 minutes	put in safe burial pit, add lime, and cover with soil
Final disposal	or when almost full, seal the pit with concrete / when ¾ full, fill drum with concrete and bury drum in a landfill	or put in safe burial pit, cover with soil. When pit is almost full, cover with soil and seal with concrete. / dry and reuse or recycle glass, metals, and plastics or discard with other solid waste	put liquid waste into safe leaching pit or into sanitary sewer or septic tank	when pit is almost full, cover with soil and seal with concrete
For more information	see pages 434 to 435 on handling sharps, and page 439 on burying sharps	see pages 429 to 433 on ways to disinfect with heat and chemicals	see page 428 on handling feces and body fluids, and page 439 for burial and leaching pits	see page 428 on handling body parts, and page 439 for safe waste burial

Immunization Programs

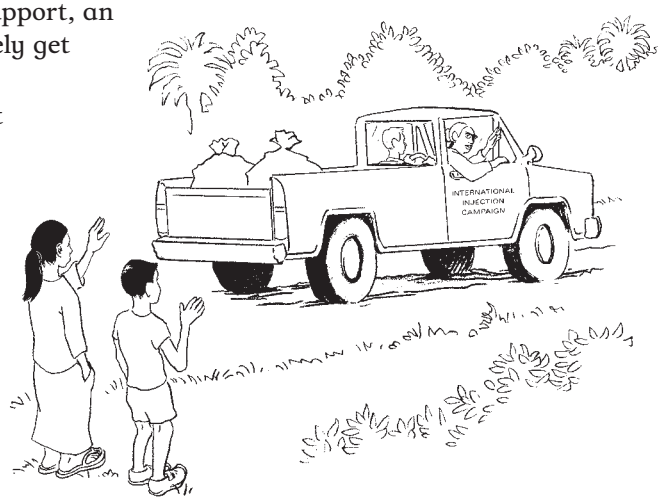


Large numbers of people around the world are protected from diseases such as measles, tetanus, and polio by receiving special injections through **immunization** (also called **vaccination**) programs. Immunization programs are often run by international organizations like World Health Organization (WHO) and UNICEF, together with national and local governments, and with the companies that make and sell vaccines.

These programs often do not include good plans for disposing of waste. In many cases they leave waste behind to be handled by the communities receiving the immunizations. This often leads to incinerating or burning the wastes in the open, creating health problems for people and their environment.

Immunization programs can take responsibility for waste

With sufficient planning and support, an immunization program can safely get rid of its waste by:



- using the same trucks that deliver immunization supplies to carry away waste for treatment and disposal. If it is a regional program, a central waste treatment center might set up an autoclave and safe burial pits.
- helping communities set up health care waste disposal systems, which can remain long after the immunization program is gone.
- using new technologies such as immunization guns that produce less waste because they do not use needles or syringes.

