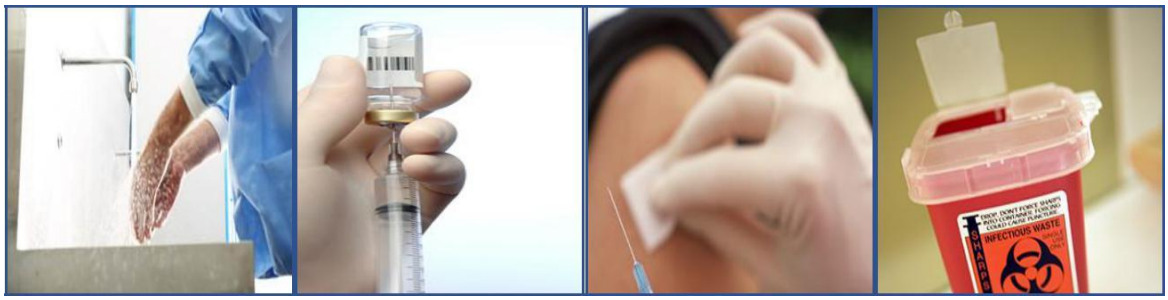
Injection Safety Project

Training Module for Master Trainers



Injection Safety Implementation Project

Directorate of Health & Family Welfare

Government of Punjab

GOVT. OF PUNJAB

POSTGRADUATE INSTITUTE OF MEDICAL EDUCATION AND RESEARCH CHANDIGARH

World Health Organization
COUNTRY OFFICE FOR India

CONTENTS

List of Abbreviations

AD Syringe	Auto Disabled Syringe
ANM	Auxiliary Nurse and Midwife
BCC	Behaviour Change Communication
CME	Continuing Medical Education
DHFW	Department (of) Health and Family Welfare
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HCWM	Health Care Waste Management
HIV	Human Immunodeficiency Virus
IAP	Indian Academy of Paediatrics
IEC	Information Education Communication
IMA	Indian Medical Association
IPEN	International Program Evaluation Network
IV	Intra Venous
KAP	Knowledge, Attitude, Practices
MIC	Model Injection Centre
PGIMER	Post Graduate Institute of Medical Education and Research (Chandigarh)
RUP Syringe	Re-Use Prevention Syringe
SDH	Sub Divisional Hospital
STEG	State Technical Expert Group
WCO	WHO Country Office for India
WHO	World Health Organization

Preface

Safe Injections can improve health outcomes and save lives. But, unsafe injections impact health adversely. Unsafe injections, and their excessive and irrational use by the service providers, for medical conditions that can be managed by other alternative and effective formulations, is a growing concern. Inappropriate disposal of used injections (and sharps) also pose a continued risk of infection to individuals and environmental hazard for the local communities.

Globally, several efforts have been made to address the issue of unsafe injection practices. WHO together with other development partners has been working for more than a decade to promote safe injection practices. In 2015, WHO published policy guidelines to promote the use of safety engineered syringes for intramuscular, intradermal and subcutaneous injections in health care settings. For promotion of this WHO's Global Policy on Injection Safety, "Global Injection Safety Campaign" was also launched in the same year. The campaign focuses on reduction of overall burden of diseases caused by unsafe injection practices and incorrect management of used injection waste, including sharps.

WHO also rolled out Injection Safety Implementation Project as a pilot intervention in 3 selected countries – India, Egypt and Uganda. Ministry of Health and Family Welfare, Government of India launched this project in the country to mark the occasion of World Hepatitis Day on 28th July 2016. Government of Punjab, which has always been a flag bearer for Hepatitis C treatment in India, and has repeatedly demonstrated its commitment for safety of patients, was identified as the only state in the country to implement Injection Safety Implementation Project. In Punjab, the project started in July 2016. This project complements state government's initiatives and activities for control of Hepatitis C (and other fatal bloodborne infections) through preventing spread of infections to both community and service providers resulting from unsafe and used syringes.

The overarching objectives of the project are - ***to prevent unsafe therapeutic injections through use of safety engineered injection devices by trained healthcare workers and service providers; to reduce demand for unnecessary injections by encouraging appropriate use of injectable medicines, and raise community awareness on injection safety; and to eliminate inappropriate disposal of injection waste with special attention on sharp waste****. Directorate of Health & Family Welfare (DHFW), Government of Punjab is playing the leading role for implementation of this injection safety project, with technical support from WHO Country Office for India. Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh is collaborating with DHFW in establishing Model Injection Centres (MIC), and facilitating trainings of service providers on injection safety.*

Model Injection Centres (MIC) are the orientation and demonstration centres developed across all district health facilities of the Punjab to implement trainings of different cadres of healthcare staff from public and private sectors on injection safety, use of RUP syringes, and injection waste management, especially sharps. These centres have been envisaged as catalyst for adoption of safety engineered devices and locally feasible injection waste disposal mechanisms; and for bring about behaviour change among prescribers and community for modifying the injection practices

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Acknowledgements

This project is joint venture of Punjab State Health and Family Welfare Department, Punjab STEG on injection safety with Prof. R.K.Dhiman as the chairperson, and Dr C.K.Lehariya from WHO India office. Hon'ble Minister of Health & Family Welfare of state sh. Brahm Mohindra ji has shown special interest to make the Punjab as first state to implement this prestigious project in the country.

Prof. R.K.Dhiman, Prof & Head Hepatology from PGIMER Chandigarh is the main motivating force to push the agenda of injection safety in Punjab. I am thankful to him, for including me as member of STEG, and assigning the task to develop capacity building tools, deliver trainings and monitor the program. All members of STEG have contributed in the development of materials, and methodologies. I am thankful to Dr.N.K.Arora, Executive Director InClen India and his team for contributing the contents and expertise to customize the training materials to the need of the state.

Dr Pankaj Arora, APHA from PGIMER Chandigarh supported not only in rational decisions for purchase of RUP syringes for the state, but also provided important insight and experiences related to biomedical waste management. Dr. Bhavneet Bharti, Professor Social Pediatrics drew attention to involve informal sectors also in the program, at some stage.

Dr.Rajesh Bhaskar, program officer for injection safety project from Punjab, is doing exemplary efforts to coordinate, and get the products delivered. The inputs in this module also come from the rapid survey done by IIHMR Jaipur. Special section on how to manage needle stick/ sharp injuries / exposure to infectious liquids has been developed with technical inputs from Dr. R.K. Dhiman. Basic concept of model injection centres and this training program is derived from the InClen project experience. This is being reproduced here with their involvement and consent.

This manual is the product of joint consultative deliberations of STEG, followed by consultation workshop of special expert group constituted for deciding communication strategies, and then pilot testing of all materials and actual training for one district of Punjab. All the suggestions throughout this process have been incorporated in this module.

We hope that it will pave the way for successful implementation of injection safety in the state.

Arun K Aggarwal

Punjab STEG on Injection safety

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Introduction

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Learning objectives:

1. What is the magnitude of injection use, globally and in India?
2. What is the magnitude of diseases which spread by unsafe injections?
3. What is the reason for excessive use of injections in healthcare?

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Injection is an equipment that is used to administer a liquid formulation (e.g. medicine or vaccine) into the body by piercing the skin or mucosal membrane for prophylactic, therapeutic, or diagnostic purposes. Since this procedure breaks the skin integrity therefore it carries the risk of introducing disease causing agents from outside to inside the body.

Magnitude of injection use

Injections are the most commonly used medical devices. According to WHO estimates, nearly 1600 crore injections are administered worldwide, every year. Up to 40% of these injections are not safe, i.e. they are given with reused equipment. Rate of reuse of syringes and needles is as high as 75% in some countries[1].

A national study[2] conducted in India by IPEN study group revealed that, around 300 crore injections are given annually. Nearly 2/3rd (63%) of all these injections were found to be unsafe, resulting from a combination of factors like,

- Use of inadequately sterilized injection equipment (90.8%)
- Reuse of disposable syringes and needles (53.3%)
- Improper technique of giving injections (53.1%)

Practice of reusing the injection equipment is prevalent due to the following reasons:

1. Lack of awareness about the risks associated with syringe reuse
2. Lack or limited supply of syringes and needles
3. Absence of infrastructure for safe disposal resulting in 'downstream' reuse through repackaging and resale of syringes

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1 WHO Global Injection Safety Campaign Summary: Annual Meeting of Safe Injection Global Network (SIGN), 23-24 February 2015, WHO/HW, Geneva, Switzerland

2 IPEN Study Group, Injection Practices in India; WHO South East Asia Journal of Public Health; 2012; 1: 189-200

Same IPEN study also found that frequency of injections in India is 2.9 per person per year, and most of these are given for medical reasons (83%). Almost one out of every two patients (48.1%) attending outpatient clinics receives injections.

Injections are commonly prescribed for conditions like fever, diarrhoea, and malaria (53.3%), which are unnecessary and is indicative of irrational use of injections.

Comparison of injection use worldwide and in India

	Worldwide (WHO estimates)	**India (IPEN study)**
Number of injections administered every year	1600 crores	300 crores
Average number of injections per person per year	3.4	2.9
Proportion of injections which are unsafe	40%	63%

In some regions of the world, over 70% injections are considered unnecessary, and can be given by oral formulation[3].

Administration of injections is one of the most common healthcare procedures. Though it is believed that majority of injections are given for vaccinating children and pregnant women, but studies have shown that[4]:

- 3% injections are for immunization purpose
- 95% injections are for curative purpose, and
- 2% injections are for other indications like,
    - Transfusion of blood and blood products
    - Intravenous administration of drugs and fluids
    - Administration of injectable contraceptives

Magnitude of diseases due to unsafe injections

Unsafe injection practices include reuse of injection equipment; accidental needle stick injuries; unsafe sharp waste management, and overuse of injections. All these practices put patients, healthcare workers and the community at the risk of transmission of blood borne virus infections, like HIV, Hepatitis B, and Hepatitis C.

3 Hutin YJ, Hauri AM, Armstrong GL; Use of injections in healthcare settings worldwide, 2000; literature review and regional estimates; BMJ. 2003; 327: 1075

4 WHO, Injection Safety, Fact Sheet, 3 February 2012

Worldwide, unsafe injection practices annually cause[5]:

- 2.60 Lakh HIV infections (5% of global burden)
- 210 Lakh Hepatitis B infections (32% of global burden)
- 20 Lakh Hepatitis C infections (40% of global burden)
- Considerable number of unreported cases of diseases like viral haemorrhagic fevers, malaria, etc.

Unsafe injection practices also increase the risk of bacterial infections and abscesses at the injection site, which can cause long term damage.

