Module 5

Using Auto-Disable Syringes

This module reviews examples of injection equipment designed to prevent the re-use of syringes.

Objectives:

After completing this module, participants will be able to:

- name several kinds of auto-disable syringes;
- change their injection technique to use auto-disable syringes;
- describe the injection practices to continue when using auto-disable syringes.

Time:

1 hour

Key topics:

- Auto-disable syringes
- Safe handling of AD syringes
- Understanding that aspiration is optional for immunization into the deltoid (arm) and thigh muscles
- Ensuring adequate supplies of injection equipment

Trainer's aids:

- Practical Exercise (page 97)
- Observation Guidelines (page 98)
- Quiz (pages 100-101)
- Case Study (pages 102-103)

Handouts:

- Copies of syringe instructions (pages 79-89)
- Comparing Different AD Syringes (page 99)

Trainer preparation:

For Practical Exercise:

- determine which type of auto-disable syringe participants will be using;
- obtain supplies: at least three auto-disable syringes, vials of liquid, and a safety-box; and
- copy the appropriate syringe instructions (pages 79-80, 83, 85, 87, or 89), Observation Guidelines (page 98), and Comparing Different AD Syringes (page 99).

Using Auto-Disable Syringes

Auto-Disable Syringes

Re-use of injection equipment is responsible for most of the infections that result from immunization. Fortunately, several new types of syringes have been designed to prevent re-use: auto-disable (AD) syringes automatically become disabled after one use. WHO and UNICEF now recommend that auto-disable syringes be used for administering vaccines—particularly in mass immunization programs.

Auto-disable syringes are designed for use with little or no instruction. However, an initial practice session with the new syringes may help workers understand how to use them more quickly, may help them appreciate the benefits of auto-disable syringes, and may assist workers to switch between different types of syringes without wasting them.

Types of Auto-Disable Syringes

This module will review the following types of new AD syringes, and will discuss their use and relative advantages.

New types of auto-disable syringes:

- Soloshot™* and Soloshot™* FX syringes from BD
- K1™* syringes from Star Syringe, Ltd.
- Destroject®* syringe from Bader
- Univec™* syringe from Univec, Inc.
- Uniject™* prefill injection device from BD

Trainer's Note

This module will give a description of each of the syringes listed above, explain how to change technique to use them, and discuss the advantages. A table "Comparing Different AD Syringes" summarizes the different types and is located on page 99.

*SoloShot and SoloShot FX, and Uniject are trademarks of BD; K1 is a trademark of Star Syringe, Ltd.; Destroject is a registered trademark of Bader and Partner Vetriebsgesellschaft mbH; Univec is a trademark of Univec, Inc.

BD SoloShot™ and SoloShot™ FX Auto-Disable Syringes

Syringe Description:

The SoloShot and SoloShot FX syringes are single-use, disposable, auto-disable syringes with a metal clip that locks the plunger after a single use. The SoloShot syringe has a fixed needle and is packaged with plastic caps to keep the needle and plunger sterile before use. In contrast, the SoloShot FX syringe currently comes with a detachable needle that is packaged together with the syringe in a sterile paper package. **The SoloShot FX detachable needle can only be attached to the SoloShot FX syringe barrel.** This prevents the needle from being re-used with other syringes.

Figure 17. SoloShot FX

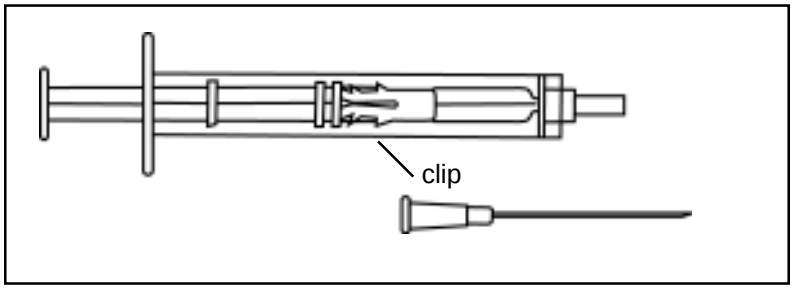
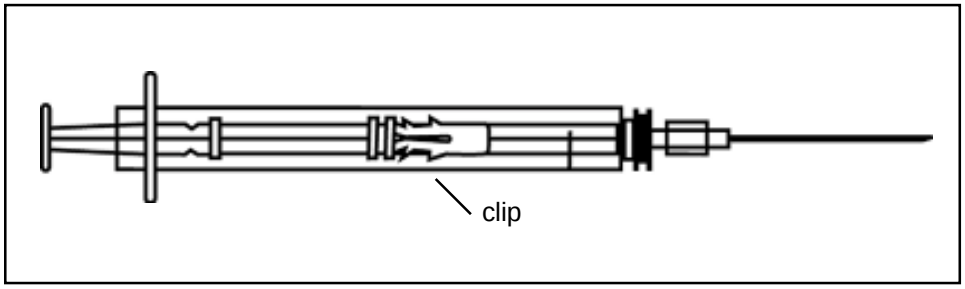


Figure 18. SoloShot



Change in injection technique required:

Because the plunger can go back and forward only once, health workers should NOT draw up air to inject it into the vial. In addition, the locking mechanism decreases the distance that the plunger can move if the health care workers aspirate for blood when giving an injection. It is still possible to aspirate, but the plunger will travel only a short distance.

Advantages of the SoloShot AD syringes:

- SoloShot is designed to prevent the re-use of non-sterile syringes.
- The longer syringe length makes it less tiring to use when immunizing large groups of people.
- The fixed-needle design reduces the dead space in the syringe that wastes vaccine or medicine.

Advantages of the SoloShot FX AD syringes:

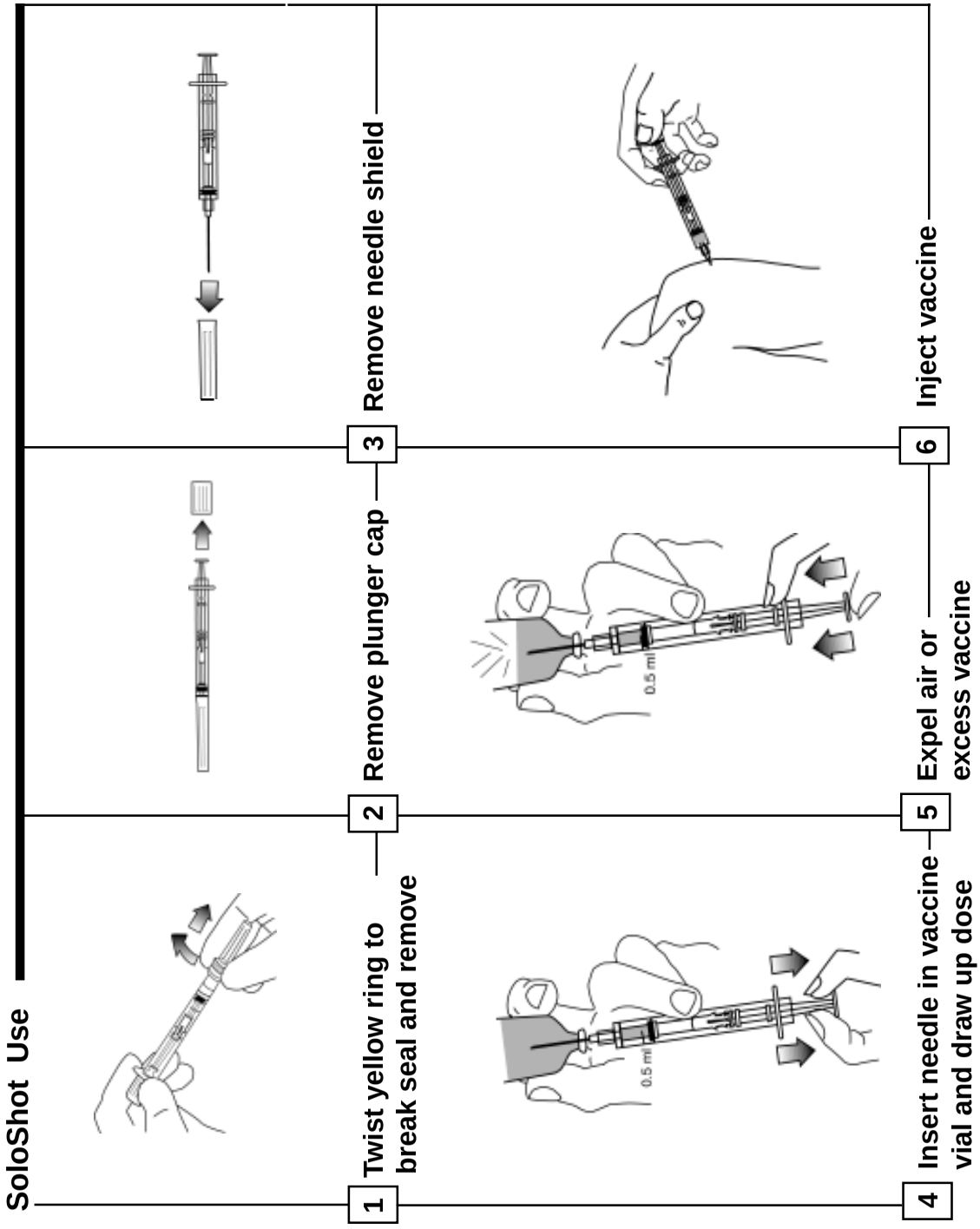
- SoloShot FX is designed to prevent the re-use of non-sterile syringes.
- The shorter length reduces the volume of material to be shipped and destroyed after use.
- Elimination of the black rubber seal on the plunger reduces the harmful by-products produced by incinerating syringes.

For more details about the SoloShot and SoloShot FX, or other BD immunization devices, please contact:

BD
1 Becton Drive
Franklin Lakes, NJ 07417
U.S.A.
Phone: (201) 847-6800
Fax: (201) 847-4845
Web site: www.bd.com/immunization/

Auto-Disable Syringe Instructions

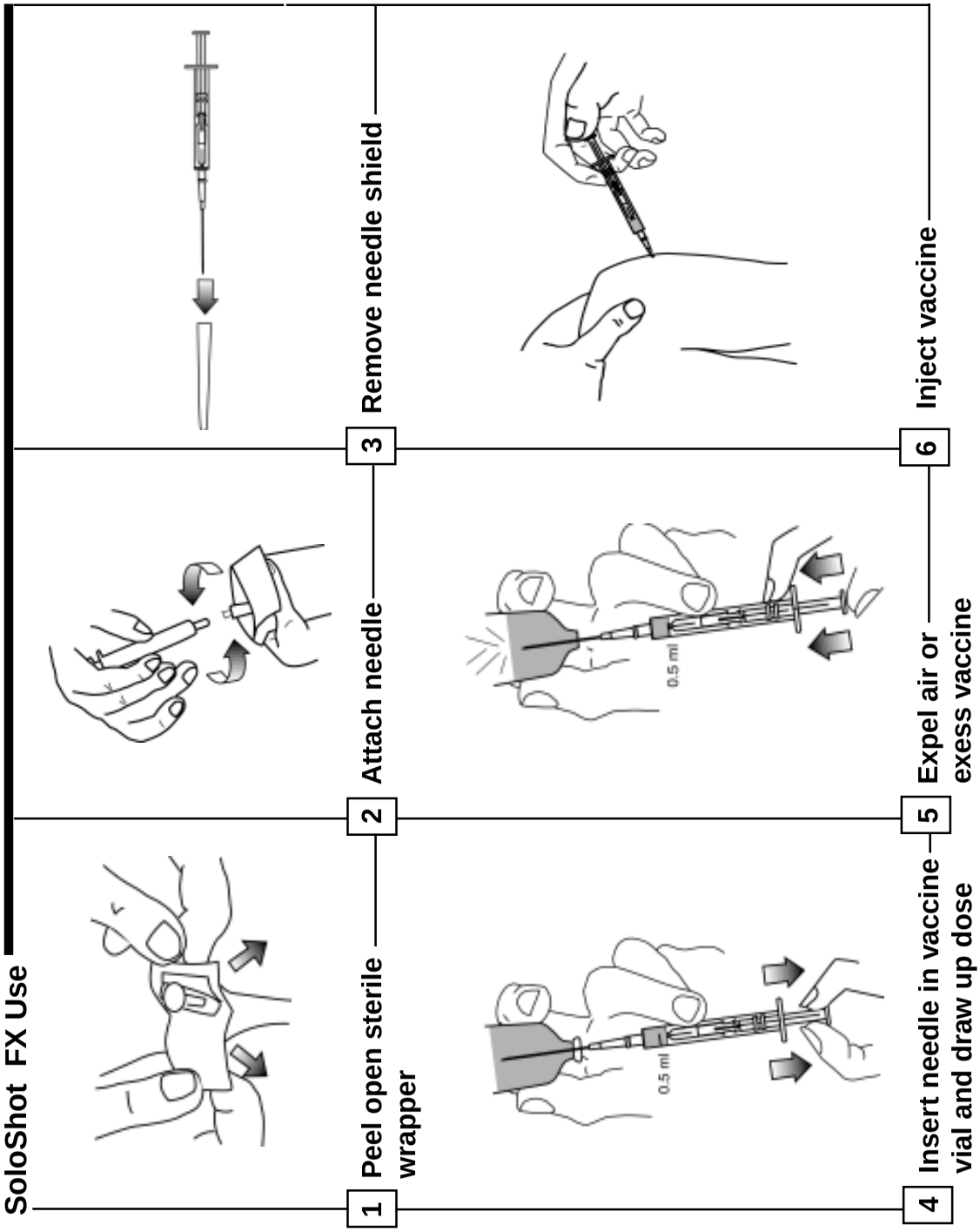
SoloShot



Adapted with permission from BD.

Auto-Disable Syringe Instructions

SoloShot FX



Adapted with permission from BD.

K1™ Auto-Disable Syringes

Syringe description:

The K1 syringe is a single-use, disposable, auto-disable syringe with a safety plunger that breaks off after a single use. The K1 syringes can be purchased with a fixed needle or a detachable needle. The detachable needles supplied with the syringe cannot be used with standard disposable syringes. A BCG syringe with a 0.05 ml dose line is available. Production of a BCG syringe with a 0.05 ml and 0.1 ml line is under discussion.

Change in injection technique required:

The K1 syringe differs from the other AD syringes discussed in this manual because it must be activated before use. The K1 syringes either have a small, plastic tab that must be removed, or 1 or 2 small twist tabs. Both measures provide assurance that the syringe has not been used before.