Burying Health Care Waste

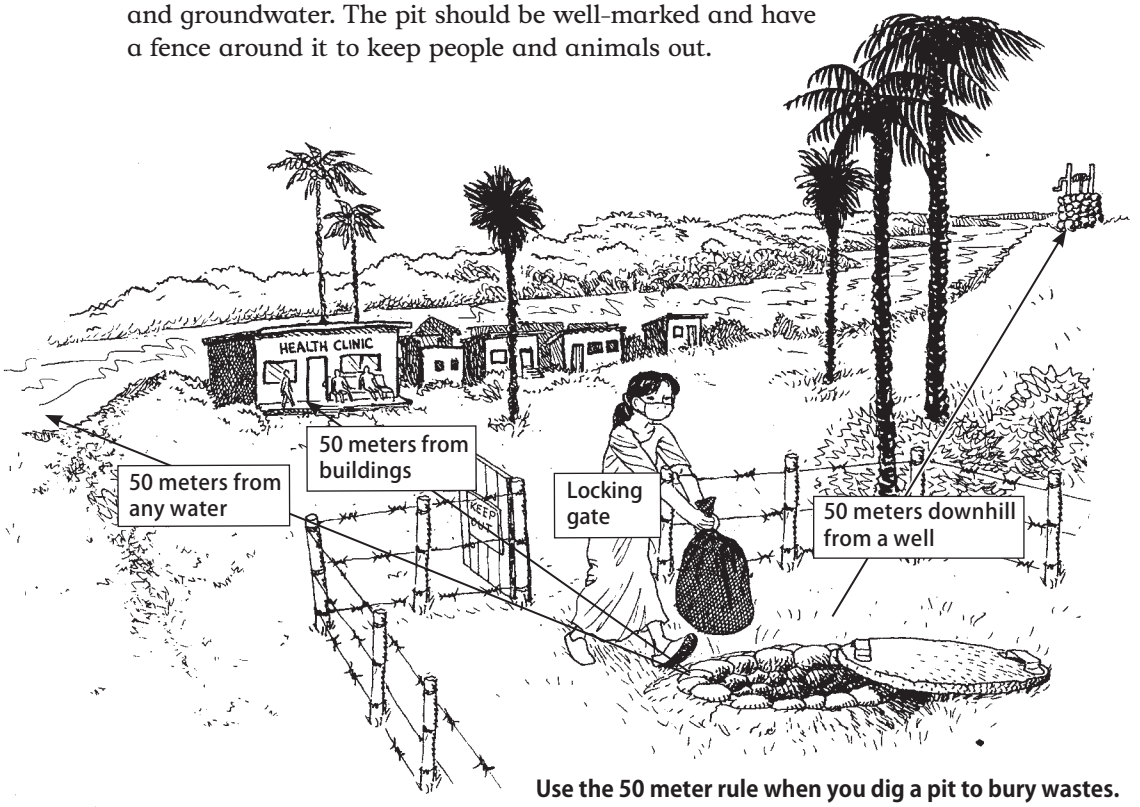
Burial pits are useful for disposing of sharps, body parts, and expired medicines. Try not to fill waste pits with materials that can be composted (such as food waste), reused (some glass and plastic materials), or put in a landfill after disinfection (plastics, cloth, bandages).

If there is waste collection and a landfill nearby, disinfected waste can be collected and safely buried there. If there is not, consider building small waste pits at the health center to make sure waste is safely buried. Because sharps are the most dangerous wastes, it is always best to bury needles and other sharp tools in a safe pit at the health center.

Burying waste is safest when everyone who handles the waste understands and follows the process.

Safe waste pits

For a waste pit to be safe, it should be located downhill from nearby wells, in an area where the groundwater is not near the surface, and at least 50 meters from rivers, streams, springs, and other water sources. Pit sides and bottoms should be lined with clay to prevent liquids from passing into the soil and groundwater. The pit should be well-marked and have a fence around it to keep people and animals out.

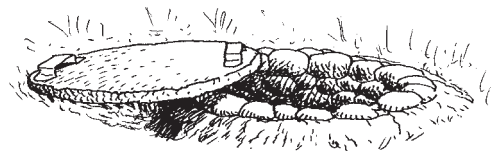


Use the 50 meter rule when you dig a pit to bury wastes.

How to make a waste pit with a concrete cover

This kind of pit is best used only for infectious waste and not for regular garbage.

1. Dig a pit 1 to 2 meters wide and 2 to 5 meters deep. The bottom of the pit should be at least 1½ meters above the highest level of groundwater (water table).
2. Line the bottom of the pit with a layer of clay at least 30 cm thick.
3. Build up a ridge of earth around the top of the pit to prevent surface water from running in.
4. Build a fence around the area where the pit is located to keep children safe and animals out.

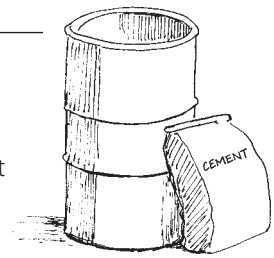


Each time waste is put in the pit, cover the waste with 10 cm of soil, or a mix of soil and lime. Lime helps disinfect the waste, and will also keep animals away.

When the waste rises to ½ meter from the surface, cover it with ½ meter of soil and seal it with a layer of concrete at least 10 to 30 centimeters thick.

How to seal sharps in containers with concrete

Place disinfected sharps and sharps containers in a hard container such as a metal drum. When the container is mostly full (¾), add a mixture of 1 part cement, 1 part lime, 4 parts sand, and ⅓ to ½ part water. Lime works as a disinfectant, and it also helps the cement flow into empty spaces to completely surround the waste. Seal the container and bury it in a trench or landfill.

