Injections are very important and sometimes indispensable routes of administration for many medications and for immunization; however, studies have shown that there is widespread overuse and misuse of injections. In many health centres in the world, a patient treatment often consists of administering an injection and prescribing several pills; health workers are confronted with patients who prefer injections to oral medications. The historical background to this popularity may be the spectacular cures achieved with injections, such as quinine to treat malaria and penicillin to treat yaws. Apart from their reputed efficacy, economic factors may also underlie their popularity; health personnel and healers can demand a higher fee for administering injections than for prescribing tablets.

Recent surveys have shown that a very high percentage of injections are unsafe. Unsafe injections can result in the transmission from one patient to another of such infectious complications as HIV/AIDS, hepatitis B, malaria and dengue. However, it is not only the patient who is at risk. Transmission from patient to health worker has also been reported in various health care settings. The community at large is at risk when used injection equipment is carelessly disposed of and, because of its commercial value, retrieved, resold and reused.

Unsafe injection practices have a wide range of causes: injection equipment (whether sterilisable or single-use) presents an inherent risk to the user or the patient in case of non-compliant use; training of health workers may be lacking or has not sufficiently emphasized the risks of unsterile injections and proper sterile practices; injection equipment is expensive and when resources are scarce, the disposal of syringes and needles appears wasteful. In some cases supplies are short and insufficient to meet the needs, leading health workers to “cut corners” and reuse disposable equipment. The cost of safety rises; in the last 10 years, concern for safety has driven the introduction of disposable syringes. This has increased the cost per injection. In addition to the cost of the syringe, the cost of disposal at the point of use is often neglected. The “high” cost of safety, which is rarely compared to the cost of cross infection, is undoubtedly one of the main impediments to any serious tackling of the problem.

Today, WHO and UNICEF are working together in a determined commitment to raise awareness of the importance of injection safety. They are currently documenting the widespread occurrence of unsterile injections and other unsafe practices. As part of their joint commitment to the issue, WHO and UNICEF have launched numerous activities to improve the safety of injections, including the introduction of new technologies (such as steam sterilizers, auto-destruct syringes, incinerators) and research on the cultural and social factors which have led to an increasing demand for injections.

The solution, however, rests with the health workers themselves. They alone can ensure that good practice is established. This implies not only ensuring the safety of an injection through the choice of suitable medication administered in the correct dose at the correct site; but it also requires sterile injection equipment and action to guard against accidental injury to the health worker, or anyone else, during and after the injection. Last, but not least, it requires health workers to involve themselves in efforts to reduce the number of injections administered. Thus, ensuring that every injection is necessary contributes to the goal of safe injections.

In 1994, the Ministers of Health of 51 African countries met in Côte d’Ivoire and, in the “Yamoussoukro Declaration,” pledged to make injections safe. The Declaration set targets for the safety of immunization injections. Sadly, slow progress has been made. The situation may even have deteriorated.

Today, the issue is critical. If injections begin to be seen as the cause of more harm than good, trust in health services such as immunization programmes and curative services would begin to fail, and the consequences would be dire. This issue of The Prescriber aims to convince health workers everywhere of the urgent need to make injections safer, and thus protect patients everywhere.

Pascale Brudon
WHO Drug Action Programme

Michel Zaffran
Expanded Programme on Immunization

WHO Global Programme for Vaccines and Immunization

May 1998

Copyright 1998-UNICEF

ORIGINAL: ENGLISH, AVAILABLE IN FRENCH, SPANISH, PORTUGUESE, RUSSIAN AND ARABIC

In this issue: Ensuring Safe Injections; Choice of Syringes; Sterilization Methods; How to Prepare a Sterilizable Syringe for Injection; Where to Give an Injection; How to Inject; Taking Precautions; Towards Safer Injection Services; Safe Injection Accessories
Are you giving too many injections? Considering the risks, especially in a time of AIDS and in areas where hepatitis B is prevalent, this question is an increasingly serious one for health workers today.

Recent surveys show that 30% of immunization injections are unsafe, and that 50% of all injections administered may be unsafe in some parts of the world. Although the threat of HIV or hepatitis transmission is particularly worrying, all injections can carry a risk. Injections can cause the spread of both viruses and infections if the syringe and needle are not sterile (completely clean and germ-free). Accidents can also happen, resulting in abscesses, cuts or scratches. For small children, injections can carry a special threat, including the risk of provoking paralytic poliomyelitis (see box at right).

It is not usually any lack of knowledge on the part of health workers that causes unsafe injections. The more likely culprits are the constraints and pressures on the health worker.

WHO has evidence of overuse of injections in Nigeria, Uganda, India, Indonesia, Thailand, El Salvador, the Dominican Republic and Colombia. In Tunisia, a study of prescriptions showed that 38% provided for at least one injection.

