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Ministry of Health  
Infection Control Directorate

# **SAFE INJECTION**

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# Safe Injection

## **I. Introduction**

A safe injection is one that does not harm the recipient, does not expose the provider to any avoidable risks and does not result in waste that is dangerous for the community. Unsafe injection practices can lead to transmission of blood borne pathogens (human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) with their associated burden of disease.

## **II. Prevention strategies**

- Eliminating unnecessary injections is the best way to prevent injection-associated infections. When effective treatment can be given by other routes (oral or rectal), this is preferred, because it reduces potential exposure to blood and infectious agents, and thus reduces infection risks.
- Vaccination of health workers with hepatitis B vaccine is important in protecting both health workers and patients.
- Methods for reducing exposure and preventing infection transmission include hand hygiene, barrier protection (gloves), minimal manipulation of sharp instruments (including injection equipment), and appropriate segregation and disposal of sharps waste (note: sharps are items such as needles that have corners, edges or projections capable of cutting or piercing the skin)
- Injections are unsafe when given with un-sterile or improper equipment or technique. It is important to avoid contamination of injectable medications. Physically separating clean and contaminated equipment and supplies helps to prevent cross-contamination. For example, immediate disposal of a used syringe and needle in a safety box placed within arm's reach is the first step in safe waste management.

Injection safety is an important component of basic infection control. The concept of “standard precautions”, with mandatory safe practices, must be routinely applied in all healthcare settings, and every person in such settings should be considered a potential source of infection

## **III. Best practices for injection**

### **A. General safety practices**

the following practices that are recommended to ensure the safety of injections and related practices:

- hand hygiene
- gloves where appropriate
- other single-use personal protective equipment
- skin preparation and disinfection.

## Hand hygiene

Hand hygiene is a general term that applies to either hand washing, antiseptic hand wash, antiseptic hand rub or surgical hand antisepsis . It is the best and easiest way to prevent the spread of microorganisms. Hand hygiene should be carried out as indicated below, either with soap and running water (if hands are visibly soiled) or with alcohol rub (if hands appear clean).


### Perform hand hygiene BEFORE:

- starting an injection session (i.e. preparing injection material and giving injections).
- coming into direct contact with patients for health-care related procedures
- putting on gloves (first make sure hands are dry).

### Perform hand hygiene AFTER:

- an injection session
- any direct contact with patients
- removing gloves. You may need to perform hand hygiene between injections, depending on the setting and whether there was contact with soil, blood or body fluids. Avoid giving injections if your skin integrity is compromised by local infection or other skin conditions (e.g. weeping dermatitis, skin lesions or cuts), and cover any small cuts.


**Table.1 Indications and precautions for hand hygiene**

Key elements	Indications	Precautions
Hand hygiene (handwashing or alcohol-based handrub) 	Hand hygiene before and after contact with every patient is the single most important means of preventing the spread of infection <ul style="list-style-type: none"><li>• When hands are visibly dirty or contaminated with proteinaceous material, wash them with antibacterial or plain soap and running water, then dry them using single-use paper towels</li><li>• When hands appear clean (i.e. are not visibly soiled), clean them with an alcohol-based hand product for routine decontamination, then dry them using single-use paper towels</li></ul>	<ul style="list-style-type: none"><li>• Ensure hands are dry before starting any activity</li><li>• DO NOT use alcohol-based hand products when hands are visibly soiled</li><li>• DO NOT use alcohol-based hand products after exposure of nonintact skin to blood or body fluids; in such cases, wash hands with antibacterial or plain soap and running water, then dry them using single-use paper towels</li></ul>

## Gloves

Health workers should wear non-sterile, well-fitting latex or latex-free gloves when coming into contact with blood or blood products. Indications for glove use in injection practice are shown in Table 2.