Figure 19. K1 Syringe with twist tab

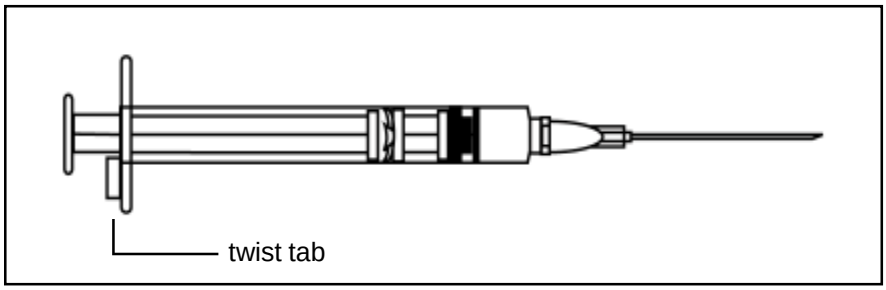
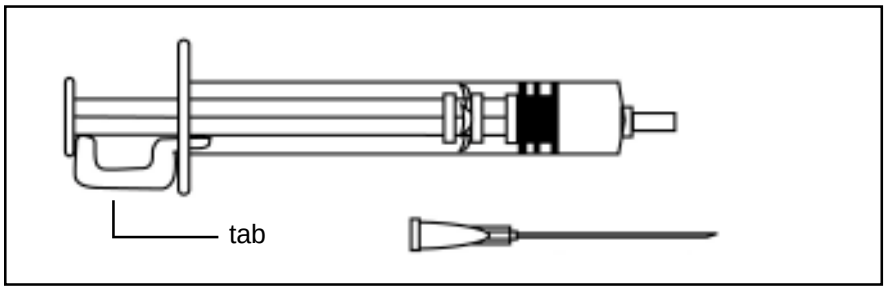


Figure 20. K1 Syringe with tab to pull off



To use these syringes, first look at the K1 syringe to see whether the syringe has a twist tab at the end of the barrel, or whether there is a rectangular tab holding the plunger to the barrel. Instructions are illustrated on page 83.

If the syringe has a twist tab:
Twist the plunger slightly—about ¼ of a turn—to break the seal connecting the plunger and the barrel. **Caution: if the barrel is twisted too far, the plunger will detach and the syringe will be disabled.**

If the syringe has a small rectangular tab on the plunger:
Pull the plunger back slightly and pull the tab off. Then, regardless of the type of K1 syringe, the same technique used with standard syringes or AD syringe can be used to draw up and inject the dose.

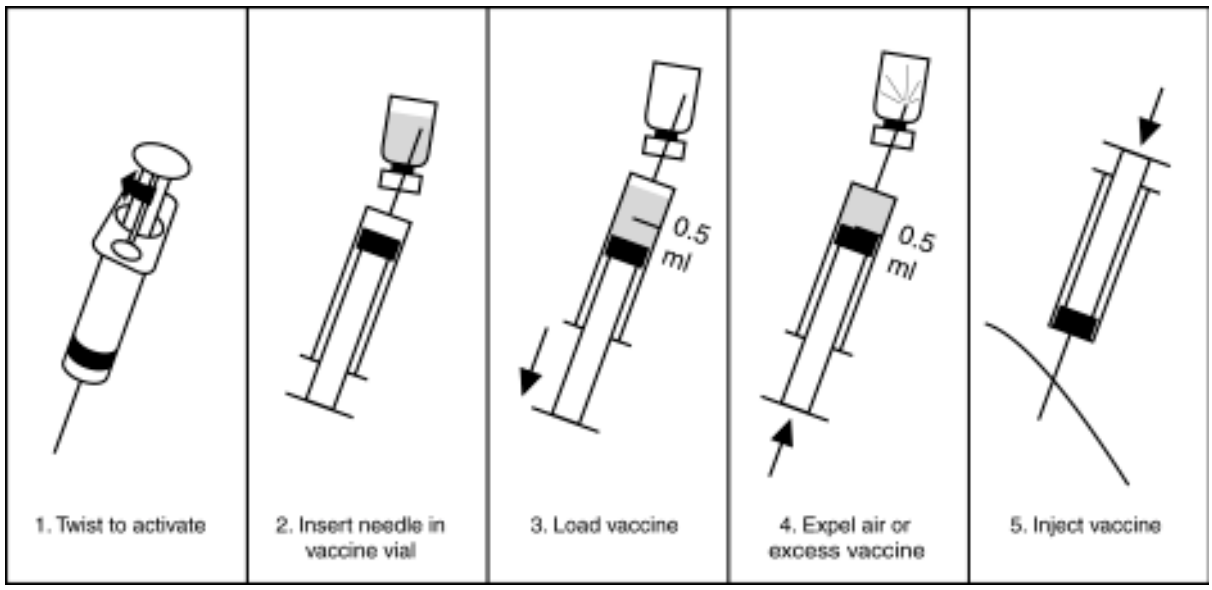
Advantages of K1 AD syringes:

- K1 syringes are designed to prevent the re-use of non-sterile syringes.
- The smaller barrel reduces the volume of material to be shipped and destroyed after use.
- The fixed-needle design reduces the dead space in the syringe that wastes vaccine or medicine.
- The design allows some air to be injected into vials to equalize the pressure that develops when doses are withdrawn from a multi-dose vial.

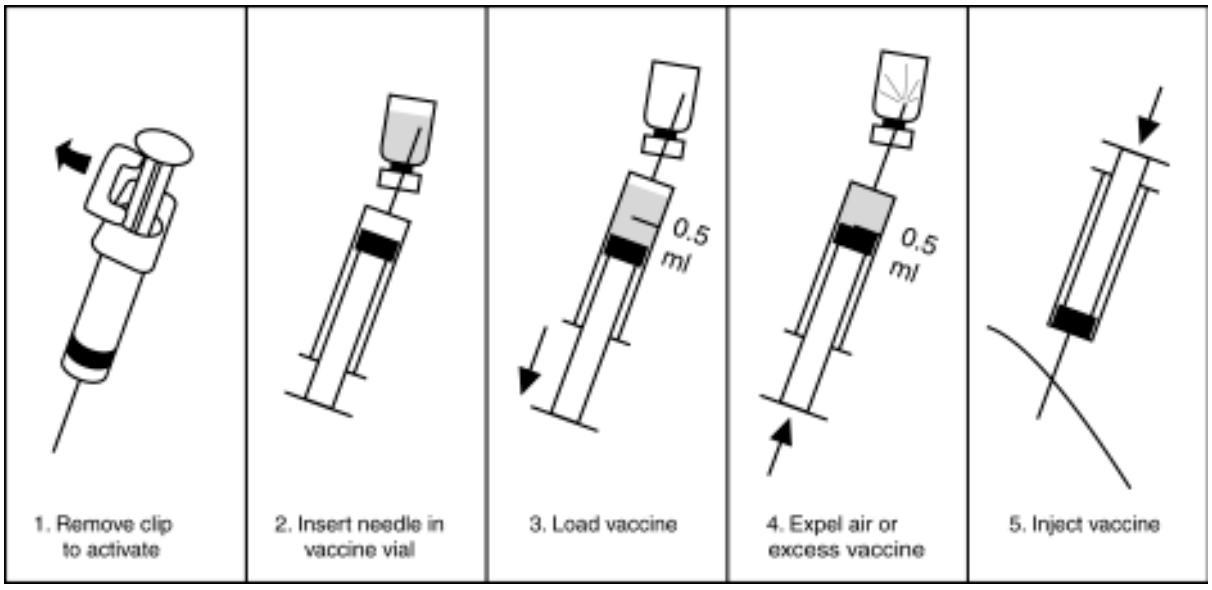
For more details about the K1 devices, please contact:
Star Syringe Ltd.
Gossard House
7-8 Savile Row
London, England W1X 1AF
Phone: (44) 20 7292 0800
Fax: (44) 20 7292 0801
Email: mkoska@starsyringe.co.uk
Web site: www.k1.adsyringes.com