Many people are convinced that injections are always more effective and faster acting than other methods of medication. The fact that injections may cause soreness and inflammation appears only to contribute to this conviction. The pain of the injection itself is often perceived as a sign of efficacy.

The popularity of injections is probably the result of the success of the yaws, kala-azar and smallpox eradication programmes. There were dramatic, positive results after only one or two injections. In addition, injections are convenient. Instead of the long walk to the health centre and a long wait on arrival, injections are often conveniently available. For example, there may be an “injector” in the marketplace, or a local medicine man may even be willing to visit you at home.

The popularity of injections may not be an entirely bad thing for public health. The fact that people believe in injections enhances the success of immunization and epidemic control programmes. And injections play a vital role in public health.

In the early stages of polio infection, 95% of children show no visible signs except fever. During this time, injections are a risk factor for “provocative polio” – a condition in which polio can be brought on in the limb which received the injection. An analysis of the case histories of 262 children with acute paralytic poliomyelitis in Pondicherry, southern India, showed that about 70% had received one or more injections just before paralysis.

With polio control and eradication efforts, polio cases now occur sporadically in most endemic countries. Clear-cut polio outbreaks are less common. Hence the risk that a child’s fever is polio-related is less likely. Fever should not be a reason to withhold immunization. However, when there is a confirmed polio outbreak, all unnecessary, non-essential injections should be stopped.

The risk of polio can be reduced by ensuring that all children receive “polio drops” or Oral Polio Vaccine (OPV) early in life.
INJECTIONS AND SAFETY IN THAILAND

During an interview in Ban, northeastern Thailand, a villager summed up the accepted wisdom on injections in this way: “One ampoule equals 10 pills!” Everyone in Ban agrees that injections “run in the blood”. It was therefore not surprising that a WHO study showed that in 26% of households at least one person had received an injection in the past two weeks. In addition, 90% of the children between 1-6 years had received an injection.

The vast majority of the injections were given as treatment, rather than prevention, and many were completely unnecessary. People who complained of a cold received an injection and 83% of people complaining of diarrhoea received at least one injection. Despite the additional risks of injections early in life, 40% of children visiting a doctor received an injection as part of the treatment.

When asked, people denied that there were any risks involved in receiving an injection. This was despite the fact that many had experienced injection abscesses after having been treated by untrained practitioners. Some were aware that sharing needles could transmit HIV infection, but consumers and untrained providers alike were not aware that syringes could entail the same risk.

Dr. Anne Reeler, who undertook the research in Thailand on behalf of WHO, has suggested some ideas on how to limit the consumption of irrational injections. She proposes that when health workers talk about the overuse of drugs and injections they should remind patients of the high value attached to moderation in Buddhist culture. She says that they might also usefully build on the idea of balance within the four body elements. Too much power, in the form of an injection, might upset the body balance. Finally, Dr. Reeler says that since Thai parents believe children are more vulnerable than adults, a special effort could be made to dissuade the very dangerous practice of giving children unnecessary injections.

Could the ritual and mythical trust in injections be replaced with a less harmful medical technology? Dr. Reeler believes that it could. She suggests that perhaps blood pressure equipment could become a regular part of consultations. The ritual of lying down, rolling up the sleeve to have the arm band applied for taking the blood pressure might satisfy a psychological need for care. If such a programme were successful, it would produce none of the adverse consequences of unnecessary injections, and the everyday costs for the health service would be minimal.

Health workers in primary health care clinics are often faced with contradictory pressures about giving injections. On one hand, their managers concentrate their management and training efforts towards boosting preventive and health-promoting responsibilities. Often, teachers give little time and attention to discussing the policy and practice of injection giving. It is not considered as important as health education, community participation, and first aid in primary health care training programmes.

On the other hand, health workers know that it is often injections which both bring patients to the health centre and contribute to the income of the clinic through fees charged. At the same time, health workers may have no choice but to provide injections because, if they refuse, patients would otherwise go elsewhere. In Ban, northern Thailand, a researcher was told by a local midwife that if she were not willing to comply with the patient's demand for an intravenous infusion to treat diarrhoea, the patient would simply find someone else to provide the service. In Ban, the patient could visit the local rice miller where the midwife said that standards of hygiene were completely inadequate. As a result, the midwife preferred to give the IV-fluid herself.

Having taken the decision to provide injections, primary health care workers carry a major burden on their shoulders. Many risks arise and action to prevent harm requires constant attention. The most serious and common risk is that HIV or hepatitis B could be transmitted from one patient to another. This is most likely to happen when blood from one person, stuck inside a hollow sharp instrument such as a hypodermic needle, is injected into someone else or accidentally pricks a health worker.