**Table 2. Indications for glove use in injection practice**

Key elements	Indications	Precautions
Glove use 	Wear non-sterile, well-fitting, single-use gloves: <ul style="list-style-type: none"><li>• when there is a likelihood of coming into direct contact with a patient's blood or other potentially infectious materials (e.g. body fluids, moist body substances and saliva [in dental procedures]), mucous membranes and nonintact skin</li><li>• when performing venepuncture or venous access injections, because of the potential for blood exposure at the puncture site</li><li>• if the health worker's skin is NOT intact (e.g. through eczema, or cracked or dry skin)</li><li>• if the patient's skin is NOT intact (e.g. through eczema, burns or skin infections).</li></ul>	When undertaking injections, <b>DO NOT</b> use gloves: <ul style="list-style-type: none"><li>• for routine intradermal, subcutaneous and intramuscular injections</li><li>• if the health worker's skin is intact</li><li>• if the patient's skin is intact.</li></ul> Gloves <b>DO NOT</b> provide protection against needle-stick or other puncture wounds caused by sharp objects. Needles, scalpels and other sharps should be handled with extreme caution.

## Other single-use personal protective equipment

Masks, eye protection and other protective clothing **ARE NOT** indicated for the injection procedures covered unless exposure to blood splashes is expected. When using single-use personal protective equipment, dispose of the equipment immediately after use.

### Skin preparation and disinfection

To disinfect skin, use the following steps

1. Apply a 60–70% alcohol-based solution (isopropyl alcohol or ethanol) on a single-use swab or cotton-wool ball. **DO NOT** use methanol or methyl-alcohol as these are not safe for human use.
2. Wipe the area from the centre of the injection site working outwards, without going over the same area.
3. Apply the solution for 30 seconds then allow it to dry completely.

N.B.

**DO NOT** pre-soak cotton wool in a container – these become highly contaminated with hand and environmental bacteria.

**DO NOT** use alcohol skin disinfection for administration of vaccinations.

**Table 3: Skin preparation for different types of injection**

Type of injection	Skin preparation and disinfection	
	Soap and water	60–70% alcohol (isopropyl alcohol or ethanol)
Intradermal	Yes	No
Subcutaneous	Yes	No
Intramuscular		
• immunization	Yes	No
• therapeutic	Yes <sup>a</sup>	Yes <sup>a</sup>
Venous access	No	Yes

<sup>a</sup> Unresolved issue because there is insufficient evidence on the need to disinfect the skin with alcohol before an intramuscular injection to change the 2003 WHO recommendation (7); further studies are warranted.

## Summary of best practice

The steps outlined above are summarized in Table 4, below.

**Table4: Infection prevention and control practices**

Do	Do not
DO carry out hand hygiene (use soap and water or alcohol rub), and wash carefully, including wrists and spaces between the fingers, for at least 30 seconds (follow WHO's 'My 5 moments for hand hygiene' <sup>a</sup> )	DO NOT forget to clean your hands
DO use one pair of non-sterile gloves per procedure or patient	DO NOT use the same pair of gloves for more than one patient DO NOT wash gloves for reuse
DO use a single-use device for blood sampling and drawing	DO NOT use a syringe, needle or lancet for more than one patient
Do disinfect the skin at the venepuncture site	DO NOT touch the puncture site after disinfecting it
DO discard the used device (a needle and syringe is a single unit) immediately into a robust sharps container	DO NOT leave an unprotected needle lying outside the sharps container
Where recapping of a needle is unavoidable, DO use the one-hand scoop technique (see Annex B)	DO NOT recap a needle using both hands
DO seal the sharps container with a tamper-proof lid	DO NOT overfill or decant a sharps container
DO place laboratory sample tubes in a sturdy rack before injecting into the rubber stopper	DO NOT inject into a laboratory tube while holding it with the other hand
DO immediately report any incident or accident linked to a needle or sharp injury, and seek assistance; start PEP as soon as possible, following protocols	DO NOT delay PEP after exposure to potentially contaminated material; beyond 72 hours, PEP is NOT effective

## B. Injection devices and medications:

### 1. Injection devices

- Health-care settings should ensure that an adequate supply of single-use devices is available, to allow providers to use a new device for each procedure.
- When using a sterile single-use device (i.e. a syringe and hypodermic needle that is not separated or manipulated unless necessary)
- Use a new device for each procedure, including for the reconstitution of a unit of medication or vaccine;
- Inspect the packaging of the device to ensure that the protective barrier has not been breached;
- Discard the device if the package has been punctured, torn or damaged by exposure to moisture, or if the expiry date has passed.

