

RATIONAL USE

First let us do no harm

INJECTIONS are very often given even when the same drug can be administered orally with greater safety, effectiveness and at lower cost. This problem is of growing concern to many health authorities. Although the risk of abscesses and hepatitis B has always been considerable when needles and syringes are used without effective sterilization, the new spectre of AIDS gives an added urgency to the need to eliminate unnecessary and unsafe injection practices. Operational research to investigate the extent of the problem and its underlying causes is already underway in order to develop appropriate intervention strategies.*

But the use of injections cannot be eliminated totally. It should be realised that, probably well into the 21st century, injections will still be necessary to give most vaccinations and several essential drugs. This implies a continuous need for good injection practices.

A safe injection requires the choice of suitable medication, administered in the correct dose at the right site. Safety also includes the use of sterile injection equipment, and action to guard against accidental injury to the health worker or anyone else during and after the injection.

Injections can be given in a number of ways, including jet injectors, pre-filled syringes, scarification, etc. However, the major choice for most health services remains whether to use disposable or sterilizable syringes and needles. A new type of disposable syringe - an auto-destruct syringe - has recently been developed to meet some of the problems related to reuse of disposable material. The relative advantages and constraints of the three technologies are examined below. Choice of equipment will be determined by factors such as the health budget, health worker training and practice, and access to assured supplies of equipment and fuel.

Sterilizable syringes and needles

Widely used in 0.5 ml size within the Expanded Programme on Immunization, these plastic syringes are predominantly made from a high grade polypropylene and can withstand repeated sterilizations at temperatures up to 130 degrees C. Sterilizable plastic syringes of 2 and 5 ml, which are suitable for a wide range of injectable drugs, are also available. The useful life of these syringes varied very much when they were first introduced six years ago but now they consistently achieve more than 100 sterilizations before they need replacing.

The recommended method of sterilizing such syringes is by the use of steam sterilizers. More than 500 000 such sterilizers have been distributed through EPI programmes alone. However, centres without such equipment will still have to use boiling to sterilize. Boiling is disinfection not sterilization, since some organisms, e.g. tetanus spores, survive the procedure. Experience shows that disinfection technique and subsequent handling of instruments may be poor, for example when health workers

use fingers instead of sterile forceps to remove syringes from the water in which they have been boiled. Boiling should only be used until steam sterilizers become available.

Steam sterilizers can use a multitude of heat sources, are portable, and come 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 gynaecological examination equipment. The triple rack sterilizer can sterilize all instruments likely to be used in primary health care.

When the health worker takes responsibility for cleaning the syringes after use and for properly carrying out the sterilization, and is the only person to handle the sterilized equipment right up to the point of giving the injection, he or she need have no doubts about the sterility of the syringes and needles being used.

Single-use syringes

Single use syringes and needles are manufactured under strictly controlled conditions. The sterility of such needles and syringes is assured until such time as the protective pack is opened. Health workers using freshly opened single use disposable syringes and needles, and destroying the syringe and needle after use, can be confident that they are using injection equipment with a very high assurance of being sterile.

Unfortunately we do not live in an ideal world. A used syringe, even though it is contaminated, still has a value. In many developing countries used syringes and needles are unlikely to be destroyed. Therefore, 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 single use.

The following questions can help determine the appropriateness of adopting single use syringes:

- Are the health workers negligent about disposing of all their syringes after use, in a manner that makes their rehabilitation impossible?
- Are syringes and needles, 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?
- Do the health workers describe various ways in which they prepare syringes for re-use, none of which could be considered as sterilization?
- Are there frequent signs of infection at the injection site following injection?

If the answer is yes to one or more of the above questions there may be a risk of cross-infection carried by the distribution of disposable syringes and needles. If the health authority does not wish to switch to sterilizable syringes and needles the introduction of auto-destruct syringes should be considered.