Preventing infections requires ensuring that every instrument, including needles and syringes, has been properly cleaned and sterilized. Infections occurring at the health centre are most likely to be the result of either accidents and carelessness, or poor practice. For example, needle-pricks and cuts happen when dirty needles, vials or blades are not disposed of properly. Poor practice includes re-use of equipment without adequate disinfection or sterilization. The risk of infection may also occur as a result of blood splashes during procedures or as a result of dressing a wound without rubber gloves. However, these last two cases represent a much smaller risk.

After giving an injection, the health worker must monitor the patient for adverse reactions such as shock or abscesses. After injecting any medicine, it is strongly advisable to stay with the person for 30 minutes to watch for signs of shock. These signs include: cool, moist, pale, grey skin (cold sweat); weak, rapid pulse or heartbeat; difficulty breathing, and loss of consciousness. If these signs appear, immediately inject Adrenalin (adults 1/2 ml, children 1/4 ml), treat the person for shock, and give an antihistamine in double the normal dose. In addition, monitor the number of patients returning to the clinic with injection abscesses.

Safe disposal of disposable needles and syringes is vital. The possibility of contamination may not discourage those collecting used syringes for resale or reuse, nor drug addicts looking for injecting equipment. Health workers equally have a responsibility to protect their junior health staff and cleaners from the dangers of discarded sharps and infectious materials.

In addition, it is particularly important that health workers inform patients about the diseases which can be transmitted via unclean needles and syringes. They also need to warn people of the general dangers of inappropriate use of medicines, and how, in many cases, swallowing tablets can be much safer, equally effective and much less costly than receiving an injection.
The small risk involved in immunizing children is greatly outweighed by the protective benefits. However, immunization injections represent only one in ten of all the injections that children receive. Because of the risks of infectious transmission or the injection of an incorrect material, every health worker should be sure of which injections are necessary and which are to be avoided. The following information is taken from David Werner’s book *Where There Is No Doctor*.

**Injections are not needed often. Most sicknesses that require medical treatment can be treated as well or better with medicine taken by mouth. As a general rule: “It is more dangerous to inject medicine than to take it by mouth.” Injections should be used only when absolutely necessary. Except in emergencies, they should be given only by health workers or persons trained in their use.**

<table>
<thead>
<tr>
<th>THE ONLY TIMES MEDICINES SHOULD BE INJECTED:</th>
<th>WHEN NOT TO INJECT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• When the recommended medicine does not come in a form that can be taken by mouth.</td>
<td>• Never give injections if you can get medical help quickly.</td>
</tr>
<tr>
<td>• When the person vomits often, cannot swallow, or is unconscious.</td>
<td>• Never give an injection for a sickness that is not serious.</td>
</tr>
<tr>
<td>• In certain unusual emergencies and special cases, such as severe pneumonia, infections after childbirth, gangrene, tetanus, poisonous snakebite, meningitis, severe allergic reaction, syphilis and gonorrhoea.</td>
<td>• Never give injections for a cold or the flu.</td>
</tr>
<tr>
<td></td>
<td>• Never inject a medicine that is not recommended for the illness you want to treat.</td>
</tr>
<tr>
<td></td>
<td>• Never inject a medicine unless you know and take all the recommended precautions.</td>
</tr>
</tbody>
</table>

**COMPLICATIONS OF UNSAFE INJECTIONS**

Injections are safe when the vaccine or medication is properly administered with sterile equipment and when the equipment is disposed of safely. The complications of unsafe injections are potentially both infectious and non-infectious. Infectious complications include those which result from transmission of blood borne pathogens (hepatitis B, HIV, dengue, malaria), or which are caused as a direct side-effect of the treatment (iatrogenic) due to unsterile equipment (abscesses, septicaemia, tetanus). Non-infectious complications include injuries due to improper technique, or due to incorrect injection materials causing toxic injection (poisoning) or anaphylactic shock (relating to an abnormal reaction).

Although blood transfusion is much more likely to result in HIV transmission, there is growing evidence that contaminated needles are a major vector in the transmission of AIDS. In the USA, it has been estimated that the risk of a health worker becoming infected with the HIV virus following a needle stick accident involving an HIV-patient is 0.35% or one in nearly 286 events. Obviously, the risk of infection is increased when needles and syringes are repeatedly reused without sterilization. Thus, if a single needle and syringe used to inject someone carrying the HIV virus is reused 10 times, the risk increases to 3.5%.
On the other hand, careful attention to sterilization and disposal reduces the risks. In a study in the Mbeya region of Tanzania, only 13 of 1.1 million patients injected in wards and outpatient departments in one year became infected with HIV. Although HIV/AIDS was prevalent, the AIDS control programme in place in the hospital had succeeded in reducing the risk of contamination through injection by improving injection practices.