### 2. Medication

Types of medication containers and recommendations on their use are given in Table 5

**Table 5: Recommendations on medication containers**

Type of container	Recommendations	Reason
Single-dose vial	Preferred	Low likelihood of contamination
Multiple-dose vial	Only if unavoidable	High likelihood of contamination if aseptic technique is poor
Ampoules	Pop-open preferred	Breaking a glass ampoule may result in particulate matter escaping from the vial, it may also injure the person opening the ampoule
Fluid or solution bags (100–1000 ml) for reconstitution	Not recommended for routine injection	High likelihood of contamination

#### When giving medication:

- DO NOT use a single loaded syringe to administer medication to several patients (i.e. ensure one needle, one syringe, one patient!).
- DO NOT change the needle in order to reuse the syringe.
- DO NOT use the same mixing syringe to reconstitute several vials.
- DO NOT combine leftover medications for later use.

#### Single-dose vials

- Whenever possible, use a single-dose vial for each patient, to reduce cross-contamination between patients.

#### Multidose vials

- Only use multidose vials if there is no alternative.
- Open only one vial of a particular medication at a time in each patient-care area.
- If possible, keep one multidose vial for each patient, and store it with the patient's name on the vial in a separate treatment or medication room.
- DO NOT store multidose vials in the open ward, where they could be inadvertently contaminated with spray or spatter.

Discard a multidose vial

- If sterility or content is compromised
- If the expiry date or time has passed (even if the vial contains antimicrobial preservatives).
- If it has not been properly stored after opening.
- Within 24 hours of opening, or after the time recommended by the manufacturer, if the vial does not contain antimicrobial preservatives.
- If found to be undated, improperly stored, inadvertently contaminated or perceived to be contaminated, regardless of expiration date.

Pop-open ampoules

- Whenever possible, use pop-open ampoules rather than ampoules that require use of a metal file to open. If using an ampoule that requires a metal file to open, protect your fingers with a clean barrier (e.g. a small gauze pad) when opening the ampoule

**3. Preparing injections**

Injections should be prepared in a designated clean area where contamination by blood and body fluids is unlikely.

Three steps must be followed when preparing injections.

1. Keep the injection preparation area free of clutter so all surfaces can be easily cleaned.
2. Before starting the injection session, and whenever there is contamination with blood or body fluids, clean the preparation surfaces with 70% alcohol (isopropyl alcohol or ethanol) and allow to dry.
3. Assemble all equipment needed for the injection:
  - sterile single-use needles and syringes
  - reconstitution solution such as sterile water or specific diluent
  - alcohol swab or cotton wool
  - sharps container.

Procedure for septum vials

- Wipe the access diaphragm (septum) with 70% alcohol (isopropyl alcohol or ethanol) on a swab or cotton-wool ball before piercing the vial, and allow to air dry before inserting a device into the bottle
- Use a sterile syringe and needle for each insertion into a multidose vial.
- Never leave a needle in a multidose vial
- Once the loaded syringe and needle has been withdrawn from a multidose vial, administer the injection as soon as possible.



### Labelling

-After reconstitution of a multidose vial, label the final medication container with

- date and time of preparation.
- type and volume of diluent (if applicable)
- final concentration; – expiry date and time after reconstitution.
- name and signature of the person reconstituting the drug.

-For multidose medications that DO NOT require reconstitution, add a label with:

- date and time of first piercing the vial.
- name and signature of the person first piercing the vial.

## **4. Administering injections**

### General:

- An aseptic technique should be followed for all injections.
- When administering an injection:
  - check the drug chart or prescription for the medication and the corresponding patient's name and dosage
  - perform hand hygiene
  - wipe the top of the vial with 60–70% alcohol (isopropyl alcohol or ethanol) using a swab or cotton-wool ball
  - open the package in front of the patient to reassure them that the syringe and needle have not been used previously
  - using a sterile syringe and needle, withdraw the medication from the ampoule or vial.