Injection waste and its management

All individuals exposed to injection waste, especially sharps, are potentially at risk of being injured or infected. They include:

- Health care providers: doctors, nurses, paramedical staff, hospital maintenance staff, etc.
- Patients in out-patient clinics or admitted at the facility, and their family members and attendants
- Workers in support services, like laundry, waste handling, and transportation, etc.
- General community and more specifically children playing in open fields.

Open disposal or dumping of injection waste, or burning used syringes, can have direct environmental effect by contaminating air, soil, and even underground water.

IPEN study revealed that in India, 74.6% injections are given using plastic syringes. The management of this huge amount of injection waste is a critical issue. Health facility level and terminal level injection waste disposal was found to be satisfactory in only 61% and 45% of health facilities respectively.

Conclusion

Injection use related perception and practices has resulted in indiscriminate use of injectable medicines, mostly with unsafe injection equipment using unsafe practices that has resulted in large scale spread of blood borne diseases, like Human Immunodeficiency Virus (HIV), Hepatitis B virus (HBV), and Hepatitis C virus (HCV), etc.

5 WHO guideline on the use of safety engineered syringes for intramuscular, intradermal and subcutaneous injections in health care settings, 2016

There are some vital precautions, which every injection giver must exercise to prevent transmission of infection. The need of the hour is to build capacity of prescribers and injection givers, and improve injection practices in the country by practice and promotion of:

- Safe injection techniques
- Introduction of safety engineered injection equipment
- Safe disposal of injection related waste
- Rational prescription of injections and
- Creating community awareness through an institutional mechanism

Rational use of injections

Learning objectives:

1. Why is rational use of injections necessary?
2. What are the conditions underlying irrational and rational use of injections?
3. How to decide when to give injections, and when not?
4. How to decide between injectable and oral medication?

According to IPEN study (2004), almost (48.1%) every 1 in 2 clients who go to a health facility receive injection irrespective of their presenting complaint.

Rational use of injections is necessary to:

- Reduce the overall burden of injections
- Reduce the burden of unsafe injections
- Minimize the amount of infectious waste generated by considerable number of injections administered in the therapeutic sector

Conditions underlying irrational and rational use of injections

	Irrational		**Rational**
a	When no injection is indicated and there are other equally effective oral medications.	a	There is appropriate indication for Oral Medication
b	Incorrect route and dosage of medication for injection	b	There is an appropriate drug which must be given by injection
c	Failure to prescribe available safe and effective oral drugs	c	Suitable patient with no contraindications, minimal likelihood of adverse event and drug and route are acceptable by patient
d	Examples • Diarrhoea • Acute Respiratory Infections • Undiagnosed Fever • Uncomplicated cases of Malaria • Non Specific Complaints like General Weakness, Giddiness, Uneasiness, Anxiety	d	Patients are provided with relevant, accurate and clear information regarding the condition and the medication being prescribed
		e	Correct route of administration, dosage and dose schedule, and duration of treatment
		f	Appropriate and need based monitoring of anticipated and unanticipated effects of medication

Deciding when to prescribe injectable medication, and when not

	When to Inject		When Not to Inject
a	When the recommended medicines are not available in form of oral medication	a	For complicated common illnesses like cold, flu, loose motions, fever etc.
b	In cases when patient cannot take oral medications like recurrent vomiting, inability to swallow, or unconsciousness	b	For vague symptoms like weakness, giddiness etc.
c	In emergencies and complicated cases, such as severe pneumonia, infections after childbirth, gangrene, tetanus, poisonous snakebite, meningitis, severe allergic reactions, etc.	c	When equally effective and recommended medicines are available in oral preparation.
		d	When prescriber is not absolutely sure about the dosage and route of medication.

Perceptions leading to irrational use of injections in healthcare

It is a common perception in most communities that injectable medicines are more effective and provide quick cure and recovery. In some communities, family members specifically ask healthcare provider to give injection to their family members. Providers who deny giving injectable medicines are considered as unqualified and unexperienced. If the pressure from patients and relatives is resisted, about 70% of the injections could be avoided.[6]

A complex patient – physician dynamic leads to physicians prescribing injections to meet patient expectations rather than to satisfy clinical judgment. Some health care practitioners give unnecessary injections to make extra money and develop credibility among patients by providing quick relief. Many service providers believe that injections best satisfy patients, though patients are often open to other alternatives.

Injectable versus oral medications:

According to WHO guidelines - for most clinical conditions that need ambulatory care (OPD care) injectable drugs have no advantage over oral drugs. It is more dangerous to inject medicine than to take it by mouth. Injections should be used only when necessary.

Example: injectable penicillin and oral amoxicillin are equally effective in uncomplicated cases of pneumonia.

[6] National Centre for Disease Control, Handbook on Safe Injection Practices, 2014. Available at www.ncdc.gov.in/safe_inj_practice2014

Benefits of oral medication include reduction in:

- Risk of needle-borne infections
- Need for referral or admission
- Administration costs
- Financial burden on the family

On the other hand, injections may pose danger to patient as well as injection provider of acquiring blood borne infections, local injury or infection, and reaction. Injectable medications are costlier and result in additional expense by the patient, as well as the health system.

Remember:

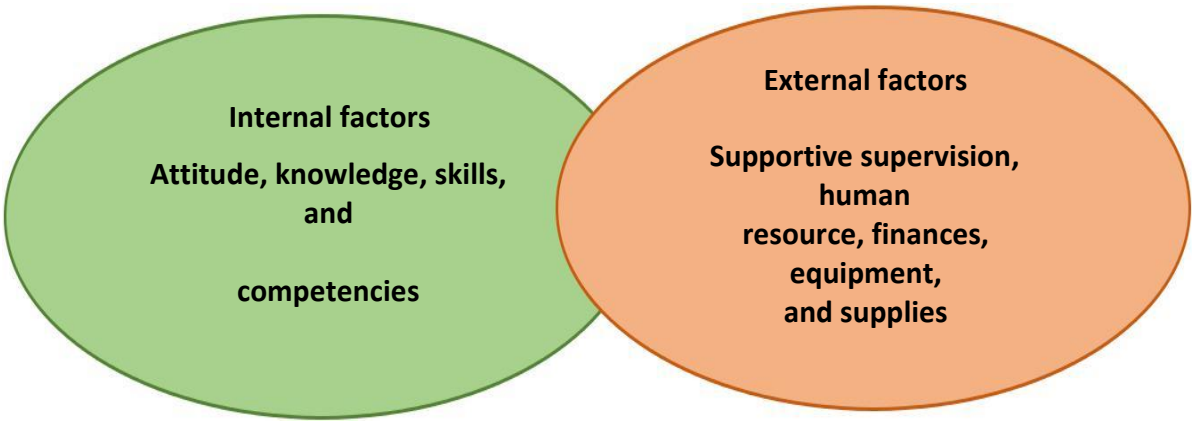
- Commonly used injectable antibiotics, analgesics and vitamins have equally effective and fast acting oral preparations as their injectable formulations and are much safer than being given as injections.
- Intravenous infusions should be limited to the emergency treatment of severe, life threatening conditions.
- Patients and family members/attendants must be informed about the potential dangers of unnecessary injections and reiterating the effectiveness as well as rapidity of action of oral drugs.

Table: Motivational and hindering factors for service provider to practice safe injection

Motivational factors	Hindering factors
○ Belief that by practicing safe injection they are protecting both patients and themselves from any potential harm. ○ Availability of correct equipment and supplies in adequate number ○ Availability of easy to follow, user-friendly guidelines specifying the correct procedures and steps ○ Availability of oral medication to implement the standard guidelines ○ Supportive work environment ○ Capacity building and on-the-job trainings ○ Incentives for following good practices	○ Unaware or having no knowledge regarding the correct practices ○ Do not believe that correct practices are important ○ Lack necessary supplies or have difficulty in obtaining equipment and supplies ○ Uncomfortable in doing new and different steps ○ Lack of knowledge and skill to perform the procedures

Stages of behaviour change:

1. People do not show any interest in changing a practice. This is because they are either uninformed or incorrectly informed about their wrong practice. There may be some people who have tried to change a wrong practice a number of times but failed due to one or the other reason.
2. People show some interest in changing a practice after they are informed correctly about the positive and negative effects of change.
3. People plan to initiate action for changing a wrong practice and adopt a correct one.
4. People make some changes in their wrong practices gradually.
5. People try to maintain correct practice.



Injection Safety

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Learning objectives:

1. What are safe and unsafe injections?
2. What are unsafe injection practices?
3. How to overcome unsafe injection practices?

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Injection safety, or safe injection practices, is a set of measures taken to perform injections in an optimally safe manner for patients, healthcare personnel, and others. Injection safety includes practices intended to prevent transmission of infectious diseases between one patient and another, or between a patient and healthcare provider, and to prevent harms such as needle-stick injuries.

Safe injection:

A safe injection is one that does not cause harm to anyone. This means that it:

- Does no cause any harm to the recipient (example, blood borne infection, or abscess)
- Does not expose health worker to any risk (example, needle stick injury)
- Does no harm to the community (example, unsafe disposal of waste)

Unsafe injection

Unsafe injection is giving an injection which may cause harm to patients, health care providers, community, or environment.

Unsafe injection practices include:

- **Re-use of injection equipment**: administering same injection to more than one patient, including reintroduction of injection equipment into multi-dose vials, re-use of syringe barrels or of the whole syringe, informal cleaning and other practices.

- **Accidental needle stick injuries to health care workers:** which occur while giving an injection or after the injection, while recapping contaminated needles, and handling infected sharps before and after disposal.

- **Overuse of injections**: when injectable preparations are unnecessarily prescribed for therapeutic purposes despite the availability of highly effective oral formulations, leading to inappropriate overuse of antibiotics, certain vitamins, and irrational second-line injectable treatment, etc.

- **Unsafe sharps waste management**: when sharp waste is inappropriately collected, and discarded putting the health care provider, waste handler and the community at

risk of sharps injuries and subsequent bloodborne infections. This includes incomplete incineration, disposal in open pits or dumping sites, leaving used injection equipment in hospital laundry and other practices that fail to contain infected sharps waste. In some cases, used injection equipment is removed from open waste pits by people who scavenge through waste and then wash, repackage and resell the equipment as new.

Needle stick injuries:

Needle stick injuries are one of the most common types of accidents that occur in health facilities every day, worldwide. These are percutaneous exposure by sharp object, (i.e., needle, blades, etc.) by a health worker. This accidental occurrence places the health worker and patients at risk of transmission of bloodborne pathogens, including HBV, HCV, and HIV.