Outbreaks of hepatitis B have occurred in hospitals and dialysis units after the use of contaminated vials of heparin. The vials become contaminated if a needle used on an infected person re-enters the vial prior to being injected into another person.

If the person giving an injection is inadequately trained, an injection may cause an injury. Some injuries are serious such as traumatic paralysis (see page 2, "Poliomyelitis and Unnecessary Injections") and BCG lymphadenitis (inflammation of the lymph nodes due to tubercle bacillus).

Equally, if the liquid being injected is harmful or administered in an incorrect dosage, there are likely to be adverse effects. Harmful injections are more likely to be given by untrained practitioners. However, there are examples of adverse reactions due to programmatic errors taking place during immunization procedures. For example, WHO has recorded cases from nine countries where side-effects, including death, have followed immunization with wrongly constituted measles vaccines. While not all mistakes can be avoided, it is important that health care workers observe and listen to their patients, and report adverse reactions and untoward events when these occur.

ENSURING SAFE INJECTIONS

Minimizing the risk involved in giving injections means choosing the correct equipment, careful sterilization and disposal, and discouraging patients against injections which are unsafe or can be avoided.

The choice of equipment is most often determined by cost. However, it is worth considering what is going to be acceptable among fellow health workers and members of the community, and what training and equipment are required to ensure correct use. It is also important before making a selection to establish whether use of a particular type of equipment is feasible, and whether the capacity exists to supply adequate stock (eg disposable syringes).

CHOICE OF SYRINGES

Making the correct choice in injection equipment is a first step towards improving injection safety. In essence, there are three choices for use at the health centre:

1. reusable syringes and needles plus a steam sterilizer;
2. disposable needle and syringe packs;
3. disposable safety (“auto-destruct”) needle and syringe packs.

These three options are demonstrated in separate posters in the WHO series “Let’s make injections safe”.

Jet injectors will also be described, though they are less useful at the primary health care level and increasingly discouraged everywhere.
STERILIZABLE SYRINGES AND NEEDLES

Not so long ago sterilizable syringes were usually made of glass. Today, they are more likely to be made of a high-grade plastic, which gives them a lifespan of between 50 and 200 injections. Immediately after use, the syringe and needle (usually made of stainless steel) must be soaked and cleaned of visible debris. Forceps, not fingers, should be used to take the syringe and needle components from the water and to place them in the sterilizer. They then should be steam sterilized for 20 minutes at 121-126 degrees C.

The lifespan of syringes depends on the hardness of local water used for the sterilization cycle. Measures exist to soften the water, including placing a hard water pad in the sterilizer (see “Hard Water Sterilization,” at right). Sterilization indicators called Time, Steam and Temperature (TST) spots should be included with each sterilizer load to ensure that sterilization is satisfactorily completed. Steam sterilization kills all harmful viruses, bacteria, and spores, including those that cause abscesses, tetanus, hepatitis B and HIV.

After careful sterilization, dispose of syringes which leak, become too stiff to use or have faded graduations (markings). Do not reuse needles which have become blocked, blunted or hooked. Do not attempt to resharpen needles. The recommended method of disposal is by burning (destructive incineration). Where this is not possible, sterilize the contaminated equipment and dispose of it by burying it deeply in the ground (at least 0.5 m below the surface.)

When choosing between sterilizable and disposable syringes, health workers often assume that community members prefer disposable syringes. This may not always be the case. A recent study in a country where HIV is highly endemic showed that, because patients were satisfied that the needles and syringes had been properly steam sterilized, they were happy with the choice of sterilizable syringes.

When health workers choose sterilizable syringes, they must ensure the sterility of the injection equipment each time it is used. They do this by taking full and careful responsibility for the entire sterilizing, injecting and disposal process. They ensure that syringes are cleaned after use and then properly sterilized, and that the health worker himself or herself is the only person to handle the sterilized equipment right up to the point of giving the injection. This way the health worker need have no doubts about the sterility of the syringes and needles being used.

HARD WATER STERILIZATION

The salts in hard water deposit on the syringe barrels increasing friction and reducing the life of the piston seals. The effects of hard water can be reduced in the following ways:

- Eliminate hard water deposits by distilling the water first. This is the most effective way and syringes sterilized in distilled water will survive well over 200 sterilizations.
- Boil the water before use. Then, without disturbing the salt deposits at the bottom of the pan, carefully pour into the sterilizer container.
- Use hard water pads inside the sterilizer. The pads cause the hard water salts to coat the surface of the pads, rather than the surface of the syringe barrels. However, in some hard water conditions the use of the pads does not extend the life of the syringes.