### Reconstitution

- If reconstitution using a sterile syringe and needle is necessary, withdraw the reconstitution solution from the ampoule or vial, insert the needle into the rubber septum in the single or multidose vial and inject the necessary amount of reconstitution fluid.
- Mix the contents of the vial thoroughly until all visible particles have dissolved.
- After reconstituting the contents of a multidose vial, remove the needle and syringe and discard them immediately as a single unit into a sharps container.

### Needleless system

If a needleless system is available:

- wipe the rubber septum of the multidose vial with an alcohol swab
- insert the spike into the multidose vial
- wipe the port of the needleless system with an alcohol swab
- remove a sterile syringe from its packaging
- insert the nozzle of the syringe into the port
- withdraw the reconstituted drug.

### Delay in administration

- If the dose cannot be administered immediately for any reason cover the needle with the cap using a one-hand scoop technique.
- Store the device safely in a dry kidney dish or similar container.

Important points

- DO NOT allow the needle to touch any contaminated surface.
- DO NOT reuse a syringe, even if the needle is changed.
- DO NOT touch the diaphragm after disinfection with the 60–70% alcohol (isopropyl alcohol or ethanol).
- DO NOT enter several multidose vials with the same needle and syringe.
- DO NOT re-enter a vial with a needle or syringe used on a patient if that vial will be used to withdraw medication again (whether it is for the same patient or for another patient).
- DO NOT use bags or bottles of intravenous solution as a common source of supply for multiple patients (except in pharmacies using laminar flow cabinets).

### **C. Prevention of sharps injuries to health workers**

- Use of best practices can help to prevent sharps injuries to health workers
- To avoid sharps injuries:
  - Ensure that the patient is adequately prepared for the procedure
  - Do not bend, break, manipulate or manually remove needles before disposal.
  - Avoid recapping needles, but if a needle must be recapped, use a single-handed scoop technique.
  - Discard used sharps and glass ampoules immediately after use in the location where they were used, disposing of them into a robust sharps container that is leak and puncture resistant.
  - Place the sharps container within arm's reach (preferably in a secured area) to allow for easy disposal of sharps.
  - Seal and replace sharps container when the container is three quarters full.

Disassembly of needle from syringe or other devices

Safe methods of removing the needle from the syringe or other devices are necessary to protect health workers from injury. This procedure must be carried out close to a sharps container, and the needle must be discarded immediately. NEVER disassemble an exposed used needle with your bare hands. If the needle has to be disassembled from the barrel or syringe, re-sheath using a one-hand scoop technique, then remove the needle using a removal device. Both of these procedures are explained below.

One-hand scoop technique

1. Leave the needle cap on the surface and guide the tip of the used needle tip into it using only one hand. Clean the surface with disinfectant afterwards to avoid leaving blood.

2. Place the needle cap against a firm upright surface with its opening towards the phlebotomist, and place the used needle tip into it.
3. Lift the needle and syringe vertically and, once the tip is covered, use the other hand to fix the cap into place.

#### Use of a removal device

- Needle pliers – Hold the needle with pliers or artery forceps. Dislodge the needle by unscrewing it or by pulling it off. Discard immediately into a sharps container.
- Needle guard (mushroom) – Place the cap in the device. Using one hand, insert the needle tip into the cap vertically and turn firmly to fix the needle in the cap. Lift the syringe or barrel and removed the covered needle. Discard immediately.

### **D. Waste management**

- Use of sealed, puncture and leak-proof sharps containers helps to prevent access to used devices
- To ensure that waste is dealt with safely:
  - Transport and store sharps containers in a secure area before final disposal
  - Close, seal and dispose of sharps containers when the containers are three quarters full; assign responsibility in written policy for monitoring the fill level of sharps containers and replacing them when three quarters full.
  - Discard waste that is not categorized as sharp or infectious in appropriate color-coded bags.
  - Ensure that infectious waste bags and sharps containers are closed before they are transported for treatment or disposal.

### **IV. References:**

1. WHO best practices for injections and related procedures toolkit. March 2010
2. Healthcare Infection Control Practices Advisory Committee (HICPAC)2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. <http://www.cdc.gov/ncidod/dhqp/pdf/isolation2007.pdf>