Needle stick injuries are caused by poor handling of needles that have been contaminated, (i.e., any needle that have been used to treat one patient and comes in contact with open skin of another person). These generally occur while manipulating used sharps (recapping, bending, breaking, or cutting the needles), and while handling or disposing waste that contain needles and other sharps.

Another concern with needle stick injuries is that these are not reported, leading to the onset of severe infections due to delay in diagnosis and subsequent treatment. *(For SOPs of Needle stick injury management go to page 43, reporting form on page 56*). A study estimated that 36% of the sharp injuries among healthcare workers went underreported in a trauma centre.[7]

Risks associated with unsafe injection practices:

- **Immediate**
  - **Drug reaction:** Abnormal response of the body to a drug. The most life threatening is anaphylaxis, which is sudden collapse of the circulatory system due to immunological response to the injected drug.
- **Short term**
  - Abscess formation, skin rashes, irritation, pain, and disabilities
  - **Paralysis:** Injection of a drug into a nerve, which can lead to damage to the nerve. This can result in weakness of the limb supplied by the nerve

[7] N Rajkumari, BT Thanbuana, NV John, J Gunjiyal, P Mathur, MC Misra, A prospective look at the burden of sharps injuries and splashes among trauma health care workers in developing countries: True picture or tip of iceberg

- **Long term**
    - **Transmission of infections,** referred to as bloodborne infections (HBV, HCV, HIV)

Unsafe injection practices:

- **Reuse**
    - Using the same needle or syringe or both to administer medicine to more than one patient
    - Using cannula with a needle that has already been used for another patient
- **Unhygienic practices**
    - Injection giver not washing hands before administering injection
    - Injection site not cleaned with new sterile spirit swab
    - Touching the needle with fingers or with any other objects before and after giving injection
    - Putting open needle on table or any other surface
    - Flushing the needles and syringes before drawing medicine or administering injection
    - Administering injections over the clothes
    - Leaving the needle in cap of multi-dose vial
- **Wrong techniques**
    - Unnecessary prescription of injections
    - Overuse of therapeutic injections
    - Wrong selection of injection sites
    - Using medicines without checking labels or expiry dates
    - Using medicines packed as single dose or single use medication for more than once
    - Recapping the needles
- **Inappropriate waste management**
    - Not segregating injection related waste at the source of generation
    - Mixing of medical waste and sharps with other waste
    - Not cutting hub of the syringe immediately after administering each injection
    - No sharp storage containers available
    - No adequate sites for storage of injection related waste, especially sharps
    - No terminal disposal mechanism

Table: Potential sources of infection and stages of occurrence

Potential source of Infection or Exposure	Stage at which infection or Exposure may occur	Critical factors
Injection recipient		
Injection equipment	Storage	Duration and conditions of storage
	Handling	Handling of injection equipment
Injected medication	Before opening	Type of medication
	During opening	Checking the vial
	After opening	Swabbing the vial neck & stopper
		Breaking of vials and ampoules
		Handling of multi-dose vials
Skin of the recipient	Introduction of the needle	Site of injection administration
		Skin (site) preparation for injection
Environment	Injection preparation	Injection preparation areas
		Aseptic techniques
Hands of the provider	Injection preparation	Hand hygiene
	Injection administration	
Injection provider		
Needle stick injury	During injection administration	Positioning and restraint of patient
		Needle recapping
	Handling of injection equipment after use	Needle removing
		Needle cutting
	Collection of used equipment	Quality of sharps containers
		Improper disposal of sharps in open
	Sharps waste management	Removal of containers used to collect sharps
Community		
Needle stick injury	Sharps waste management	Improper disposal of sharps in open
		Storage of sharp collection containers
		Removal of containers used to collect sharps
		Terminal disposal of sharp waste

Ways to overcome unsafe injection practices

- Reduction of unnecessary injections
- Rational prescription of injections
- Availability of oral medications

- Training in injection safety practices
- Supportive supervision
- Availability of correct injection devices
- Proper disposal of sharp injection waste
- Behaviour change communication

Healthcare settings must ensure that an adequate supply of single use injection devices is available to allow providers to use a new device for each procedure.

Aseptic technique:

Aseptic technique refers to the manner of handling, preparing, and storing of medications and injection equipment/supplies (e.g., syringes, needles and IV tubing) to prevent microbial contamination.

Table: common myths regarding injection safety

Myth	Truth
Changing the needle makes a syringe safe for reuse.	Once they are used, both the needle and syringe are contaminated and must be discarded. A new sterile needle and a new sterile syringe should be used for each injection and for drawing medicine from vial every time.
Syringes can be reused if an injection is administered through IV tubing	Syringes and needles should never be reused. The IV tubing, syringe, and other components represent a single, interconnected unit. Distance from the patient, gravity, or infusion pressure do not ensure that tiny amounts of blood won't contaminate the syringe once it has been connected to the unit.
If you don't see blood in the IV tubing or syringe, it means that those supplies are safe for reuse.	Bloodborne pathogens, like bacteria and virus are invisible to the naked eye, but can easily infect patients even when present in microscopic quantities. Do not reuse syringes, needles, or IV tubing.

INJECTION SAFETY IS EVERY PROVIDER'S RESPONSIBILITY

SAFE INJECTION PRACTICES CANNOT BE SACRIFICED FOR SAVING TIME AND MONEY

The most important infection control measure for preventing infection among injection recipients is the use of a new, sterile, single-use syringe and needle for each injection.

10 best practices for injection safety

Use single-use, sterile syringe and needle for each injection
Use safety engineered injection devices for all injections
Maintain hand hygiene all the time
Use gloves, wherever indicated
Prevent contamination of injection equipment as well as medicine
Swab top of vials using sterile spirit swab
Ensure skin integrity of the provider
Prevent injection provider from needle stick injuries
Prepare injection site correctly and adequately
Prevent reuse of syringe and needles by correctly disposing used equipment

Safety engineered injection devices

Injections are invasive procedures and are administered in high frequency, therefore, meeting minimum safety standards is imperative as a means of protecting against the avoidable transmission of disease or injuries. Two types of safety engineered injection devices, viz. AD and RUP syringes are being introduced in our country. The details of these two types of syringes are as follows:

1. Auto Disable (AD) syringes for immunization

These are sterile, hypodermic, single use syringes. These syringes are used in Universal Immunization Programme across all states of the country since 2005. Since these syringes only allow a fixed dose (maximum 0.5 ml) to be withdrawn therefore they are not suitable for use in therapeutic sector.

In these type of syringes, once the plunger is pushed past the point of the safety mechanism, it cannot be pulled backwards which prevents refilling and re-use of the syringe. Weak spots in the plunger may also cause it to break if the user attempts to pull it back a second time.

2. Re Use Prevention (RUP) syringes for therapeutic injections

These are sterile, hypodermic, single use syringes.

These syringes are like AD syringes but have feature to withdraw variable doses, which makes to useful in therapeutic sector.

Once the plunger is pushed past the point of the safety mechanism, it cannot be pulled backwards which prevents refilling and re-use of the syringe. Some models of RUP syringes also have a weak spot in the plunger that causes it to break if the user attempts to pull back on the plunger after the injection.

In India, these syringes are recommended for use in both government and private therapeutic sector.

There are three other types of safety engineered injection devices available in the commercial market. However, these are not planned to be introduced in India in recent future. Salient features of other types of safety engineered devices are as follows:

A. Syringes with sharps injury protection (SIP) feature combined with RUP feature

Single-use, hypodermic syringes with needles used for blood sampling and for catheters.

These syringes have a mechanism that covers the needle after the injection is given. The purpose is to prevent exposure to needle-stick injuries, especially to healthcare workers, but also to those who handle sharps waste.

B. Manual retractable syringes with active safety feature

These are single-use, hypodermic syringes with both SIP and RUP features

These are a type of SIP syringes, which include syringes with a feature that draws the needle up into the syringe barrel. In the manual retractable models, the injection provider must activate the safety feature, which is to pull the plunger backwards until the needle has retracted into the barrel.

C. Automatic retractable syringes with passive safety feature

These are single-use, hypodermic syringes with both SIP and RUP features

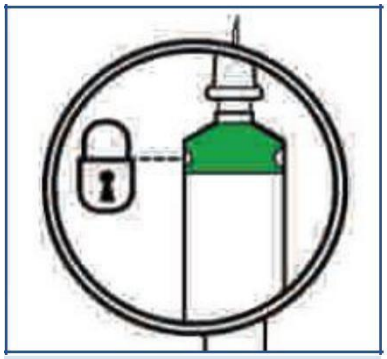
These are a type of SIP syringes, which include automatic retractable models. These are essentially similar to the manual version, but they include a device, such as a spring, that automatically pulls the needle into the plunger once the plunger hits the bottom of the barrel.

In addition to these, there are prefilled injection devices having pre-filled medicines in the exact dose as required to be given to a patient. After administration, these devices get locked. These syringes are also effective in reducing the time taken in an injection procedure. Vacutainers or vacuum based devices for drawing blood are used for collecting blood directly in small tubes as per the need for a particular investigation.

Features of Re Use Prevention (RUP) syringes

RUP syringes are functionally like AD syringes, in that the syringe gets locked once the plunger is pushed forward. However, RUP syringes are more suited for therapeutic use as it has feature to withdraw variable doses of medicine as per the requirement.