Auto-Disable Syringe Instructions
K1

Type One: K1 Syringe with twist tab—twist to activate



Type Two: K1 Syringe with tab—remove tab to activate



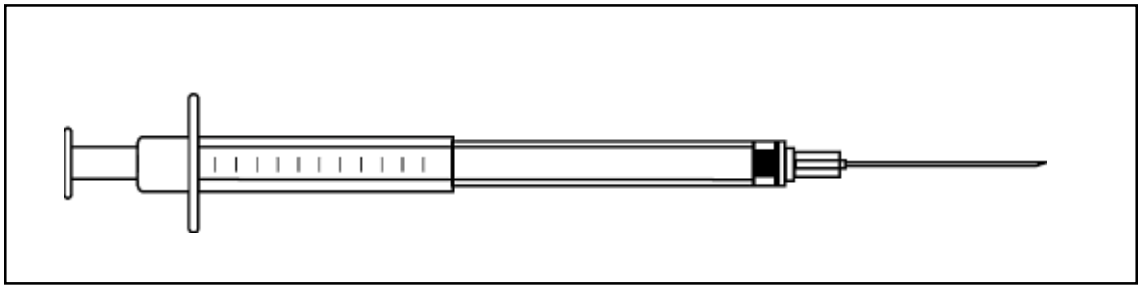
Instructions from Star Syringe Ltd., 1999-2000 (www.kl.adsyringes.com/products/htm); modified with permission.

Destroject® Auto-Disable Syringe

Syringe description:

The Destroject syringe is the third single-use, disposable, AD syringe that will be distributed by UNICEF in 2000 and 2001. The syringe comes with a fixed needle, and the sterile packaging includes a plunger cap and needle shield. The plunger locks once it is depressed. This syringe is available in a 0.5 ml size.

Figure 21. Destroject syringe



Change in injection technique required:

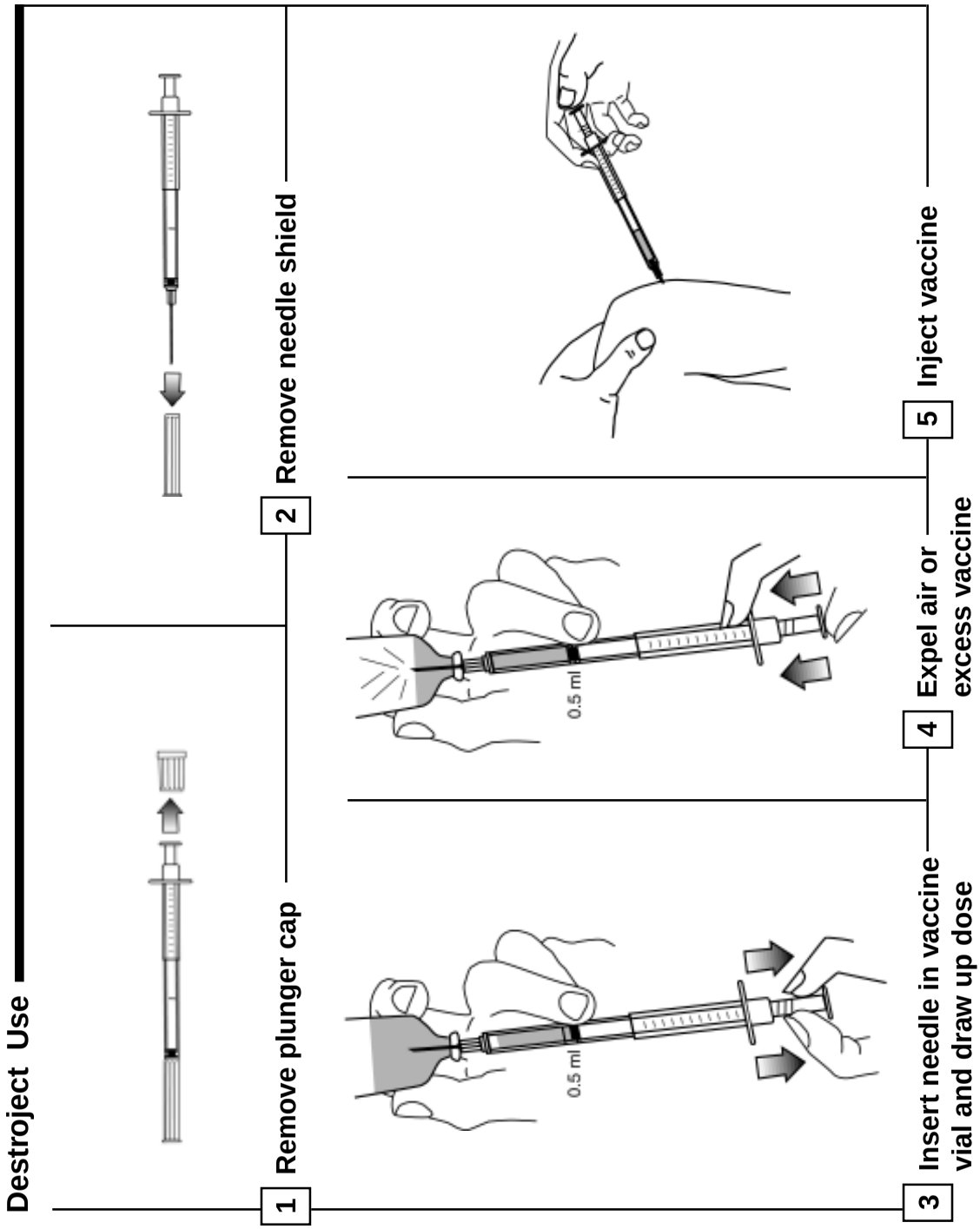
Like the SoloShot syringes, the plunger of this syringe can be pushed in only once. Users should not draw the plunger back to inject air into the vial prior to drawing up a dose. It is not possible to aspirate for blood when using this syringe.

Advantages of Destroject AD syringes:

- Destroject is designed to prevent the re-use of non-sterile syringes.
- The longer syringe length makes it less tiring to use when immunizing large groups of people.
- The fixed-needle design reduces the dead space in the syringe that wastes vaccine or medicine.

For more details about the Destroject device, please contact:
GmbH Medical Devices
Havelstrasse 1-3
24539 Neumünster
Germany
Phone: (49) 43 2188 0088
Fax: (49) 43 218 1855
Email: info@destroject.de
Web Site: www.destroject.de

Auto-Disable Syringe Instructions
Destroject



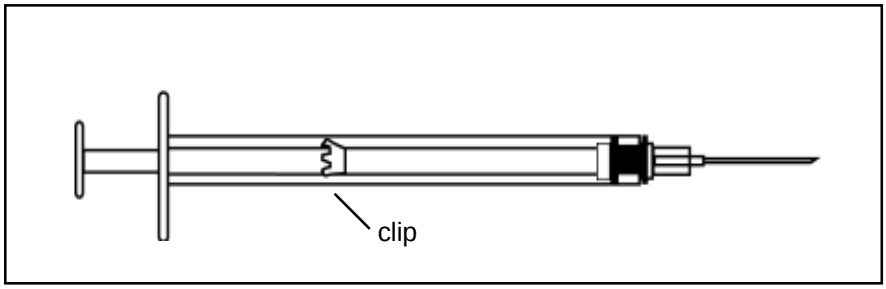
Modified with permission from GmbH Medical Devices.

Univec™ Auto-Disable Syringe

Syringe description:

The Univec syringe is a 0.5 ml syringe which comes with a fixed needle or detachable needle. The syringes are individually packed in sterile paper packaging. The plunger locks once it is depressed, but can be withdrawn a short distance to aspirate for blood when checking the needle position. A BCG syringe with a 0.05 ml dose line is available.