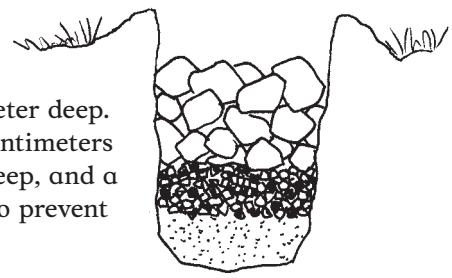


Disposing of liquid waste

Many health centers pour bleach, contaminated water, or other liquids from the health center down a drain. This is only safe if the drain does not lead to a stream or other water source. Dilute the liquid with a lot of water before dumping it. To protect water sources, it is better to put used bleach and other liquids into a safe leach pit. Chemicals such as glutaraldehyde and formaldehyde should be treated before disposal (see page 440).

To build a safe leach pit

In a place where the ground does not flood, and far from waterways and wells, dig a pit ½ meter to 1 meter deep. In the bottom of the pit, put a layer of sand a few centimeters deep. Then put a layer of gravel a few centimeters deep, and a layer of larger stones on top. Put a cover on the pit to prevent rainwater from getting in.



Safe Disposal of Chemical Wastes

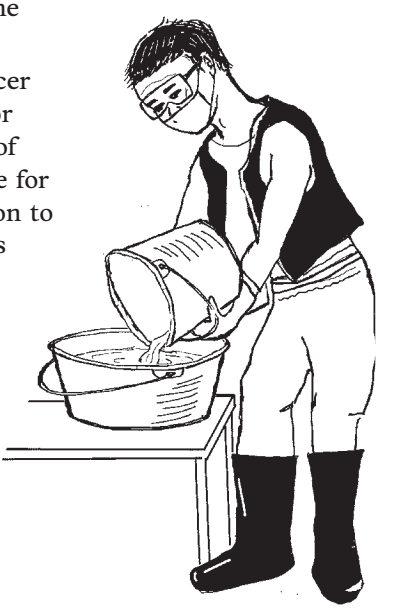
Most health centers, small or large, end up creating chemical wastes that need to be disposed of safely. Larger centers may also have waste from x-rays, chemotherapy, and laboratories. We do not include ways to dispose of these kinds of waste in this book because they are too complicated. (For information on handling these wastes, see Resources.)

Chemicals used to clean and disinfect

Bleach can be diluted and then dumped into a leaching pit (see page 439). Hydrogen peroxide solutions can be disposed of with no special treatment. You can safely pour them down the drain of a sink or into a toilet.

Glutaraldehyde and formaldehyde can cause cancer and death. But if your center uses these chemicals for disinfecting and cleaning, there are ways to get rid of them safely. To treat glutaraldehyde or formaldehyde for disposal, add caustic soda (sodium hydroxide) solution to change the acidity (pH). Measure the pH with litmus paper or a pH meter. Bring the pH to 12 and stay at that pH for at least 8 hours. After 8 hours, bring the pH to a neutral level (pH 7) by adding hydrochloric acid (HCl). If you do not have the proper materials to make glutaraldehyde or formaldehyde safe for disposal, do not use them — they are that dangerous. After processing, it is safe to pour them into a leach pit.

Carbolic acid, used to sterilize sheets, causes breathing and skin problems. A worker should wear protective clothing including eye protection and a mask when using or disposing of carbolic acid. The wastewater should be added to a solution of sodium hydroxide, then poured into a leach pit.



When preparing liquid chemical wastes for disposal, wear protective gear (see Appendix A), and be careful not to splash.

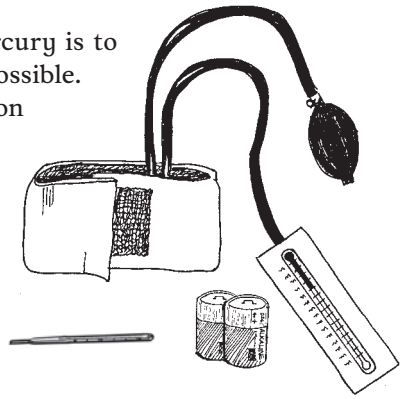
Mercury

Mercury is the silver liquid inside a thermometer. It is also used in other medical equipment, such as the meters attached to old blood pressure cuffs, as well as in batteries and lamps.

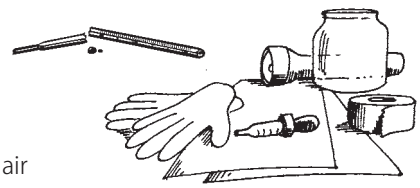
Mercury is a very toxic heavy metal (see page 338). Absorbing it through the skin or breathing in even a very small amount of mercury can damage the nerves, kidneys, lungs, brain, and cause birth defects.

Mercury is not destroyed by burning. In fact, burning mercury turns it into even more harmful gas.