DISPOSABLE NEEDLES AND SYRINGES

Single use, or disposable, syringes are sterilized at the time of manufacture. They are then packaged and their sterility is guaranteed until an expiry date which is stamped on each package. Health workers using freshly opened packs (before an expiry date) can be confident that they are using injection equipment with a very high assurance of being sterile.

The risk comes with the disposal of the single use syringe. Needles can infect or injure due to inadequate disposal methods. Once used, the health worker should immediately put the syringe into a thick walled container. They should not try to recap the needle. At one time it was recommended that a single-hand procedure should be learned to allow recapping of needles for safe disposal. However, in reality this procedure is impractical. Single use syringes should only be used if safe and final disposal immediately after use can be absolutely guaranteed and if adequate supplies can be maintained (see “Choosing Single Use Syringes,” below). When resources are short, there is a temptation to reuse single use syringes. It is vital that this does not happen.

Many countries in Africa, South East Asia and the Western Pacific continue to use sterilizable syringes because they appear to remain the most sustainable injection technology for national budgets. However, the use of sterilizable syringes is not practical for mass immunization. Because mass immunization is often necessary, national policies which include both sterilizable and disposable syringes are common. Unfortunately, having both sterilizable and non-sterilizable syringes and needles available has sometimes caused confusion and inconsistent sterilization practices.

CHOOSING SINGLE USE SYRINGES

Single use syringes and needles should only be used if it can be ensured that they will be safely and finally disposed of immediately after first use. The questions below can help determine the appropriateness of adopting single use syringes—if the answer is “yes” to one or more of these questions, there may be a risk of cross-infection carried by the distribution of disposable syringes and needles and their use should be reconsidered:

- Are health workers negligent about the proper disposal of syringes after use?
- Are syringes and needles that are no longer sealed in their sterile pack frequently seen in drawers, health workers’ pockets, bags or other places?
- Is the number of syringes and needles distributed less than the number of doses of medication being given?
- Are there frequently signs of infection at the injection site following injections?

If switching to sterilizable syringes and needles is not possible, the introduction of auto-destruct syringes may be considered if funds are available.

AUTO-DESTRUCT SYRINGES

The auto-destruct, or safety, syringe resembles a traditional disposable syringe, but is designed with a mechanism which makes it impossible to use more than once. The auto-destruct models currently in use in many immunization programmes have a device in the barrel which blocks the plunger after a single use. This automatically prevents the syringe from being used a second time. The syringe is calibrated for 0.5 ml. This is the standard dose for all WHO’s Expanded Programme of Immunization (EPI) vaccines, except BCG.

At the time of manufacture, a needle is attached to each syringe, and the unit is sterilized and individually packaged. The syringes are subsequently distributed in specially designed containers which, after the syringe has been used, can be used as a safe disposal container and later to incinerate the syringes.

Although opting for auto-destruct injections represents the option with the lowest risk of person to person transmission, it nevertheless presents some problems. First, these new safety injections cost twice as much as
an ordinary disposable syringe. Secondly, if stocks run out, health workers are forced either to stop giving injections or to seek out the few conventional disposable syringes remaining. EPI recommends that each health centre using auto-destruct syringes should have an emergency supply of sterilizable syringes and sterilizer as backup in the event of stock shortages.

UNICEF and WHO insist on auto-destruct syringes as the only disposable syringe acceptable for mass immunization campaigns (See WHO/UNICEF Policy Statement for Mass Immunization Campaigns, reference WHO/EPI/LHIS 97.04). Supplies of meningitis vaccine are increasingly supplied with auto-destruct syringes and a safety box for the safe disposal of the syringe after use. On trial in Bolivia and Indonesia is a single-dose, pre-filled auto-destruct device for tetanus toxoid or hepatitis B vaccinations. It is known as UNIJECT. Research is underway to determine whether the pack can be kept outside the cold chain. If it can, it would be particularly useful to midwives who visit patients at home.

**JET INJECTORS**

Needle-less, jet injectors deliver immunizations with a high pressure jet of fluid compelled by a compression system. They were developed for high workload situations and are used in immunization campaigns rather than smaller clinic settings. Their major advantage has been that the same nozzle tip can be used to vaccinate more than one person. However, recently concern has grown of the risk of bloodborne disease transmission. This follows an outbreak of hepatitis B in a weight-loss clinic which had been using jet injectors. Because of this newly-recognized risk of cross infection, WHO’s programme no longer encourages the use of jet injectors.

**STERILIZATION METHODS**

The recommended method of sterilizing reusable syringes and other medical equipment is by use of steam sterilizers. Steam sterilizers are portable, they can function with many different heat sources and are available in three sizes. The smallest unit is designed exclusively for needles and syringes and has changeable racks for use with 42 syringes and needles of either 0.5 ml or a mixture of 2 ml and 5 ml syringes and needles.