Figure 22. Univec syringe



Change in injection technique required:

Like the SoloShot and DestroJect syringes, the plunger of this syringe can be pushed in only once. Users should not draw the plunger back to inject air into the vial prior to drawing up a dose.

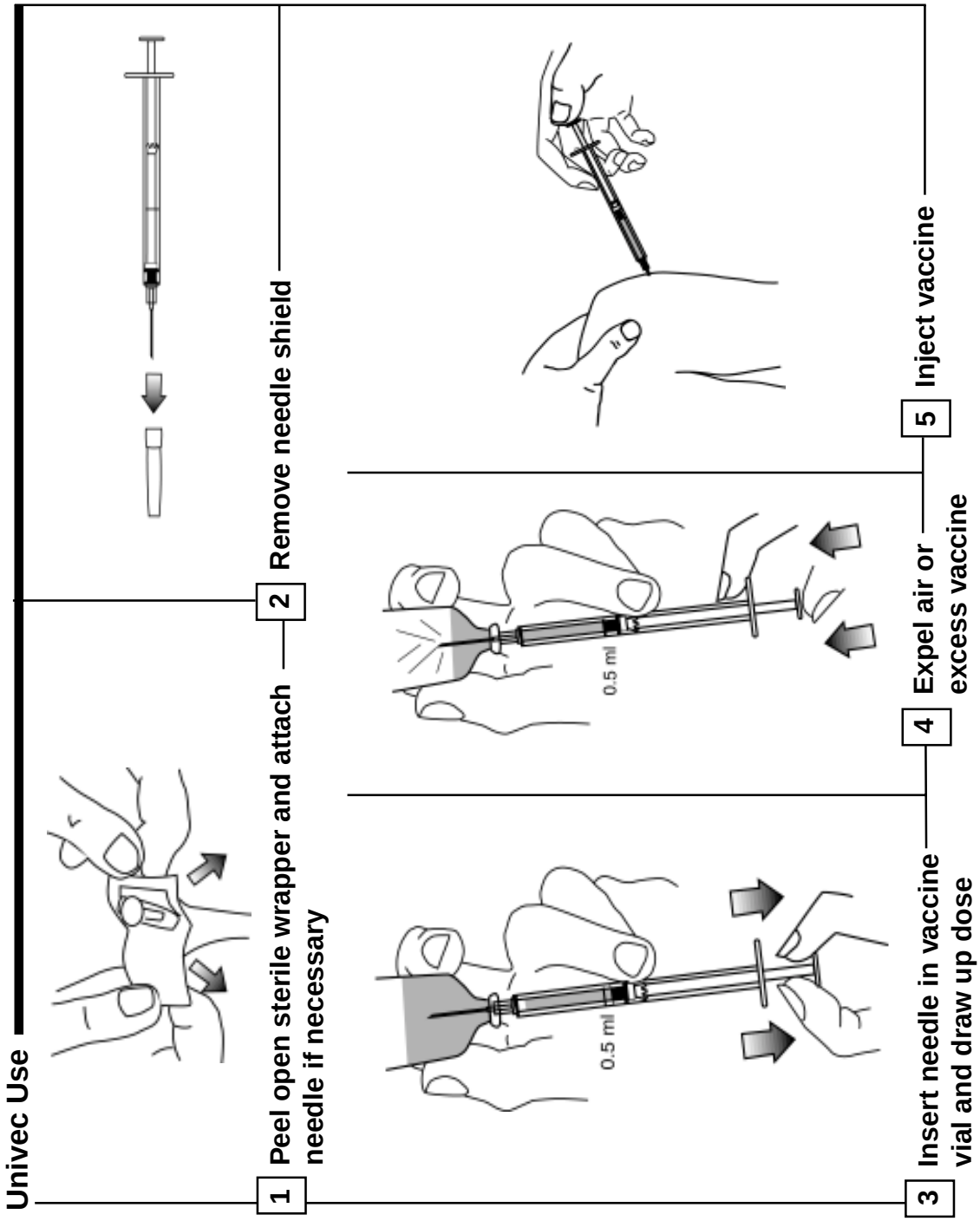
Advantages of Univec AD syringes:

- Univec is designed to prevent the re-use of non-sterile syringes.
- The longer syringe length makes it less tiring to use when immunizing large groups of people.
- The fixed-needle design reduces the dead space in the syringe that wastes vaccine or medicine.
- The plunger has some limited back and forth motion that can assist in removing air from the syringe.

For more details about the Univec devices, please contact:
Univec
22 Dubon Court
Farmingdale, NY 11735
U.S.A.
Phone: (631) 777-2000
Fax: (631) 777-2786
Email: univec@univec.com
Web Site: www.univec.com

Auto-Disable Syringe Instructions

Univec



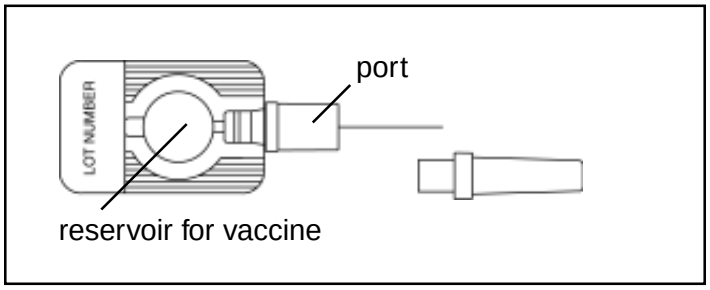
Adapted with permission from Univec, Inc.

BD Uniject™ Prefill Injection Device

Device description:

The Uniject is a single-use, disposable, auto-disable injection device that contains one dose of vaccine or medicine. Currently, each dose is individually wrapped in a foil envelope. Because the dose cannot be separated from the injection device, use of Unijects can increase the volume of cold storage required, particularly at central levels of the cold chain.

Figure 23 . Uniject



For more details about the Uniject devices, please contact:
BD
1 Becton Drive
Franklin Lakes, NJ 07417
U.S.A.
Phone: (201) 847-6800
Fax: (201) 847-4845
Web site: www.bd.com/immunization/

Change in injection technique required:

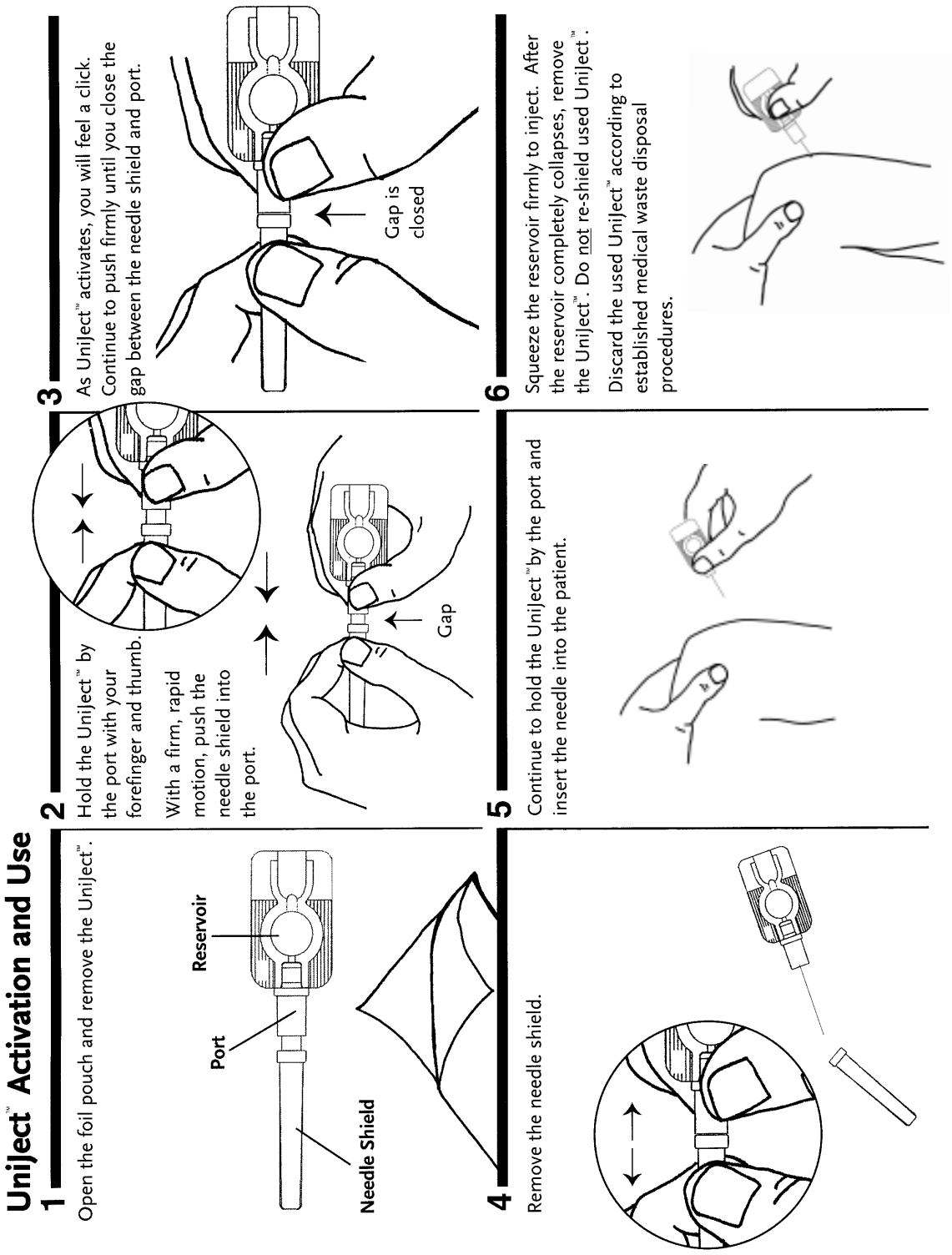
The device needs to be activated by pressing the needle shield into the port. This opens the canal that allows medication or vaccine to flow into the needle. The health worker then removes the needle shield. While holding the Uniject by the hard plastic port, the health worker inserts the needle into the patient and squeezes the bubble-like reservoir until the entire dose has been injected.

Advantages of Uniject AD injection device:

- Uniject can only be used once.
- The prefilled device ensures an accurate dose.
- The syringe and vaccine can be ordered with a single request.
- Vaccine and syringes will always be available in the necessary ratios: one dose of vaccine and one syringe.
- The device contains less plastic than a syringe, so the volume of waste is reduced.
- The unit-dose device reduces the vaccine wastage that occurs when health workers use open multi-dose vials.
- Use of VVMs on the Uniject outer packaging may allow flexible storage procedures for heat-stable vaccines.

Auto-Disable Syringe Instructions

Uniject



Reprinted with permission from BD.

Is Aspiration Necessary?

Some of the new designs of AD syringes do not permit health workers to aspirate for blood when they place the needle in the injection site. The inability to aspirate with AD syringes has led workers to wonder whether it is necessary to aspirate when giving immunizations.

It is not necessary to aspirate for blood for routine immunizations.

AD syringes were used without aspirating in campaigns where millions of intra-muscular immunizations were given. No problems were documented related to lack of aspiration. There is also no evidence to justify the need to aspirate when giving subcutaneous or intradermal vaccinations. Many health workers have been taught to aspirate for blood to see if the needle is in a blood vessel. However, the injection sites used for immunization (e.g., the center of the deltoid muscle; the subcutaneous fat of the upper arm; and the middle portion of the upper, outer thigh) do not have large blood vessels.

It is also important to note that blood oozing from the injection site after the needle is removed does not indicate that the needle was in a blood vessel, does not indicate poor technique, and can occur with injections given by experts. After considering the way vaccines act in the body (pharmacokinetics), the historic experience with vaccines, and the fact that injection sites do not have large, accessible vessels, WHO does not require that immunizers aspirate for blood when injecting vaccines into these sites. While the plunger of some AD syringes can be drawn enough to aspirate, it is not necessary to do so for routine immunizations and should not be given as a reason to delay adoption of auto-disable syringes.

Injection Practices to Continue

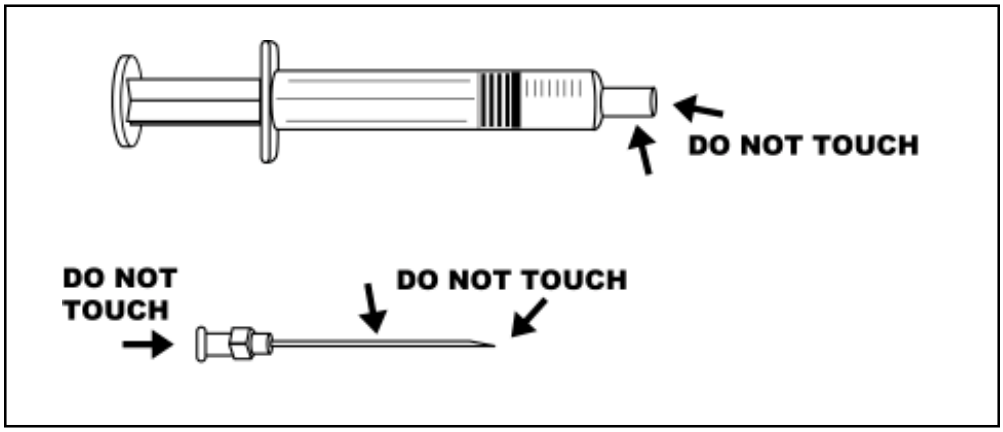
While some practices change with the use of AD syringes, others are important and should be continued.

Keep the needle and syringe sterile.

Because any part of the syringe that you touch becomes contaminated, you should NOT touch parts that come into contact with the injectable vaccine. If you touch any of these parts by accident, the syringe and needle are not sterile. Discard them immediately and replace them with a sterile syringe and needle.

Never touch the needle with your fingers.

Figure 24. The "do not touch" areas of a syringe and needle



Health workers sometimes place their fingers on the needle to help guide it in when pushing through the skin. Touching the needle with your fingers contaminates the needle.

Should the injection site be cleaned?

The WHO Expanded Programme on Immunization does not require that injection sites be cleaned prior to giving an injection. Several large U.S. studies showed that persons receiving injections into uncleansed skin had no significant problems.

> In a survey of more than 1,000 intravenous drug users, 173 reported always cleaning their skin prior to injection. These persons had fewer abscesses. (See Vlahov 1992)

Despite the lack of evidence that it is necessary to clean injection sites, wiping the site with 70% alcohol remains the standard of practice in many settings. It does no harm if clean cotton and uncontaminated alcohol are used. It will decrease the number of organisms present on the skin, and thus may help reduce the risk of abscesses, as was shown in a study for drug users. Disinfectants other than alcohol may not be beneficial. Pathogens can grow in many other disinfectants, and can grow well on moist cotton. Contamination can occur when containers for disinfectant or cotton are refilled again and again without cleaning, when cotton is torn with the hands, and when cotton is moistened and stored.