Some models of RUP syringes are even better as they have an additional feature of a weak spot in the plunger that causes it to break if the user attempts to pull back on the plunger after the injection. Because of this injection giver should take care not to push the plunger rod forward before use – pushing plunger may automatically lock the syringe

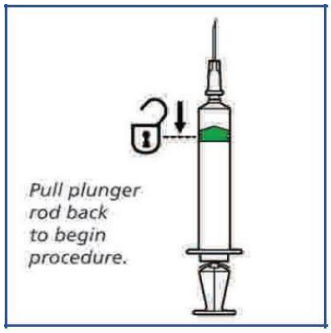


RUP gets locked after use

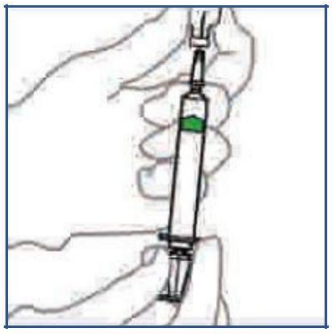
Plunger breaks after use

Use carefully

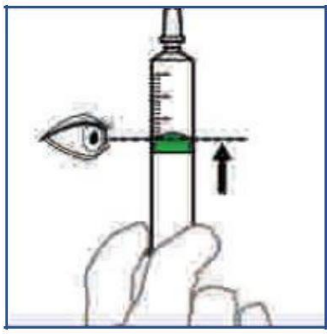
Steps in using RUP syringes:



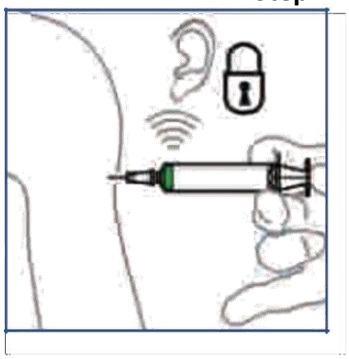
Step 1. Begin



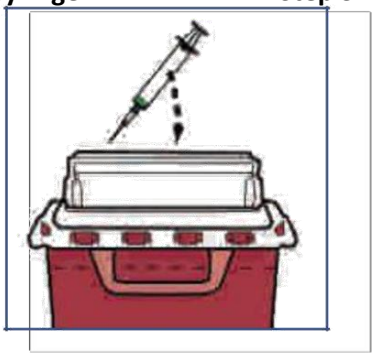
Step 2. Fill syringe



Step 3. Check bubbles



Step 4. Inject



Step 5. Discard

Remember:

RUP syringes have been specially designed for ensuring safety of health care workers as well as the clients in the therapeutic sector. They are not designed as multipurpose injection equipment therefore take care of following points while using RUP syringes.

- Do not re-sterilize
- Do not use for blood collection
- Do not use in syringe pumps
- Do not recap
- Do not reuse

Initiatives taken by Government of India to improve injection safety and sharps waste management:

1. Implementation of Bio Medical Waste Management and Handling rules under the Environment Protection Act, 1986. The rules were later amended in 2003, 2011, and most recently in 2016.
2. Introduction of Auto Disabled Syringes in 2005 across all states under the Universal Immunization Programme (UIP)
3. Launch of Safe Injection Environment (SIE) in 2012 by the Indian Academy of Paediatrics in association with BD India.
4. National AIDS Control Support Project (NACP), Phase III, has implemented a component for infection control and waste management. Project focuses on the development of guidelines and training manuals on infection control and waste management, conduct training of various categories of medical and other technical professionals.
5. National Centre for Disease Control in 2014 published a handbook on safe injection practices to prevent transmission of blood borne infections.
6. Indian Council of Medical Research (ICMR) included the basic principles of infection control, role of health care workers, and bio-waste management as a part of the new set of Infection Control Guidelines.

Safe Injection Techniques

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Learning objectives:

1. What are the various steps involved in giving safe injection?
2. What are the correct techniques for each step of giving injection?

……

Injection safety, or safe injection practices, are a set of measures taken to administer injections in an optimally safe manner for patients, healthcare workers, bio-medical waste handlers, professionals involved in handling the waste outside the health facilities, rag pickers, and general community. Safe injection practices include practices intended to prevent transmission of infectious diseases between one patient and another, or between patient and healthcare provider, and also to prevent harms such as needle stick injuries.

Five C's for Injection Safety

Correct Indication
Correct Medicine
Correct Provider
Correct Recipient
Correct Technique

Steps involved in giving safe injection are as follows:

1. Preparing to give injection
2. Drawing up the medication
3. Giving the injection
4. Safe disposal of syringes and needles

1. Preparing to give injection

1.1 Assembling the equipment

Before giving injection ensure availability of following items:

- **Injection equipment (syringe, needle, catheter, etc.)**
    - Appropriate size of syringe and needle is necessary for giving injections correctly and to minimize the pain.

- The ideal needle size (gauge) for intramuscular injection is 23g or 24g and for subcutaneous and intradermal injections is 25g or 26g.
- Other recommended gauge of needles for different conditions are as follows:
  - 24-26g for infants and children
  - 22-24g for adults and elderly
  - 20-24g for surgical patients
  - 18g when rapid blood administration is required
  - 16g for trauma patients and those requiring large volume of fluid rapidly
- The catheter should be small in diameter so that it takes less space in vein. This reduces the risk of phlebitis as it reduces the mechanical and chemical irritation to the vein wall.

- **Spirit or alcohol swabs**
  - Swabs are required to clean the injection site before administering injection.
  - In case spirit or alcohol swabs are not available, then swabs boiled in water or swabs soaked in clean water may be used.
  - One swab should be used for cleaning skin only once. It should not be reused even if another injection is to be given to same patient.

  Note: Spirit or alcohol swabs or any other medicine should not be used to clean the site before giving vaccines.

- **Medicine vial or ampoule**
  - It is better to use single-dose vials rather than multi-dose vials, depending on the availability of formulation.
  - Some medicines require reconstitution with a specified diluent. Always use only the correct quantity of recommended diluent provided by the manufacturer for reconstitution.

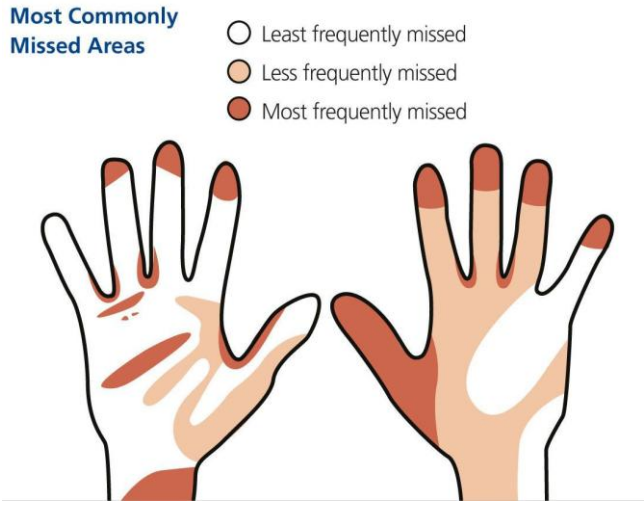
- **Sterile gauze pieces,** for opening the single dose ampoules of medicines and diluents.

- **Hub cutter**
  - This is used to cut the hub of syringe immediately after use. Cutting the hub has two benefits – first, it prevents the reuse of syringe; and secondly, the sharp needle gets contained in puncture proof box and thus prevents injury to patient or injection giver.

- This ensures segregation of sharp and plastic waste at the point of waste generation, each having different recommended disposal guidelines.
- Needle cutters leave a sharp edge of the needle which can cause injury and transmit infection to service provider or recipient.
- Electrical needle destroyers produce aerosols when syringe is exposed to elevated temperature. This aerosol can be infectious if inhaled by the service provider.

- **Container for storing used syringes (or waste segregation bags)**
  - The syringe after cutting from the hub should be disposed in safely in a container (bin or safety box, as applicable) immediately after use.

1.2 Wash hands



Body secretions contain potentially harmful and infection causing pathogens, and any contact with these is likely to contaminate hands or body surface. This carries risk of transmitting infection for the injection giver, as well as the patient.

Ideally, injection giver should wear new disposable gloves before giving an injection. However, many times it is not possible due to logistical constraints. Injection giver should ensure that hands are thoroughly washed, with soap, in running water, before giving the first injection, whenever comes in contact with dirt or blood or any other body fluid, and after giving all injections.

Effective hand washing technique involves three stages – preparation, washing, and rinsing and drying. Running water source should be used to wash hands.

When hands are visibly dirty or contaminated, wash them with anti bacterial or plain soap and running water, then dry them using single use paper towels. Do not use alcohol based hand products when hands are visibly soiled. Also, do not use alcohol based hand products after exposure of non-intact skin to blood or body fluids. In such cases hands should be washed with soap as specified above.

WHO has prescribed guidelines on how to wash hands to ensure that all parts of palm and fingers are cleaned, and no area is missed.

Figure: WHO guidelines for washing hands

2. Drawing up the medication

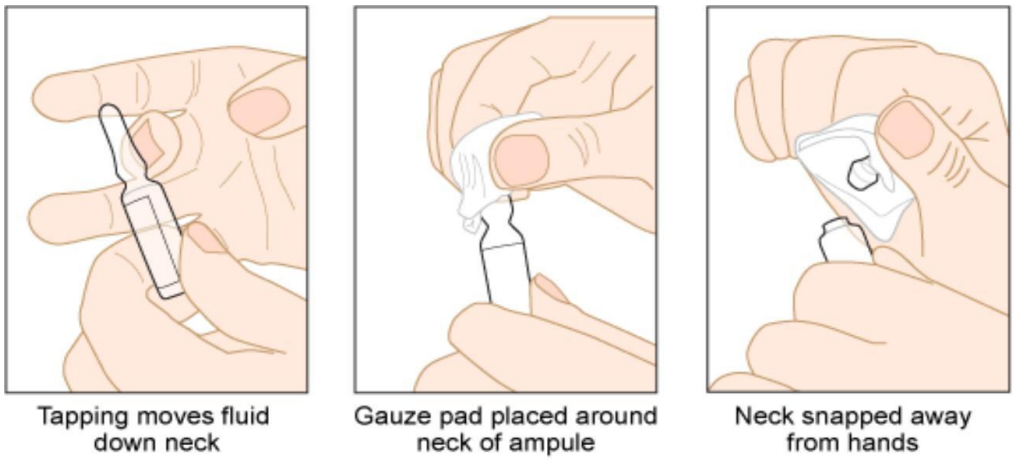
2.1 Check the medication

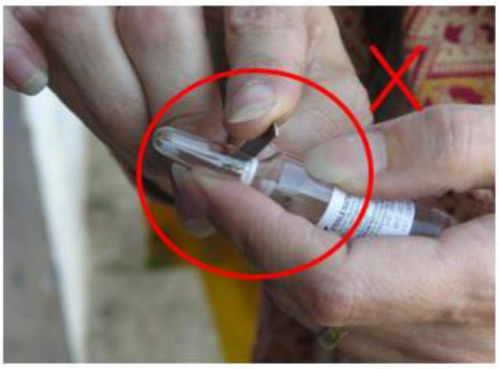
- Check if the medicine is correct and as prescribed by the physician. Always ensure that the right patient receives the right medication.
- Carefully check the expiry date on medicine vials (multiple dose) or ampoules (single dose) before drawing it in the syringe.
- Discard immediately if the medicine vial or ampoule has crossed the expiry date, or if it does not have readable label, or is cracked, or have signs of contamination (e.g. flakes or precipitate).

2.2 Breaking the ampoule

- Tap upper part of the ampoule lightly to move any liquid down. Wrap a gauze pad around neck of the ampoule and flick open the ampoule away from your body.