Auto-destruct syringes

An auto-destruct syringe is a disposable syringe that after one use cannot be re-used. This new technology has recently been introduced into many EPI programmes. As 5 of the 6 vaccines used in the EPI are administered by injection it was considered a priority that injections given for vaccination be of the highest safety standards. The injections given with the EPI syringe are simple as the dose is a standard volume. Auto-destruct syringes for the injection of other essential drugs are not currently manufactured but could be made available.

Auto-destruct syringes work in many ways. Two syringes that have been tested by the EPI, auto-destruct by restricting the total movement of the plunger, which can be withdrawn to the capacity of the syringe only once. Attempts to withdraw the plunger using force cause damage to the syringe making reuse even more difficult. Given human ingenuity some people with enough time, tools and skill may find ways to rehabilitate the syringes but the chosen designs do make this very difficult and visible.

Auto-destruct syringes provide good protection against cross-infection to the patient but new risks will be introduced if there are any stock shortages. If health workers use all the auto-destruct syringes and still need to give injections they will be unable to do so. Some health workers may stop giving injections. Others may seek out the few conventional disposable syringes remaining and reuse them repeatedly. The EPI recommends that each health centre using auto-destruct syringes should have an emergency contingency supply of sterilizable syringes and sterilizer as a back-up in the event of stock shortages.

The increased number of contaminated auto-destruct needles and syringes could present an extra risk to the community. The equipment is therefore distributed in specially designed boxes that can safely hold the needles and syringes after use and become a self-contained incinerator for their final disposal.

The introduction of auto-destruct syringes into a programme normally using standard disposable syringes does not represent a change in policy. It is merely an additional step to reinforce the inherent safety of disposable syringes after use.

Weighing up the pro's and con's

In summary all three methods have economic and/or safety advantages and disadvantages:

The reuse of syringes and needles after sterilization is usually culturally acceptable, the risk of not having sterile syringes and needles available when needed is greatly reduced, and the cost is the most advantageous at about US\$0.02 per injection. However, if steam sterilizers are not available in the health centre, problems may arise through inadequate disinfection practice. Fuel supply can also represent a problem in some areas - particularly rural parts of the country without access to electrical supply.

Standard disposable syringes provide a very high degree of assurance of sterility when first used but are subject to abuse. They are moderately expensive at about US\$0.05 per injection.

Auto-destruct syringes also provide the same high degree of assurance of sterility but are safer since they cannot be reused. However, this is the most



Immunization, a chance for every child. Protecting newborn babies in Ethiopia

expensive method of all, costing about US\$0.13 per injection, which will be beyond the means of many health services. It should only be considered when disposable syringes are required but there is no assurance that standard disposable syringes will not be reused.

Training v. technology

Although appropriate technology is undoubtedly contributing to the safe delivery of drugs and vaccines, a key issue which technology alone cannot address is that of training and awareness. Health workers simply must be taught to understand the enormous potential risks of using unsterile equipment; to safely sterilize and dispose of syringes and needles; to correctly administer injections; and most important of all, to understand that unnecessary injections are bad clinical practice with serious public health consequences. The public also requires education, so that patients will not press health workers to give unnecessary injections, or inject themselves or their family, which is an increasingly common and dangerous practice.

Many reasons are put forward for the popularity and overuse of injections. In some countries they represent an additional (and sometimes vital) source of income for the poorly paid health worker, and access to this western medicine technology may also be a source of societal status.

For the community, injections may symbolise the power of modern medicine, with the psychological impact of the intervention in marked contrast to the undramatic dispensing of small white pills. Paradoxically, the visible success of the EPI programme may have contributed to the belief that injected medicine is the best medicine. Investigating and tackling these issues and perceptions are the other side of the technology coin and undoubtedly represent a major challenge to health services.

Yet we must take care when warning against overuse of injections not to imperil the justified confidence gained in the effectiveness of vaccination for which the needle and syringe are the essential tools of delivery. ■

* WHO's Action Programme on Essential Drugs, in consultation with the Expanded Programme on Immunization and the Global Programme on Aids, is undertaking an injection practices research project in Indonesia, Senegal and Uganda.

Source: WHO Expanded Programme on Immunization and the Action Programme on Essential Drugs