The best way to reduce harm from mercury is to use as few mercury-containing items as possible. If possible, keep equipment with mercury on metal trays, so if it breaks the mercury will not soak into wood surfaces like tables or floors. Use non-mercury thermometers if they are available in your area (see Resources).



How to clean up a mercury spill



When a thermometer or other item containing mercury breaks, the mercury scatters as small pieces. Keep people and animals away from the spill area. Turn off any heaters, fans, or air conditioners, and open windows to let air in. To clean up the spill you will need gloves, an eyedropper, 2 pieces of stiff paper or cardboard, 2 plastic bags, sticky tape, a flashlight, and a glass container with water in it.

To collect the mercury safely:

1. **Do not touch the mercury.** Open windows or doors.
2. Remove watches and jewelry. Mercury sticks to other metals.
3. Shine a flashlight on the area to make the mercury easier to see, even during the daytime.
4. Wear chemical resistant gloves if possible. If you have only latex gloves, wear at least 2 pairs.
5. Use small pieces of stiff paper or cardboard to gather the mercury into a small pile.
6. Use an eyedropper to suction up the mercury beads, and put the mercury in a glass container with water.
7. Pick up any mercury that is left using sticky tape.
8. Place sticky tape, eyedropper, gloves, and cardboard in a plastic bag.
9. Label the bag "mercury waste" and put the bag in the glass container with the water in it.
10. Seal and mark the container. Put it inside another plastic bag.
11. Dispose of it as toxic waste (see page 410).

Antibiotics and other medicines

Old medicines are another kind of chemical waste that need to be disposed of safely. Getting rid of antibiotics and other medicines safely means keeping them out of water sources and away from people who handle waste. Unfortunately, health centers, pharmacies, and drug companies often get rid of old medicines unsafely, in open dump sites, waterways, or down the drain.

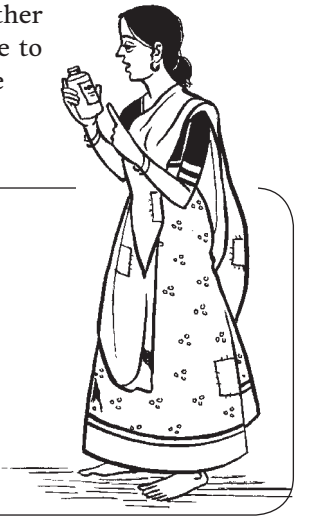
When antibiotics are dumped into the environment, they can cause **antibiotic resistance** in people, animals, and even germs that come into contact with them. This means that when people take antibiotics to fight infections, the medicines will be less effective because fewer germs will be killed by them.

Buy and use fewer antibiotics

Do not use antibiotics for health problems they cannot cure. (For more information about how to use antibiotics, see *Where There Is No Doctor,* pages 55 to 58, and *Helping Health Workers Learn,* Chapter 19.) When your health center buys only the amount of antibiotics it needs, then fewer drugs will need to be dumped because they are old.

Return expired medicines to the manufacturer

The drug companies that make medicines have the equipment to safely dispose of expired antibiotics and other medicines, and they should do this. But if you are unable to return medicines to the company that made them, there are ways you can dispose of them safely.