Avoid touching the injection site with your fingers.

After an injection, health workers sometimes apply pressure to the injection site with their fingers or a piece of cotton wool to reduce bleeding. It is a better practice to ask the patient or the adult accompanying small children to hold the cotton on the injection site. If the nurse

contaminates his or her fingers with blood, he or she can transmit pathogens from one patient's injection site to another.

Other injection practices that remain the same when using AD Syringes.

- **DO NOT re-use syringes that have been used before, including mixing syringes.** Used, disposable syringes cannot be sterilized and eventually change shape at temperatures necessary for sterilization. Health workers who try to decontaminate, clean, and sterilize disposable equipment are at risk of accidental needlestick injuries. Re-using syringes and needles can also transmit infections between patients.

- **NEVER leave a needle inserted in the vial cap to withdraw multiple doses.** This provides a direct route for microorganisms to enter the vial and contaminate the vaccine. The needle used to withdraw the vaccine from the vial should also be used to administer the dose.

- **ALWAYS use a new needle and a new syringe every time an injection is given**. The practice of loading multiple doses in a syringe and then injecting several children is dangerous and never justifiable.

- **ALWAYS use a sterile needle and sterile syringe to mix each vial of freeze-dried vaccine.** Then, discard the mixing syringe and needle in the needle-disposal box.

- **ALWAYS use a new needle and a new syringe each time vaccine is withdrawn from a multi-dose vial**.
  Re-using the same syringe to give injections to several patients—even if the needle is changed—is a dangerous practice. It allows pathogens to contaminate the multi-dose vial and then be transmitted from patient to patient both by the contaminated vaccine and the syringe.

Trainer's Note

- **Conduct Practical Exercise (page 97).**
- **Use Observation Guidelines for Practical Exercise (page 98) to monitor practice.**
- **Review Comparing Different AD Syringes (page 99).**

Ensuring Adequate Supplies of AD Syringes

If you need to order syringes, the following pages will help calculate the number of syringes to order for immunization campaigns.

How many syringes are enough?

If the budget permits, it is simplest to order one syringe for every dose of vaccine ordered, and one mixing syringe for each vial to be reconstituted. If that is not possible, the instructions below explain one strategy for reducing the number of syringes to request while still ensuring there will be enough so that each injection is delivered with a sterile syringe and a sterile needle.

Calculating the number of syringes to order using the wastage factors, or the wastage rate.

The number of syringes needed depends upon the number of doses to be ordered and the vaccine wastage rate. The vaccine wastage rate measures the portion of vaccine that is wasted. When vaccines are ordered in multi-dose vials, more vaccine than syringes will be wasted. In other words, the wastage rate for the vaccines is greater than the wastage rate of the syringes. Over time, a surplus of syringes will result. This means that programs can save money if they order or request syringes based on the actual number of syringes used. Although, it is simplest to order one syringe for every dose of vaccine ordered, this costs more money, increases the chance that a complete order may not be received, and results in more syringes being ordered than is necessary, particularly for routine immunization programs.

To order syringes based on the actual need, health workers can try to measure the true vaccine and syringe wastage factors occurring in their setting. They then order supplies by multiplying the wastage factor by the number of persons to be immunized in the target population. Some commonly used formulas are found in Figure 25.

If it is not possible to calculate the wastage rate or wastage factor, then a wastage factor of 1.11 can be used to order auto-disable syringes. This will allow some extra stock to cover syringes that get disabled prematurely or contaminated. A wastage factor of 1.11 assumes that 10% of the syringes will be wasted. That means that for every child in the target group to be immunized, 1.11 syringes would be ordered.

Figure 25. Calculating the wastage factor for vaccine and syringes.

Syringe wastage factor $= \dfrac{\text{number of syringes used}}{\text{number of persons immunized}}$

Vaccine wastage factor $= \dfrac{\text{number of doses used}}{\text{number of persons immunized}}$

Syringe wastage rate $= \dfrac{(\text{number of syringes used} - \text{number of persons immunized})}{\text{number of syringes used}}$

Vaccine wastage rate $= \dfrac{(\text{number of doses used} - \text{number of persons immunized})}{\text{number of doses used}}$

Converting the wastage rate to the wastage factor:

Wastage factor $= \dfrac{1}{(1 - \text{wastage rate})}$

Ordering stock for routine program use requires reserve stock.

The persons ordering stock for a routine immunization program must order additional reserve stock to ensure that they have enough syringes during the re-ordering period. Because the delay between ordering supplies and receiving them varies in different locations, and because the number of times each year that stock is distributed also varies, contact local supervisors to get information about the quantity of reserve stock to request and the ordering delay to expect in particular circumstances. The examples in Figure 26, show a simplified order method that can be used for campaigns. Note that it includes no request for reserve stock.

Once vaccine, syringes, and needles are ordered, it is still necessary to request mixing syringes for vaccines to be reconstituted. Since one mixing syringe is needed for every vial to be reconstituted, the following method will indicate the number of syringes to be used.

- Find out the total number of doses to be requested.
- Divide this number by the number of doses per vial. This will give the number of vials expected to arrive.
- Order one syringe and needle for every vial.
- Syringes typically come in boxes of 100. Divide the number of the mixing syringes by 100 to determine the number of boxes to order. Round the number up to the nearest box. For examples, see Figure 26.

Figure 26. Calculating the number of auto-disable syringes and mixing syringes to use in a campaign: 3 examples

Estimating the number of doses to order (simplified example)

Community	Number of People to be Immunized	Wastage Rate for Vaccine	Wastage Factor for Vaccine	Number of Vaccine Doses to Order
A	1000	25%	1.33	1330
B	5000	15%	1.18	5900
C	3780	10%	1.11	4196

Estimating the number of auto-disable syringes to order

Community	Number of People to be Immunized	Wastage Rate for AD syringes	Wastage Factor for AD Syringes	Number of AD Syringes to Order	Number of Boxes to Order (100 syringes in 1 box)
A	1000	10%	1.11	1110	12
B	5000	10%	1.11	5550	56
C	3780	10%	1.11	4196	42

Estimating the number of mixing syringes to order

Community	Number of Doses of Vaccine to Order	Number of Doses Per Vial	Number of Vials	Number of Mixing Syringes to Order	Number of Boxes to Order (100 syringes in 1 box)
A	1000	10	100	100	1
B	5000	20	250	250	3
C	3780	80	48	48	1

Trainer's Note

- **Review Key Points of Module 5.**
- **Conduct Quiz (pages 100-101).**
- **Review Case Study: Wrong-way Kudzu (pages 102-103).**

Key Points

- New syringe designs can prevent re-use of syringes. Purchase of auto-disable syringes can reduce re-use.
- Do not draw back on the plunger to put air into a vial when using SoloShot, SoloShot FX, Univec, or Destroject syringes. The plunger will move back and forth only once!
- NEVER leave a needle inserted in the vial cap.
- ALWAYS use a new needle and a new syringe **every time** an injection is given.
- ALWAYS use a new needle and a new syringe **every time** vaccine is withdrawn from a multi-dose vial.
- Syringes designed to prevent re-use do not automatically prevent needlesticks.
- Order adequate quantities of both auto-disable syringes and mixing syringes.

Practical Exercise

Practice Use of Auto-Disable Syringes and Devices

1. The trainer demonstrates the use of the auto-disable syringe or syringes that the participants will be using, and reviews the instructions and observation guidelines.