The double rack size sterilizer holds twice as many syringes and needles but can also accept other primary health care equipment such as forceps, dental instruments or gynecological examination equipment. The triple rack sterilizer can hold all instruments likely to be used in primary health care.

Although sterilizers are common, they are often unused either because they are not conveniently located or because they have fallen into disrepair. A study in Ahmedabad, India, in 1984 showed that 5,000 doctors had no sterilizing equipment and 40% of sterilizing drums were defective. Local production of steam sterilizers could make sterilizable syringe policy the most sustainable injection technology, according to some WHO experts. It could enable poorer countries to eventually generalize the use of steam sterilization to other invasive instruments.

Meanwhile, centres without sterilizers have to rely on boiling the equipment in water. Boiling provides disinfection but not sterilization. Some organisms, for example tetanus spores, survive the boiling procedure. Nevertheless, high level disinfection can be achieved by immersing syringes and needles in boiling water for 20 minutes. Timing should begin from the moment the final syringe is introduced into the boiling water. If an additional syringe is dropped into the boiling load during disinfection, the timer should be restarted. Sterile forceps should be used to remove syringes from the water in which they have been boiled.
PREPARING TO GIVE AN INJECTION

Most health workers have attended courses or read materials about administering injections safely. However, the knowledge may not be followed partly because procedures are rather complicated. The following section, adapted from David Werner’s, *Where There Is No Doctor*, provides a reminder of the process of using a sterilizable syringe.

**HOW TO PREPARE A STERILIZABLE SYRINGE FOR INJECTION**

1. Use forceps to take the sterilizable syringe apart and boil it and the needle for 20 minutes.

2. Pour out the boiling water without touching the syringe or the needle.

3. Using forceps, put the needle and the syringe together.

4. Clean the ampoule of distilled water well, then break off the top.

5. Fill the syringe. (Be careful that the needle does not touch the outside of the ampoule).

6. Rub the rubber of the bottle with a clean cloth wet with alcohol or boiled water.

7. Inject the distilled water with the powdered medicine.

8. Shake until the medicine dissolves.

9. Fill the syringe again.

10. Remove all air from the syringe.

**IMPORTANT REMINDER**

Be careful not to touch the needle with anything--not even the cotton with alcohol. If by chance the needle touches your fingers or something else, boil it again.
WHERE TO GIVE AN INJECTION

It is preferable to inject in the muscle of the buttocks, always in the upper outer buttock. (See diagram A at right.)

Never inject into an area of the skin that is infected or has a rash.

Never inject children under two years of age in the buttock. Inject them in the upper outer part of the thigh.

HOW TO INJECT

1. Clean the skin with soap and water (or alcohol - but to prevent severe pain, be sure the alcohol is dry before injecting).

2. Put the needle straight in, all the way. (If it is done with one quick movement, it hurts less.)

3. Before injecting, pull back on the plunger. (If blood enters the syringe, the needle may have entered a blood vessel. Take the needle out and put it in somewhere else nearby to avoid injecting directly into the bloodstream.)

4. If no blood enters, inject the medicine slowly.

5. Remove the needle and clean the skin again.

6. After injecting, rinse the syringe and needle at once. Squirt water through the needle and then take the syringe apart and wash it. Sterilize or boil it before using again. If using a disposable syringe and needle, discard them properly.

TAKING PRECAUTIONS

It is very important to know what reactions a medicine can produce and to take the recommended precautions before injecting.

Avoid giving the same or similar medicine again if any of the following signs of allergic or poisonous reaction appear: hives or rash with itching; swelling anywhere; difficulty breathing; signs of shock; dizzy spells with nausea; problems with vision; ringing in the ears or deafness; severe back pain; difficulty in urinating.

Penicillin injections may cause a serious reaction in some cases. Wherever possible, avoid the risk by giving the penicillin orally (as tablets or in a syrup). Always ask the patient whether they have previously had any hives, itching, swelling, or trouble breathing after an injection of penicillin. If the answer is “yes”, use erythromycin or sulphonamide. Before injecting, have some ampoules of Adrenalin ready. After injecting, stay with the person for at least 30 minutes. If he or she becomes very pale, with a very fast heartbeat, or has difficulty breathing or starts to faint, immediately inject into a muscle half an ampoule of Adrenalin (a quarter of an ampoule in small children) and repeat in 10 minutes if necessary.

1 These can appear a few hours or up to several days after the injection. If the same medicine is given to the patient again, it may cause a very severe reaction or even death.
AVOIDING MISTAKES

As stated earlier, the risks of injecting any medicines are infection caused by germs entering with the needle, and allergic or poisonous reactions caused by the medicine.