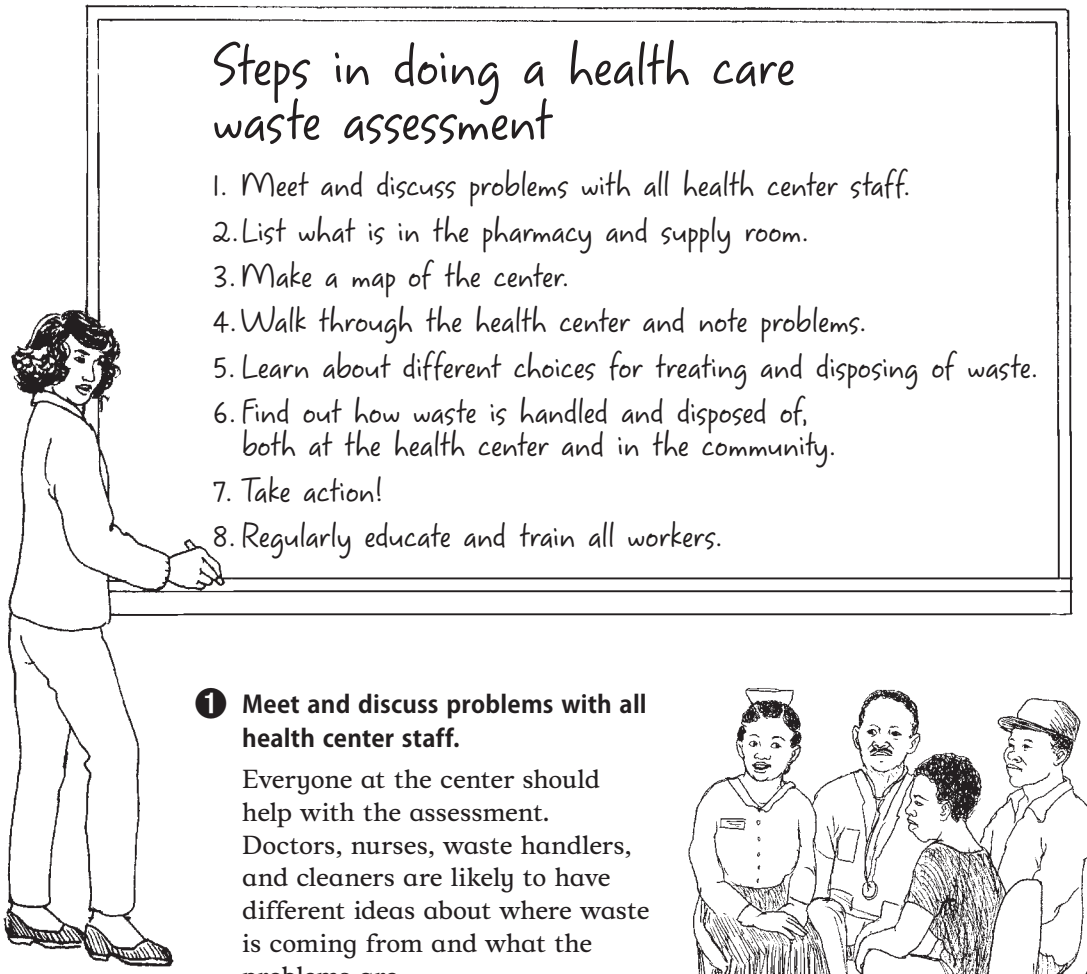


How to dispose of medicines safely

1. Wear gloves, safety glasses, and a dust mask.
2. Mix pills with dry cement powder.
3. Add water and form cement into solid balls.
4. Bury these cement balls in a sealed waste pit.

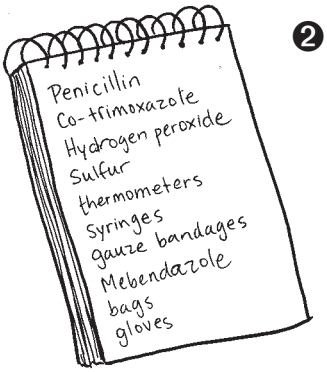
Do a Health Care Waste Assessment

Evaluating how health care waste is created, handled, and disposed of can help everyone in a health center find ways to work more safely. An assessment can identify the problems in how waste is created and handled, and can help find solutions.



❶ Meet and discuss problems with all health center staff.

Everyone at the center should help with the assessment. Doctors, nurses, waste handlers, and cleaners are likely to have different ideas about where waste is coming from and what the problems are.



❷ List what is in the pharmacy and supply room.

Since most materials are ordered through the pharmacy or supply room, start your assessment by making a list of what you find in those places. As you look at each item, ask what kind of waste will be produced, and how harmful it will be.

Can disposable items be replaced with things that can safely be reused? Can fewer or safer chemicals be used? Can the center use less plastic, fewer items that contain mercury, or make any other changes to reduce the amount of harmful waste?

❸ Make a map of the health center.

Show all rooms, doors, and windows, and note what each room is used for. Use different colors to mark places where waste is created, where waste containers are kept, and where waste is stored as it is collected and transported from its source to its final storage or disposal site.

This map can be changed as the group walks through the health center. After the assessment, make a new map to show any changes that have been made. Notice especially where containers are kept for collecting waste.

❹ Walk through the health center and note problems.

Visit all the areas where waste is produced. Look in the trash bins and note what kinds of waste are there. Do this walk-through several times over the next few weeks, and try to do it at different times of day. Then you can see the waste in different conditions and how it is handled throughout the day.

Do the walk-through with different workers. Cleaners will see things differently from doctors and nurses, and each may have important ideas about how to best handle waste.

To manage waste safely, we need to think about each other as much as we think about ourselves.