Figure: Steps in breaking the ampoule





- Apply pressure at any point above the ring on the thicker part of the neck in backward direction. Do not hold top too near to the ring and be careful of the glass during breaking.
- Now, pop open single dose ampoules are available, which do not require use of metal file to open.
- Never use steel blade to cut the neck or smash neck/top of the ampoule with any other solid object. These practices have a potential danger of scattering glass shreds inside the ampoule and outside on the floor/table or injection couch.
- For opening the multi dose vial remove the metal or plastic cap protecting the rubber cap of vial. Do not remove rubber cap of the vial as it may contaminate the medicine.

2.3 Check the syringe

- Check packaging of syringe and needle for expiry date or any breaches in the packaging.
- Discard the syringe if the packaging is punctured, torn, exposed to moisture, damaged; or if it has crossed the expiry date.
- Open the syringe pack from plunger side by pulling apart two ends of paper or plastic wrapper.

- Pull out syringe from the pack by holding the plunger. hold the syringe barrel between thumb, index, and middle fingers after taking it out from the pack.
- If needle is supplied separately from the syringe, then open both from their respective packs and fix the needle securely to the syringe. Take care not to uncap the needle and touch it while fixing it.

2.4 Drawing the medicine

For multi-dose vial

- Clean the rubber stopper of medicine vial with a spirit swab[1] Don't use this or another swab to clean needle as it is pre-sterilized, and there is no need to make it sterile.

- With non-dominant hand hold the medicine vial in an upright position and push the needle at 90-degree angle into the vial through the rubber cap.
- Before pulling the plunger back to withdraw medicine make sure that tip of needle is completely covered with medicine or it is below the level of medicine. This will avoid drawing air in the syringe.

For single dose ampoule:

- With non-dominant hand hold the medicine vial and insert the needle into the ampoule.
- Before withdrawing medicine make sure that tip of needle is immersed into the medicine or it is below the level of medicine. This will avoid drawing air in the syringe.
- Pull back the plunger to fill medicine in required quantity.
- **Note: Never inject air into the vial while using RUP or AD syringes, as these syringes have been designed for only one time use of the plunger.**
- After withdrawing the needle from the ampoule, hold it upright and flick the syringe with your fingertips to see if there are any bubbles in the medication. If

[1] 70% alcohol (isopropyl alcohol or ethanol)

there are any, flicking will bring them to the surface. Gradually push the air out from the syringe making sure that desired amount of medicine remains inside.

Precautions while and after withdrawing the medicine:

- Prepare injections in a clean designated area, where the risk of contamination by blood or body fluids is low.
- Always use new sterile needle to draw medicine from a vial or ampoule.
- Ensure that while preparing and before administering the injection the needle does not touch any dirty surface or any other object. Do not even keep it on tray.

- Never clean the needle with swab or finger.
- Never leave a needle in place in the rubber stopper of the multi-dose vials.

  Needles left in the septum of multi-dose vials might encourage the use of the same syringe to repeatedly draw medications for one patient, a practice that may lead to vial contamination and infections among subsequent patient.

- Never touch the needle before or while preparing the injection, or after administering the medicine.
- Never recap the used needles or place used syringes and needles in open.

- Never use a single loaded syringe to administer medicine to several patients
- Never change the needle to reuse the same syringe
- Never use the same mixing syringe to reconstitute several vials
- Never combine left-over medicines for using it later
- Never store multi-dose vials in the open ward, where there are chances of contamination
- Never use bags or bottles of intravenous solution as a common source of supply for multiple patients.

3. Giving the injection

Injections are given through a wide variety of routes, like intradermal (ID), subcutaneous (SC), intramuscular (IM) and intravenous (IV). The injection sites also vary according to the type of route for administering medicines. Intramuscular and intravenous are more common routes for administering medicines in the therapeutic sector; while intradermal and subcutaneous injection are more commonly administered for giving vaccines.

Intradermal injection provides local effect, and this route is also typically used for diagnostic purposes like testing for allergens, tuberculin (Mantoux's test).

Subcutaneous route is preferred for giving insulin. Other medications given using this route include epinephrine, heparin and growth hormone.

The basic principles for selecting an injection site are as follows:

- The site should be easily accessible for administering injection by the desired route.
- The site should have least likelihood of accidental injury to adjoining structures like nerves or blood vessels.
- Medicine could be well absorbed into the blood circulation.

Irrespective of the route of injection, it is important to examine the local skin for any signs of inflammation, swelling, infection or other skin lesions. Injections should not be administered at such sites.

Always use new, single-use, sterile syringe and needle for

each injection. Observe for 30 minutes after giving injection

injection givers should trim their nails before giving injection.

Preparing the skin:

For therapeutic injections, it is essential to clean the site selected by fresh spirit swab before administering the injection. This is necessary to reduce bacteria present on the skin at the injection site.[2]

Spirit swabs are generally preferred for cleaning the injection site. However, boiled swabs/swabs soaked in clean water can also be used in cases when spirit swabs are not available.

Clean the skin in a circular motion starting from the centre of the site moving outward from the injection site.

Spirit or alcohol swabs are not to be used to clean site while giving vaccines. However, if skin is unclean, a sterile swab dipped in fresh potable water can be used.

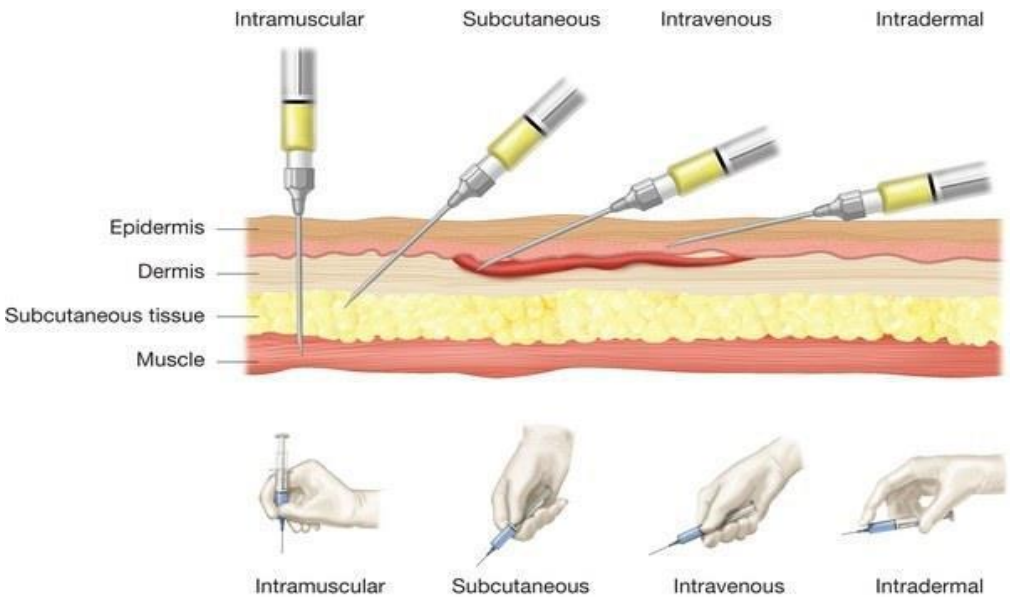
Allow 30 seconds for the spirit to dry. This is necessary for the alcohol to have its effect on the bacteria. Use new spirit swab for cleaning the skin before each injection.

Details about the various injection routes and procedures done in the therapeutic sector:

A. Intramuscular injection:

- This route is adopted to administer medicine into the muscle mass from where it gets absorbed rapidly into the blood capillaries and have systemic action.
- Relatively large doses of medication (up to 5 ml) and irritation producing drugs (like Iron and oily preparations) can be administered by this route.
- These injections are given by keeping 90-degree angle of the needle with skin.
- Common sites for these injections are:
    - Arm, on the deltoid muscle
    - Buttocks, on the outer upper quadrant of gluteus maximus muscle
    - Anterolateral aspect of mid-thigh, in the vastus lateralis and rectus femoris muscles. This route is most commonly adopted for children as they have more muscle mass on mid-thigh.
- For giving an intramuscular injection hold the syringe like a pencil in one hand.
- With the thumb and index finger of the non-dominant hand (left hand for right handed persons) stretch the skin at the injection site
- Thrust the needle through the skin into the underlying muscle at a 90-degree angle to ensure that the needle reaches the muscle. In case of older and very thin patients it is necessary to 'bunch up' the muscle before the injection is given

Figure: Routes, angle and technique for administering injections



- Release the skin held with the non-dominant hand and hold the base of the syringe to stabilize it.
- If the blood appears then withdraw the needle, discard the syringe and prepare for a fresh injection.
- Inject the medication slowly taking about 10 seconds for every ml of the medicine to be injected. This is necessary to allow the medicine to be absorbed by the muscle.
- Withdraw the needle and press the site with the spirit/boiled swab/swab soaked in clean water gently for about a minute.
- Don't rub the injection site as it may lead the drug to leak from the injection site and irritate local tissue.

B. Subcutaneous injection:

- All the sites specified for intramuscular injections can also be used for giving subcutaneous injections. In addition, subcutaneous injections are frequently given over abdomen. The area is about 5 cm around the navel. Care must be taken not to inject in the area immediately around the navel (in a radius of 1cm around the navel).
- Subcutaneous injections are administered in the fatty tissue beneath the skin. Since there is little blood flow to the fatty tissue, this route is used for a slow, sustained absorption of medication.
- Before administering injection, using non-dominant hand pinch the skin between the thumb and index finger to separate it from the underlying muscle tissue.
- Needle is then inserted into the raised fold of skin at an angle of 90-degree if using a 26g needle. However, for small children and persons with thin skin, the needle should be inserted at an angle of 45-degree when using a larger needle. This is to ensure that medicine is not to injected accidentally into the underlying muscle.
- Skin fold between the thumb and index finger is released once the needle is inserted completely.
- Inject the medication slowly taking 5-10 seconds for injecting the entire amount.
- Withdraw the needle and press the site with the spirit/boiled swab and press gently for about a minute.
- Do not rub or massage the injection site.

C. Intradermal injection:

- Before administering injection, pull skin taut over the injection site using non-dominant hand.
- Place the needle almost flat against the patient's skin, at an angle of 10 to 15-degrees, bevel side up.
- Insert the needle just under the epidermis so that the point of the needle can be seen through the skin—only about 2 to 3 mm.

- Slowly inject agent the desired dose while watching for a small wheal or blister to appear. If none appears, withdraw the needle slightly.
- Withdraw the needle at the same angle it was inserted.
- Do not massage the area after removing the needle.