To lower the chance of infection when injecting, take great care that everything is completely clean. Use a sterile syringe or boil the needle and syringe before injecting. After boiling, do not touch the needle with your fingers or with anything else.

Never use the same needle and syringe to inject more than one person without sterilizing or boiling it again first. Carefully follow all the instructions for injecting, shown on pages 10 and 11.

EXPLODING MYTHS

Two dangerous misconceptions exist about the safety of injections. Firstly, while most people know that needles can transmit HIV infection, not everyone is aware that sharing a syringe can entail the same risk. In a study in Thailand, consumers and health care providers alike were unaware of the risk of reusing a syringe which has not been re-sterilized. A non-sterile syringe can be the cause of the transmission of HIV or hepatitis.

Secondly, people often believe that once a syringe has been exposed to the air for a certain period of time, any traces of the HIV virus on the equipment would lose its power to cause infection. However, once syringes and needles are contaminated with HIV, the equipment remains unsafe. Studies have shown that injection equipment remained contaminated for a period of 7-30 days. This makes the safe disposal of single-use injection equipment vital.

CHANGING ATTITUDES

As well as taking the necessary precautions associated with giving injections, health workers can also contribute to a reduction in risks by giving fewer injections. This may require convincing patients that the treatment will be equally effective. It may therefore be useful for the health worker to consider ways of convincing patients that injections are not always the best option. Patients need to be reminded that the alternatives to injections, such as tablets, often present lower risks, lower costs and equal effectiveness. Every time a health worker dissuades a patient from having an injection of vitamins, analgesics, antimicrobials, penicillin or chloroquine for mild cases of malaria, for example, he or she is contributing in an important way to making injections safer.

A useful starting point in this education effort may be with mothers bringing their children for treatment (see page 13, “Young Children and Injections”). When specifically asked, most mothers say that they would prefer that their children were not given injections. There are records which show that mothers were
convinced that injections led to paralytic poliomyelitis long before doctors agreed that this might be the cause of some paralysis.

In some cases, simply by waiting till the patient actually asks for an injection, or opening the issue for discussion with individuals or groups of patients, may break a vicious circle of expectation. Health workers are in a strong position to initiate the discussion, explaining that at times injections are not necessary and potentially harmful. For this, they need good information about the correct circumstances in which to use an injection (see page 5, “The Only Times Medicine Should Be Injected”).
WHO/UNICEF documents state that “a single sterile syringe and sterile needle must be used for each injection” and that “20 minutes’ sterilization, preferably steam, for multiple use needles and syringes.” Targets have been set, first, for more than 95% of injections for immunization to be safe by 1997, and then, for 100% safe and sterile injections by the year 2000. Sadly, neither of these targets is likely to be achieved.

Achieving safety in injection services, both immunization and curative, is primarily constrained by the simple fact that safety increases costs. Pressure of time, poor and unsafe practices and the popularity of injections also contribute to the problem. In addition, international and government health officials involved in providing immunization services are sometimes reluctant to draw too much attention to this issue for fear that it would lead to a loss of public acceptance of injections in immunization programmes.

Concrete steps can be taken to improve safety. First, for mass immunization and emergency campaigns, supplies of vaccines, auto-destruct syringes and safety boxes can be sold as a package. Second, programmes for safe collection and incineration of used syringes could be implemented as a priority. Third, where countries have demonstrated that they can manage mixed policies successfully, they could be supported in their continued use of sterilizables for routine services. All sterilization cycles should be monitored by Time, Steam and Temperature (TST) spots. Fourth, all areas should monitor and report on progress in injection safety and countries should conduct injection practice surveys and elaborate a national policy for safe injections.

A more ambitious approach would be to involve all concerned international and national agencies in a broader initiative. Data collection, the development of awareness messages for different groups and more training for health workers might contribute significantly to reducing the problem.

Meanwhile, health workers need to regularly refresh their knowledge of safe injection practices and develop for themselves ways to convince patients that not all injections are necessary. Ensuring that their health centre has a workable policy and is well-stocked will contribute to safety, as will monitoring the system and adapting it if risks have arisen.

Safe injections are vital to the long-term credibility of the entire health service. Lack of resources, the popularity of injections and poor practice constantly threaten injection safety. However, the individual health worker can contribute substantially to injection safety, he or she can do this by always following sterile injection procedures, generating awareness of injection risks, creating a demand for safe injections and promoting the refusal of unsafe injections. We hope that this issue of The Prescriber will help health workers in the task of improving injection safety.