❺ Learn about different choices for treating and disposing of waste.

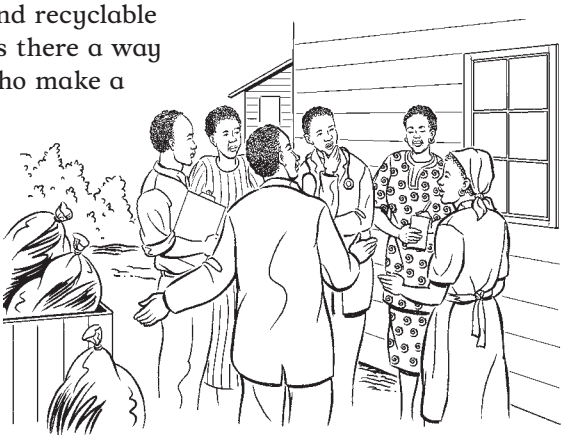
After several walks through the health center, have a group discussion about the problems and possible solutions. Solutions do not have to be expensive or technical. Most solutions require only organization, cooperation, and commitment.

Try to make a plan that starts with the most harmful waste — sharps — and then chemicals, blood and other body fluids, and so on. The goal is to improve your entire system, not just 1 part of it.

❻ Find out how waste is handled and disposed of.

Follow waste from where it is made, to where it is stored, and where it leaves the health center. Is the waste picked up regularly? How is it collected? Do waste handlers wear gloves, shoes, or other protective clothing? Is it transported in safe containers?

Waste handlers often sell whatever they can to junk dealers. This can be safe or dangerous depending on how waste is separated and disinfected. Do waste collectors pull reusable and recyclable materials out of the waste safely? Is there a way to make a safer system for those who make a living handling or selling waste?



Is the waste taken to a dump site or an incinerator? If possible, visit the place where waste is dumped. Does it remain separated, or is it mixed with other kinds of waste? Does it lead to health risks for the community, such as sharps in an open dump site?

❼ Take action!

What happens in the health center eventually touches everyone in the community. Taking even small steps to make waste handling safer will reduce harm to people and the environment. Which improvements are possible for the health center to make now? How can the health center influence what happens to waste once it is taken away to a landfill or incinerator?

❽ Regularly educate and train all workers.

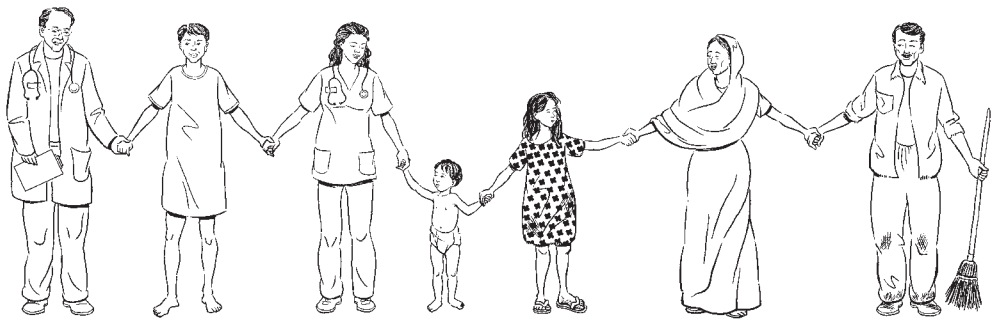
The success of any safety plan relies on continuing to educate and train everyone who handles and creates health care waste. It is easy to become careless with safety practices when nothing harmful seems to happen. Repeating a waste assessment every year can help remind people of the importance of being careful.

Community Solutions

Some systems of waste collection, treatment, storage, transportation, and disposal are more costly than many health centers can afford. But if several centers in a region share resources, together they can create a waste handling system that is safer and more complete than any could do on their own. And if they can coordinate their purchases of supplies, they can better influence suppliers to offer health care supplies that produce less dangerous waste.

If your health center does not have an autoclave and a safe waste pit, wastes can be disinfected, separated into safe containers, and transported to a center that has a safe waste pit or sanitary landfill. A regional system of sharps collection, transport, and disposal can be organized to serve many health posts in both urban and rural areas.

If there is municipal waste collection in the area, disinfected waste can be collected and sent to the landfill. And toxic wastes can be sent to the toxic waste site (if there is one). If there is no waste collection in the area, consider working toward a community solid waste system (see Chapter 18). Which methods your center uses depends on what your resources are and what works best for you.



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