D. Intravenous injection or Venepuncture:

Venepuncture is a frequently done procedure in the therapeutic setting and are used for giving intravenous injections, drips and for drawing blood for diagnostic purposes. Procedure used for withdrawing a specific amount of blood from a vein is also known as **Phlebotomy**.

Since this procedure involves direct contact of the needle with the blood stream, therefore, this should be done with extreme care. An unsafe needle may transmit infection to the blood stream directly leading to dire consequences.

The process for venepuncture is essentially same as that for an intramuscular injection in terms of cleaning the skin, and handling of the syringe/needle, however, following points must be observed while performing a venepuncture or giving an intravenous injection.

- Always wear a sterile glove before performing a venepuncture.
- Use a tourniquet on the mid-arm to increase pressure in the brachial vein (in the elbow regions) and make it more prominent. Veins on the back of the hands can also be used.
- Skin at the injection site should be meticulously cleaned using a spirit swab.
- Hold the syringe at an angle of 10-15 degrees, and push the needle gently, but firmly into the vein, ensuring that the bevel of the needle is facing up.

- Be careful not to push more than 1 cm inside the vein.
- Draw the plunger of the syringe to see if the needle is inside the vein. If the blood flows easily into the syringe that indicates that the needle is inside the vein.
- If medicine is to be injected, first release the tourniquet and then inject the medicine into the vein.
- If blood is to be withdrawn for diagnostic purposes, then first withdraw the plunger to the level till the required amount of blood is withdrawn
- After the required amount is withdrawn, ease the tourniquet.
- Withdraw the syringe and needle.
- Press the site of the puncture firmly with a spirit swab.
- Don't rub the site of puncture.
- Keep the swab pressed till the blood stops oozing out, this usually takes about 1-2 minutes.

If swelling occurs at local site while injecting or blood does not flow freely while withdrawing, interrupt the procedure, withdraw the needle and restart the procedure at another site (use fresh needle and syringe every time).

Handling and Disposal of Injection Related Waste

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Learning objectives:

1. What are the various types of injection related waste?
2. How to segregate various types of waste at the point of generation?
3. How injection waste is disposed?
4. How to prevent needle stick injuries

……

Incorrect handling, management and disposal of waste generated during injection activities such as sharps and infectious waste can have a harmful impact, either directly or indirectly, on the injection providers, other healthcare staff, waste handlers, as well as on the community and environment. Healthcare workers as well as general community are always at risk of infection due to accidental needle stick injuries[10] if sharps are not appropriately contained.

Bio medical waste

Any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals or research activities or in the production or testing of biologicals or in the health camps. It is a form of infectious waste and can cause potentially life-threatening illnesses if any person gets inadvertently exposed to untreated waste

According to updated Bio-Medical Waste (Management and Handling) Rules of Government of India, revised in 2016[11], biomedical waste has been divided into 4 categories. The Schedule 1 of this notification defines these four categories and type of waste to be included in each of them.

Injection related waste

Any waste that is generated during preparation of injection (opening syringe, preparing site, drawing medication), actual administration of injection, and till used syringe is discarded is known as injection related waste.

This waste is also biomedical waste but is separately categorized because guidelines for management and disposal of this kind of waste are different. There are three types of injection related waste, viz. used sharps, contaminated waste, and the general waste.

10 A penetrating stab wound caused by a needle. It can cause the transmission of blood-borne pathogens.

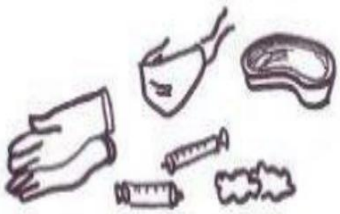
11 Notification, Government of India, Ministry of Environment, Forest, and Climate Change, New Delhi, 28th March 2016, Published in the Gazette of India, Extraordinary, Part II, Section 3, Sub Section (i)

Table: Categories and types of biomedical waste	
Categories	**Types of waste**
Yellow	a. Human anatomical waste b. Animal anatomical waste c. Soiled waste d. Expired or discarded medicines e. Chemical waste f. Chemical liquid waste g. Discarded linen, beddings etc. contaminated with blood or body fluid h. Microbiology, biotechnology and clinical laboratory waste
Red	Contaminated waste which is a. recyclable Example; disposable items, tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles and fixed needle syringes) and gloves.
White **(Translucent)**	**a. Waste sharps including metals** Example; needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts. This includes both used, discarded and contaminated metal sharps
Blue	a. Glassware b. Metallic body implant

Correct management of injection waste:

Management of injection waste comprise of various steps starting from use of injection (syringe and needle) till its terminal disposal. This includes generation, correct handling, segregation, collection, storage, packaging, loading, treatment, transportation, unloading, processing and final destruction or disposal.

Correct management of injection waste as per revised national guidelines includes all steps required to ensure that the waste is managed in such a manner as to protect health and environment against any adverse effects due to handling of such waste.

Table: Types of injection related waste generated during preparation and administration of injections		
Used sharps	**Contaminated waste**	**General waste**
		
Needles, Lancets, scalpels, blade Cut hub of AD and disposable syringes Broken glass (vials and ampoules	Syringes without needles (plastic part) Gauze, dressing, swabs Empty unbroken vials Gloves, gowns, masks, medical supplies Containers for storing	Packaging, needle caps, wrappers Boxes, papers, disposable cups Tissues, paper towels

The principles of correct management of injection waste includes:

1. Segregation at source
2. Collection and safe storage
3. Transportation
4. Treatment and disposal

Salient features of revised biomedical waste management rules of 2016 vis a vis 2008:

- The ambit of the rules has been expanded to include vaccination camps, blood donation camps, surgical camps or any other healthcare activity.
- Phase out use of chlorinated plastic bags, gloves and blood bags within two years from the date of notification of these rules.
- Health facilities to provide training to all its health care workers and others involved in handling of bio medical waste at the time of induction and thereafter at least once every year.
- Immunization of all its health care workers and others involved in handling of bio-medical waste for protection against diseases including Hepatitis B and Tetanus

- Bio-medical waste has been classified in to 4 categories instead of 10 to improve the segregation of waste at source. These are yellow, red, white and blue categories.
- Revised rule specifies disposal of recyclable waste (all plastics) in red coloured bag or container; instead of microbiological waste as mentioned in earlier version.
- Sharp waste, excluding broken glass is to be segregated in while translucent container. Now as per revised rules there is no need of adding hypochlorite solution to this waste.
- All waste glassware (broken as well as unbroken) are now to be segregated and stored in a cardboard box with blue marking.

Remember:

- The bio-medical waste is to be segregated into containers or bags at the point of generation in accordance with Schedule I prior to its storage, transportation, treatment and disposal.
- Sodium hypochlorite treatment refers to chemical treatment using at least 10% sodium hypochlorite having 30% residual chlorine for twenty minutes.
- Syringes are to be either mutilated or needles should be cut and or stored in tamper proof, leak proof and puncture proof containers for sharps storage.
- Waste sharps are to be treated by dry heat sterilization at a temperature not less than 185-degree C, at least for a period of 150 minutes in each cycle.

Incorrect practices for injection waste and sharps handling and disposal:

1. Never recap a needle, as it may cause needle stick injury.

2. Never store injection waste in normal puncturable bags

3. Needle burners, used to blunt the needles cause fumes, and produce aerosol of blood and medicine which may s pread infections. They are not recommended for use.

4. Don’t throw injection waste in open

5. Never burn injection waste

6. Never throw injection waste in open

Table: National guidelines for segregation, collection, treatment, processing and disposal of injection waste and sharps

Category	Type of waste	Type of bag or Container to be used	Treatment and disposal
Yellow	Soiled waste: Cotton swabs contaminated with blood or body fluids	Yellow coloured non-chlorinated plastic bags	Incineration, plasma pyrolysis or deep burial
Red	Contaminated waste: Syringes (without needles and fixed needle syringes) · Vaccutainers with their needles cut Intravenous tubes and sets, Gloves	Red coloured non-chlorinated plastic bags or containers	Autoclaving or microwaving/ hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent to registered or authorized recyclers Plastic waste should not be sent to landfill sites.
White (translucent)	Waste sharps including metals: Needles, syringes with fixed needles, needles from needle tip cutter or burner Scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts. This includes both used, discarded and · contaminated metal sharps	Puncture proof, Leak proof, tamper proof containers	Autoclaving or Dry Heat Sterilization followed by shredding or mutilation or encapsulation in metal container or cement concrete; Combination of shredding cum autoclaving; and sent for final disposal to iron foundries (having consent to operate from the State Pollution Control Boards or Committees) Sanitary landfill or designated concrete waste Sharp pit
Blue	Glassware: · Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes.	Blue Boxes	Disinfection (by soaking the washed glass waste after cleaning with detergent and Sodium Hypochlorite treatment) Or through autoclaving or microwaving or hydroclaving and then sent for recycling.

Sharps Injury/Accidental Needle Stick Injuries Exposure Management
Standard Operating Procedures (1st Edition)

Dr R K Dhiman
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1.0. Definitions

1.1. Needle stick Injury: The accidental puncture of the skin by a needle during any medical intervention.

1.2. Sharps: Objects or devices with sharp points, protuberances or cutting edges that are capable of cutting or piercing the skin.

1.3. Sharps injuries: A worker in healthcare settings is injured by a needle or other sharp instruments, which penetrates the skin and is contaminated with potentially infected blood.

1.4. Exposure: An event which may place a health care professional at risk of blood-borne infection is defined as: a percutaneous injury (e.g. needle-stick or cut with a sharp instrument), contact with the mucous membranes of the eye or mouth, contact with non-intact skin (particularly when the exposed skin is chapped, abraded, or afflicted with dermatitis), or contact with intact skin when the duration of contact is prolonged (e.g. several minutes or more) with blood or other potentially infectious body fluid.

2.0. Overview of Protocol for Management of Needle-Stick Injury

In case of Needle Stick Injury/ Splash

Don't

- Do not panic.
- Do not put pricked finger in mouth.
- Do not squeeze wound to bleed it.
- Do not use bleach, chlorine, alcohol, betadine, iodine or any antiseptic or detergent antiseptic or detergent.