**Quiz**

1. Does sharing a syringe pose the same risk of infection transmission as sharing a needle?
2. Is over-consumption of drugs and injections a greater problem in the informal sector (traditional practitioners, medicine men and so on) or in public hospitals and private clinics?
3. Which of the following injections are “necessary” and which are “unnecessary” - DPT immunization, antimicrobials, chloroquine for mild cases of malaria, tetanus.
4. Should disposable syringes be recapped after use?
SAFE INJECTION ACCESSORIES

<table>
<thead>
<tr>
<th>Injection Accessories</th>
<th>Use</th>
<th>Description</th>
<th>Size</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam Sterilizer</td>
<td>Equipment for sterilization of needles, syringes and other primary health care equipment.</td>
<td>Aluminum or stainless steel pot with close-fitting, sealed lid.</td>
<td>170 x 130 x 225 x 370 mm, 186 x 87 x 216 x 337 mm, 270 x 230 x 225 x 370 mm, 300 x 205 x 216 x 337 mm, 390 x 290 x 216 x 337 mm (5 sizes)</td>
<td>Sterilizers have single, double or triple racks. All EPI sterilizers are supplied with valves that allow sterilization at altitudes of up to 2,100 meters. Sterilizers should last 10 years, though rubber seal and pintel may need to be replaced every year.</td>
</tr>
<tr>
<td>Sterilizer Drum</td>
<td>Container in which complete sterilization of needles and syringes can take place in steam sterilizer.</td>
<td>A round lidded pot which holds: 40 or 42 x 0.05 - 0.5 ml syringes and 2x5 ml syringes, and 50 needles per drum.</td>
<td>210 x 120 mm</td>
<td>The drum can replace a rack in the sterilizer. It can be used to transport sterilized needles outside the sterilizer.</td>
</tr>
<tr>
<td>Sterilizer Timer</td>
<td>Measures time period of boiling or sterilizing.</td>
<td>Newer Models: Spring wound, with signal bell. Maximum duration of up to sixty minutes in one minute intervals.</td>
<td></td>
<td>Useful to ensure that boiling or sterilizing has completed 20 minutes required.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Older Models: Small, white plastic globe calibrated for one to sixty minutes (no longer manufactured).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>60 x45 cm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard Water Pad</td>
<td>Softens water in which reusable syringes and needles are to be sterilized.</td>
<td>Small grey stainless steel wire mesh pad.</td>
<td>200 x 25 mm, 205 x 25 mm, 220 x 254 mm</td>
<td>To be used in the steam sterilizer.</td>
</tr>
<tr>
<td>TST Indicator Strips</td>
<td>Measures time, steam and temperature in steam sterilization.</td>
<td>A paper strip with a yellow indicator line which will turn blue when in the presence of steam at 121° C for 15 minutes.</td>
<td>345 x 280 x 155 mm</td>
<td>Measures the three essential parameters of steam sterilization. Color will only change if time, steam, and temperature conditions are met to ensure sterility.</td>
</tr>
<tr>
<td>TST Control Spot and Record System for Steam Sterilizers</td>
<td>Control spot measures time, steam and temperature in steam sterilization. It is distributed with a booklet for keeping records of sterilization.</td>
<td>A paper strip with yellow colored indicator spot which will turn blue when in the presence of steam at 121° C for 15 minutes.</td>
<td>220 x 240 x 70 mm</td>
<td>Measures the three essential parameters of steam sterilization. Color spots will only change if time, steam, and temperature conditions are met. Low-cost chemical sterilization indicator.</td>
</tr>
<tr>
<td>Safety Box</td>
<td>Container for handling and disposing of used syringes, needles and sharps.</td>
<td>Hardboard box with dispersion barrier inside. Yellow background, text in black in four languages.</td>
<td>100 x 2 ml syringes with needles attached.</td>
<td>Protects health workers and others from contaminated equipment.</td>
</tr>
</tbody>
</table>

Sources: WHO Product Information Sheets (1993/1994) and UNIPAC
In Conclusion

SIX KEY POINTS

• Inform patients about the risks of injections with unclean needles. Convince patients that oral treatments are safer and can be equally effective.

• Both syringes and needles can be infected. Never reuse an unsterilized needle or an unsterilized syringe.

• Do not recap disposable syringes.

• Sterilization requires 20 minutes in steam for multiple use needles and syringes, though high-level disinfection can be achieved by immersing syringes and needles in boiling water for 20 minutes.

• Use TST indicators to check sterilization process.

• Inject in the correct place. There is a risk of damage to the nerve if a child or adult is injected too low on the buttock.

All correspondence should be addressed to:

The Prescriber
Health Section TA-24A
UNICEF
3 United Nations Plaza
New York, NY 10017, USA.
Fax: 1-212 824 6462/6464

We would like to receive your comments on the articles in The Prescriber or on other issues relating to the use of drugs in basic health services.