2. The trainer divides the group into pairs.

Trainer's Note

Trainer's Note: Distribute AD syringes, the applicable syringe instructions, vials of liquid, a needle-disposal box, and Observation Guidelines.

3. The pairs take turns being an "immunizer" and an "observer." The immunizer tries to fill the syringe with a full dose and then ejects the dose. The observer helps by reading the steps on the instruction sheet. After trying 1-2 syringes, the immunizer should then pretend to give a safe injection. The observer follows the steps listed on the Observation Guidelines (page 98) to ensure that routine safety precautions necessary for any injection are being demonstrated.

Practical Exercise Continued...
Observation Guidelines for Practicing Use of Auto-Disable Syringes

As health workers try new syringes, they need to adapt their techniques. However, many routine steps in giving an injection still need to be emphasized. Both participants and trainers should review these steps that are recommended for any injection, regardless of the type of syringe used.

Persons giving injections should:

- Verify the medication, the dose, the patient, the site, and the route of administration.
- Check the sterile pack's expiry date; if the expiry date has passed, it should be discarded.
- Check whether the sterile pack is damaged or punctured. If damaged or punctured, it should be discarded.
- For syringes wrapped in sterile (blister) paper packaging,
  - Peel open the package without touching the needle hub or syringe tip.
  - If the syringe has a detachable needle, attach the syringe firmly to the needle and twist.
- Activate the syringe, if necessary.
- Remove the protective caps on the plunger and the needle, if present.
- Remove the needle cap or shield.
- Insert needle into the vial, keeping the needle in the fluid until a complete dose is drawn up.
- Remove air bubbles by tapping the barrel and pushing the plunger to the correct dose mark, while the needle remains in the vial.
- Check that the dose is correct.
- Inject the entire dose.
- After injection, place the syringe immediately in a needle-disposal box.

Persons giving injections should handle the syringes safely after use.
The health worker should NOT:

- Recap the needle.
- Set the needle down before disposal.
- Carry the syringe from the area where the immunization was given.

The health worker should:

- Discard the used, uncapped syringe in a needle-disposal box at the point of use.

Comparing Different AD Syringes

Type of AD Syringe	Packaging	Requires Activation	Disabled by	Available with Fixed Needle (as of Oct. 2000)
SoloShot 	Bulk packed with plunger caps	No	Metal clip	Yes
SoloShot FX 	Individual paper package	No	Metal clip	No
K1 	Individual paper or plastic package	Remove tab or twist plunger (depending on style)	Plunger breaks off	Fixed or detachable needle available
Destroject 	Bulk packed with plunger caps	No	Ratchets on plunger	Yes
Univec 	Individual paper package	No	Metal clip and ratchets on plunger	Fixed or detachable needle available
Uniject 	Pre-filled, single dose: individual foil package	Push port into needle shield	Reservoir (bubble) can not be refilled	Yes

Quiz

Quiz Questions

1. What are some advantages of auto-disable syringes?

2. How are auto-disable syringes different from other syringes?

3. When is it acceptable to re-use contaminated single-use syringes?

4. Which syringes have the lowest risk of re-use?

5. What changes in technique are necessary when using an auto-disable syringe?

6. What must you do if you accidentally touch the “do not touch” (page 91) parts of the syringe or needle?

7. Which of the following can be used to clean the injection site?
   A. 70% alcohol (rubbing alcohol or spirits)
   B. Soap and water
   C. Water only
   D. Any of the above

Trainer’s Note

This quiz should be given orally to stimulate classroom discussion. After the discussion for each question, repeat the correct answer. At the end of the quiz, review this module’s Key Points again.

Quiz Answers

1. What are some advantages of auto-disable syringes?

   - *They prevent re-use.*
   - *Syringes without the black rubber seal on the plunger produce less toxic smoke when burned.*

2. How are auto-disable syringes different from other syringes?

   Some auto-disable syringes have plungers that lock after a single use. Others have a plunger that breaks off. This prevents the syringe from being used a second time. It is important not to pull back the plunger to inject air into a vial before drawing up a dose. Not all manufacturers have a 5.0 ml auto-disable syringe for reconstitution.

3. When is it acceptable to re-use contaminated single-use syringes?

   NEVER.

4. Which syringes have the lowest risk of re-use?

   Auto-disable syringes.

5. What changes in technique are necessary when using an auto-disable syringe?

   Do not inject air into the vial; draw back the plunger only once, it is not necessary to aspirate when injecting EPI vaccines.

6. What must you do if you accidentally touch the “do not touch” (page 91) parts of the syringe or needle?

   Discard the syringe and needle immediately and replace them with a sterile syringe and needle.

7. Which of the following can be used to clean the injection site?

   D. Any of the above. Rubbing alcohol, soap and water, or water can be used to clean the injection site.

Case Study

Wrong-way Kudzu

Kudzu, the vaccinator, arrives at the outreach site late and many children are waiting. He has been on a crowded bus for two hours and wants a cigarette to calm his nerves. He smokes while preparing for the immunization session.

The community has given him a table to use during the session. He places it in the sun, because the clients are sitting in the only shady place—under a mango tree.

Questions for Discussion

1. **Is the supervisor right to stop the session?**
2. **What reasons does she have for stopping the session?**

Before he starts giving the immunizations, Kudzu takes out two vials of each kind of vaccine, two ampules of diluent for BCG, and two ampules of diluent for measles vaccine. He reconstitutes the BCG and measles vaccines. He then puts the vaccines in the slits of the foam pad on top of the open vaccine carrier.

In his rush to get ready, Kudzu drops his only mixing syringe with the needle-point first, onto the ground. He washes his hands thoroughly, then decides to reconstitute vaccine with the other type of syringes. He holds the syringes and needles by their adapters when assembling them, thinking that this is satisfactory as long as he does not touch the other parts.

Finally, he loads a syringe with 2 ml of measles vaccine, puts it inside the vaccine carrier to keep it cool, and begins immunizing.

Kudzu is giving the fourth injection with the same syringe and needle when a supervisor passes by and whispers in his ear to “please stop the session.”

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

Answers to Case Study Questions

1. Is the supervisor right to stop the session?

   Yes, it is the supervisor's duty because Kudzu is harming the children he is vaccinating. Stopping the session may be embarrassing for Kudzu and may raise concern among the clients, but the health worker's first responsibility is to prevent harm. It is worse to put people at risk for abscesses, hepatitis B, hepatitis C, HIV, or other illnesses than to face embarrassment.

2. What reasons does she have for stopping the session?
   The most dangerous mistakes Kudzu made were:
   - *He gave repeated doses with the same syringe.*
   - *He used the same syringe for four children by loading more than one dose into a syringe.*

   Other areas for improvement:
   - *He arrives late.*
   - *He smokes while working.*
   - *He puts the vaccination table in a sunny place.*
   - *He takes two vials of each vaccine out of the vaccine carrier.*
   - *He reconstitutes vials of BCG and measles vaccines before he has the children who need them.*
   - *He touches the adapter of the syringe that must remain sterile.*
   - *He loads a syringe before he has a client needing the particular vaccine.*
   - *He puts a loaded syringe into the vaccine carrier where it will get contaminated.*

   The supervisor should privately talk with Kudzu to see if he has any safe vaccine and sterile syringes. If not, the supervisor could try to find new sterile syringes and needles; otherwise, the supervisor could help explain to the crowd that they will reschedule a new clinic session because they have run out of sterile needles and syringes.

   The supervisor should follow up to see if Kudzu needs additional training or extra supervision.

Notes:

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PATH gratefully acknowledges several extremely useful sources of information on safe injection issues. Following is a list of these resources and the areas in which they specifically contributed to the development of this manual:

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