Remember: Risk of HIV transmission through -

- **Needle Stick Injury in 0.3%**
- **Splash of fluids to mucous membranes, eyes, oro-nasal mucosa is 0.09%**

Take Following Actions:

1. **First Aid Measures**

   a. **Immediate For skin (If the skin is broken after a needle stick or sharp instrument):**

      i. For Injury: Wash with soap and running water. Do not scrub or use antiseptics or skin scrub (bleach, chlorine, alcohol, betadine, etc.)

      ii. For Non-intact Skin Exposure: Wash with soap and water

   b. **1.2 After a splash of blood or body fluids on unbroken skin:**

      Wash the area immediately. Do not use antiseptics.

   c. **1.3 For the eye**

      - Irrigate exposed eye immediately with water or normal saline. Sit in a chair, tilt head back and ask a colleague to gently pour water or normal saline over the eye.
      - *If wearing contact lens, leave them in place while irrigating*, as they form a barrier over the eye and will help protect it. Once the eye is cleaned, remove the contact lens and clean them in the normal manner. This will make them safe to wear again
      - Do not use soap or disinfectant on the eye.

d. 1.4 For mouth

- Spit fluid out immediately
- Rinse the mouth thoroughly, using water or saline and spit again. Repeat this process several times
- Do not use soap or disinfectant in the mouth

2. Get the Following Information

What is the HIV status of the source - Person to whom you were injecting/ drawing blood from/ or person on whom that needle or cannula etc. was used.

Encircle your options from the following:

a) HIV status of source is unknown
b) Source is HIV Negative
c) Source is HIV positive and not on ART
d) Source is HIV positive and on ART. Find out what ART he/she is taking and since long.

3. Report to Designated Medical Officer with Above Information

All sharps injury and mucosal exposure needs to be reported to the supervisor and to the Officer in charge to evaluate the injury. Details of the needle-stick injury should be noted by the concerned supervisor and handed over to the in charge of needle stick injuries dedicated to the hospital.

4. In case you are expecting anticipating delay

Take first dose of ART immediately (It is most effective to take with 2 hours. However, it can be taken up to 72 hours).

5. Medical officer will assess the severity of injury, assess the risk of exposure to HIV and then administer appropriate PEP for HIV to you.

Broad Guidelines for PEP for HIV

a) Mild injury/exposure will not require PEP if source is HIV negative. However, if source is HIV positive, then PEP is recommended.

b) Moderate to Severe injury/exposure will require PEP irrespective of HIV status of source: Positive, Negative or Unknown.

c) Even if source is on ART, first dose of ART is given. Expert opinion is sought for further management.

d) All cases will need assessment for managing possible exposure to Hepatitis B and/or C

Management for possible Exposure to Hepatitis B

All health staff must be vaccinated against hepatitis B. The vaccination for hepatitis B consists of 3 doses: initial (0 month), 1 month and at 6 months. The dose is 20 mcg/ intramuscular in the deltoid for age 10 years or above and half dose for age below 10-years. Sero-conversion after completing the full course is 97%-99%.

ALL unvaccinated or unclear vaccination status persons exposed to HBsAg positive source require HBIG also along with complete hepatitis B vaccine series. **When indicated immunoprophylaxis should be initiated as soon as possible, preferably within 12-24 hours.**

Exposure	**Treatment**	
	Unvaccinated /Unclear Vaccination	**Vaccinated**[1]
HBsAg Positive Source		
Percutaneous or mucosal exposure to blood or body fluids	Administer HBV vaccine and HBIG[2]	HBV vaccine booster
Sex or needle sharing	-do-	-do-
Victim of sexual abuse by HBsAg Positive	-do-	-do-
HBsAg Source Unknown		
Percutaneous or mucosal exposure to blood or body fluids	HBV vaccination	No treatment
Sex or needle sharing	-do-	-do-
Victim of sexual abuse by HbsAg Positive	-do-	-do-

[1]A person who has a written documentation of a complete hepatitis B vaccine series and who did not receive post vaccination testing. [2]HBIG dose is 13-15 IU/Kg body weight.

Studies are limited on the maximum interval after exposure during which post-exposure prophylaxis is effective, but the interval is unlikely to exceed 7 days for percutaneous

exposures or 14 days for sexual exposures. The hepatitis B vaccine series should be completed.

A person who is in the process of being vaccinated but who has not completed the vaccine series should complete the series and receive treatment as indicated.

Determination of HBIG (Immunoglobulin)

For percutaneous (needle stick), ocular, or mucous-membrane exposure to blood known to contain HBsAg and for human bites from HBsAg carriers that penetrate the skin, a single dose of HBIG (0.06 ml/kg or 5.0 ml for adults or 13-15 IU/Kg body weight) should be given as soon as possible after exposure and within 12-24 hours if possible. HBV vaccine 1 ml (20 mcg) should be given IM at a separate site as soon as possible, but within 7 days of exposure, with the second and third doses given after one month and 6 month, respectively. If an individual has received at least two doses of hepatitis B vaccine before an accidental exposure, no treatment is necessary if serologic tests show adequate levels (>10mIU/dL) of anti-HBs.

Management for Possible Exposure to Hepatitis C

There is presently no prophylaxis available against hepatitis C. Post-exposure management for HCV is based on early identification of chronic HCV disease and referral to a specialist for management. In the absence of PEP for HCV, recommendations for post exposure management are intended to achieve early identification of chronic disease and, if present, referral for evaluation of treatment options. All persons who are exposed must have anti-HCV done to document their baseline status.

Follow-Up for PEP

Follow-up and statistics of needle-stick injury are to be done by the Hospital Infection Control nurse on a weekly basis. Whether or not post-exposure prophylaxis is started, a follow up is needed to monitor for possible infections and to provide psychological support.

A. Clinical Follow-up

In the weeks following the exposed person must be monitored for the eventual appearance of signs indicating an HIV seroconversion: acute fever, generalized lymphadenopathy, cutaneous eruption, pharyngitis, non-specific flu symptoms and ulcers of the mouth or genital area. These symptoms appear in 50%-70% of individuals with an HIV primary (acute) infection and almost always within 3 to 6 weeks after exposure. When a primary (acute) infection is suspected, referral to an ART (Antiretroviral Therapy) center or for expert opinion should be arranged rapidly.

An exposed person should be advised to use precautions (e.g., avoid blood or tissue donations, breastfeeding, unprotected sexual relations or pregnancy) to prevent secondary transmission, especially during the first 6–12 weeks following exposure. Condom use is essential. Drug adherence and side effect counseling should be provided and reinforced at every follow-up visit. Psychological support and mental health counseling is often required.

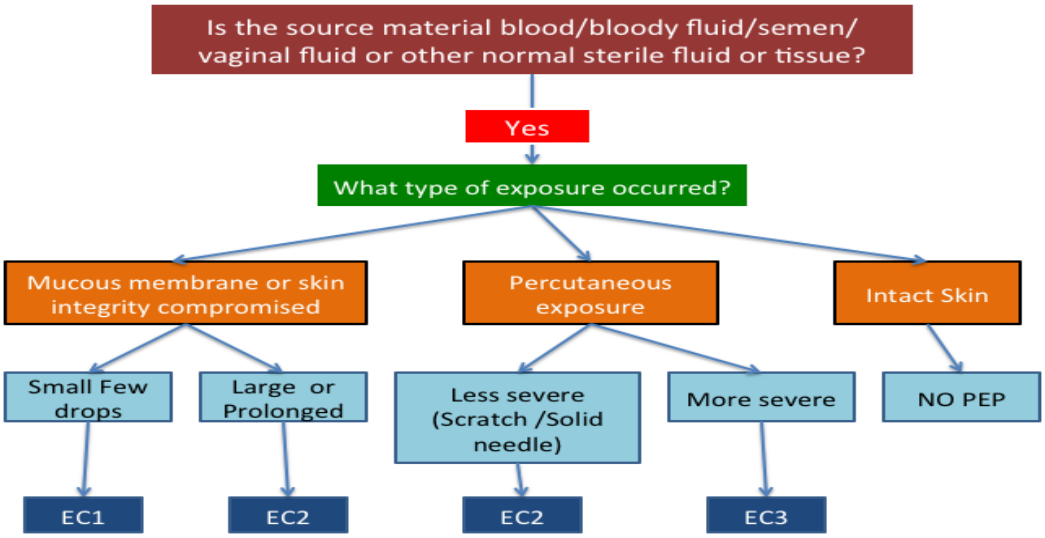
B. Laboratory follow-up:

Exposed persons should have post-PEP HIV tests. HIV-test at 3 months and again at 6 months is recommended. If the test at 6 months is negative, no further testing is recommended.

Guidelines for Treating Physicians for PEP

Risk Assessment: Designated physician of the institution should assess the risk of exposure and risk of HIV and HBV transmission immediately using three steps. **(Within 2 Hours- 72 Hours).**

A. Determine Exposure Code [Extent of Exposure]



B. Determine HIV Status Code for Source of Infection

HIV status Code	HIV status of Source and Whether Symptomatic?
HIV negative	Source is not HIV infected but consider HBV and HCV
Low Risk (SC1)	HIV positive, High CD4, Low titre exposure & clinically asymptomatic
High Risk (SC2)	HIV positive, High Titre Exposure, Low CD4 & Clinically symptomatic
Unknown	Status of the patient is unknown & neither the patient nor his/her blood is available for testing. The risk assessment will be based only upon the exposure

Abbreviation: HIV, HBV, HCV, SC

C Determine PEP treatment plan

Exposure Code	HIV Status Code	PEP Recommendations
1	1	Not Warranted
1	2	Recommend for 28 days
2	1 or 2	
3	1 or 2	
2/3	Unknown	Consider PEP for 28 days, if HIV prevalence is high in the given population & risk categorization

ART regimen (Three Drug Regimen, available in single tablet):
Tenofovir 300 mg + Lamivudine 300 mg+ Efavirenz 600 mg once daily for 28 days.

As is evident from above charts, the decision to start PEP is made on the basis of degree of exposure to HIV and the HIV status of the source from where the exposure/infection has occurred. More so, it should begin as soon as possible preferably.

This evaluation must be quick so as to start treatment without any delay, ideally **within two hours but certainly within 72 hours**. If the risk is insignificant, PEP could be discontinued, if already commenced. **First PEP dose should be within 72 hours**

PEP is not needed for all types of exposures: The HIV seroconversion rate of 0.3% after an accidental exposure to blood for percutaneous exposure is an average rate. The risk of infection transmission is proportional to the amount of HIV transmitted, which depends on the nature of exposure and the status of the source patient. A baseline rapid HIV testing of exposed and source person must be done for PEP. However, **initiation of PEP should not be delayed while waiting for the results of HIV testing of the source of exposure**. Informed consent should be obtained before testing of the source as per national HIV testing guidelines.

Informed Consent and Counseling for PEP
Exposed persons (clients) should receive appropriate information about what PEP is about and the risk and benefits of PEP in order to provide informed consent for taking PEP. It should be clear that PEP is not mandatory.

Psychological support
Many people feel anxious after exposure. Every exposed person needs to be informed about the risks, and the measures that can be taken. This will help to relieve part of the anxiety. Some clients may require further specialized psychological support.

Seek expert opinion in case of

- Delay in reporting exposure (> 72 hours).
- Unknown source
- Known or suspected pregnancy, but initiate PEP
- Breastfeeding mothers, but initiate PEP
- Source patient is on ART
- Major toxicity of PEP regimen.

Project Monitoring

After the training it is expected that, each district will establish a model injection centre to demonstrate the model practices and to impart training to the relevant health functionaries is the district. As per the directives of State, each district should have a nodal officer for injection safety, and the medical officers who will be responsible for management of needle stick injuries. The names, designations and phone number of these officers should be displayed at all possible injection rooms/ nursing stations.

Each injection centre should maintain a register. Format of the register is given at Form 1, page 55. Details of patients who are given injection should be entered in this register. Do not write name of the patients on this. Monthly report should be compiled from this register. Format of this report is given at Monthly Report 1, page 57. Each injection room incharge / ward sister should compile this report and send to the nodal officer of the district hospital by 3rd of every month. He / She will consolidate the information, and also add the components of trainings and stock-out of RUP syringes, and send to the state, by 7th of every month.

Each injection centre/ ward should report any needle stick injury/ exposure (NSI/E) to body fluid immediately, as decision for PEP should not be delayed. Form to report NSI/E is given at Form2, page 56. Report should be submitted to the nodal officer and a copy to treating medical officer. District nodal officer will compile a monthly report of all such NSI/E on the format given at Monthly Report 2, page 58. This monthly report should be submitted along with the monthly report 1 to the state nodal officer.

Each clinical area can display prominently the chart of first aid measures in case of exposure, given at page 54.

Frequently Asked Questions

1. **What are some procedures that have been associated with unsafe injection practices?**

   Common therapeutic procedures that have been associated with unsafe injection practices and which put patients at risk for transmission of blood borne infections are as follows:

   - Administration of sedatives and anaesthetics for surgical, diagnostic, and pain management procedures;
   - Administration of intravenous medications for chemotherapy, cosmetic procedures, and alternative medicine therapies;
   - Use of saline solutions to flush IV lines and catheters;
   - Administration of intramuscular medicines.

2. **Is it acceptable to visually inspect syringes to determine whether they are contaminated or can be used again?**

   No. Just because blood or other material is not visible in a used syringe or IV tubing does not mean the item is free from potentially infectious agents. Pathogens associated with bloodborne infections, including HBV, HCV, and human immunodeficiency virus can be present in sufficient quantities to produce infection in the absence of visible blood. Similarly,

   bacteria and other microbes can be present without clouding or other visible evidence of contamination.

3. **How medication should be drawn in injection syringe?**

   Parenteral medications should be accessed in an aseptic manner. This includes using a new sterile syringe and sterile needle to draw up medications while preventing contact between the injection materials and the non-sterile environment.

   Proper hand hygiene should be performed before handling medications and the rubber septum should be disinfected with alcohol prior to piercing it.

   Medications should be drawn up in a designated clean medication area that is not adjacent to areas where potentially contaminated items are placed. In general, any item that could have come in contact with blood or body fluids should not be in the medication preparation area.

4. **Is it acceptable to leave a needle inserted in the septum of a medicine vial for multiple draws?**

   No. A needle should never be left inserted into a medication vial septum for multiple uses. This provides a direct route for microorganisms to enter the vial and contaminate the fluid.

   The safest practice is to always enter a medication vial with a sterile needle and sterile syringe.

5. **Is it acceptable to use the same syringe to give an injection to more than one patient if after changing the needle, i.e. used syringe but new sterile needle?**

   No. Once they are used, the syringe and needle are both contaminated and must be discarded. A small amount of blood can flow into the needle and syringe at time of administration which can potentially cause infection. Therefore, a new sterile syringe and needle should be used for each patient.

6. **Is it acceptable to reuse a syringe and/or needle to draw medicine from a vial for the same patient and not for any other patient/s?**

   OR

   Is it acceptable to use the same syringe and/or needle to administer multiple injections to the same patient?

   The safest practice is to always draw medicine from a vial with a sterile needle and sterile syringe and use it only once for administering medicine. This applies to both conditions, when additional doses of medication are drawn for the same patient; as well as multiple injections are administered to the same patient.

   Basic principle is, one syringe, one needle, and only one time.

7. **If a syringe has been used only to inject medicines into an intravenous tubing port that is several feet away from the patient's IV catheter site, is it acceptable to use the same syringe for another patient?**

   No. Everything from the medication bag to the patient's catheter is a single interconnected unit. All the components are directly or indirectly exposed to the patient's blood and cannot be used for another patient.

   A syringe that intersects through ports in the IV tubing or bags also becomes contaminated and cannot be used for another patient. Separation from the patient's IV by distance, gravity and/or positive infusion pressure does not ensure that small amounts of blood are not present in these items.

Annexure: First aid management of injection induced injuries

Injury or exposure	Steps in management
Needle stick or other injury due to sharps	• Immediately wash the affected area with soap and water • Allow injury to bleed freely • Do not suck blood from the site • Do not squeeze out blood • Report immediately to higher authority where Post Exposure Prophylaxis (PEP) facility is available
Splash of blood or body fluids on non-intact skin	• Immediately wash the affected area with soap and water • Do not use disinfectant on skin • Do not scrub or rub the area. • Do not squeeze or press the area • Report immediately to higher authority where Post Exposure Prophylaxis (PEP) facility is available
Splash of blood or body fluids on intact skin	• Immediately wash the affected area with soap and water • Do not scrub or rub the area
Splash of blood or body fluids into eyes	• Flush the eyes gently but thoroughly with running water or saline for at least 15 minutes keeping the eyes open. Keep eyelids gently inverted while flushing.
Splash of blood or body fluids into mouth or nose	• Immediately spit out the blood or fluids and rinse the mouth with water several times • Blow the nose and clean the affected area • Do not use disinfectant

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Form 1: Injection Safety Project: Injection Record Register

Date	Sr.No	OPD Number/ CR Number	Age	Gender	Name of Injection	Route of Injection	Indication

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Injection Safety Project, Punjab

Form 2: Performa for Reporting Occupational Exposure to

Needle stick/ Sharps/Blood or Body Fluids

District: Date:
Name of Health facility:

1. Demographic of exposed person
   a. Name…… b. Age…….
   c. Sex …….M/ F…. d. Designation……
   e. Place of posting: (Name of Ward/ OPD injection room/ etc)…….
2. Hepatitis B vaccination of exposed person: Complete/ Incomplete/ Unvaccinated
3. Details of Injury:
   a) Date and time of Injury:……..
   b) Type of injury: Needle stick/ superficial percutaneous/ deep percutaneous/ Mucosal
   c) Procedure: Injection IM/ SC/ ID/ IV/ garbage bag
   d) Whether exposed to body fluids? Blood/ other body fluids
   e) How much was spill? Small volume / Large volume
   f) Which body area was exposed? Eyes/ Mouth/ Skin/ Any other……..
3. Details of HIV status of source at the time of exposure?
   a) HIV: Positive on ART (Since when……..……..)/ HIV: Positive NOT on ART / HIV negative/ Unknown
   b) Hepatitis B- HBs Ag: Positive/ negative/ unknown; HBe Ag: Positive/ Negative/ Unknown
   c) Hepatitis C: HCV Positive/ Negative/ Unknown
4. Source blood sent for testing: HIV/ HBsAg/ HCV / [Date and time sent and any reference number……] / Not sent
5. What was done immediately after the exposure?
   a. Washed area with soap and water
   b. Squeezed the blood out of the bleeding site
   c. Washed area with antiseptic
   d. Sucked the injured site with mouth

Signatures

Name and designation of reporting officer:
Date and Time report received……...
Result of source blood: Positive for: HIV/HBsAg/HBeAg/HCV/None……
Date and Time HBV vaccine given: Not indicated /indicated given …… /indicated not given
Injury: Mild/ Moderate / Severe Source HIV Status: Positive (On ART/ Not on ART) / Negative/ Unknown
PEP not indicated/indicated given/indicated not given. Date and time of first dose …….

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Monthly Report 1: Project Management- Injections/ Trainings & Stock

Reporting Month			
Total OPD attendance during Month			
Total injections given during Month			
Age and sex Distribution of Injections	Male	Female	Total
0-<5 years			
5-<15 years			
15-<49 years			
49-<65 years			
65 years and above			
Total			
Types of Injections Administered			**Number**
Intramuscular			
Subcutaneous			
Intradermal			
Intravenous			
Total			
Indications for Injections (There can be more than one condition)			**Number**
Cough and Cold			
Pneumonia			
Diarhooea			
Dysentery			
Low grade Fever(upto 100 degree F)			
High grade fever (above 100 degree F)			
Vomitting			
Not able to take orally			
Mild joint pains			
Severe joint pains			
Weakness			
Any other problem specify…			
Number of Trainings Done during month			
Number of Doctors trained			
Number of Staff Nurses Trained			
Number of ANMs Trained			
Number of LHVs Trained			
Any Other category trained. Specify……..			
Number of Pharmacists Trained			
Was there stock-out of any type of RUP syringe during the month?			
If yes, then give details of the same			
Total Number of Needle Stick Injuries reported. [Submit detailed report separately]			
Name and Signature	Date		

Monthly Report 2: Needle Stick Injury/ Body fluid Exposure Report

SrNo	Reporting Variables	Number
1	**Place of Exposure:** General Ward	
	ICU	
	OPD	
2	**Sex**	
	Male	
	Female	
3	**Designation**	
	Doctor	
	Staff Nurse	
	ANM	
	LHV	
	Pharmacist	
	Hospital Attendant	
	Sanitation Attendant	
4	**Hepatitis B Vaccination Status of Exposed Person**	
	Complete	
	Incomplete	
	Unvaccinated	
5	**Type of Injury**	
	Superficial Percutaneous	
	Deep Percutaneous	
	Mucosal	
6	**What procedure was being performed at Exposure**	
	IM	
	IV	
	SC	
	ID	
	Garbage Bag	
	Any Other specify	
7	**Volume of Exposure** Small Volume Body Fluid Exposure	
	Large Volume Body Fluid Exposure	
8	**HIV status of Source of Infection**	
	Positive on ART	
	Positive	
	Negative	
	Not Known	
9	**Hepatitis B and C Status of Source of Infection**	
	HBsAg Positive	
	HBsAg Negative	
	HBsAg Not Know	
	HBeAg Positive	
	HBeAg Negative	
	HBeAg Unknown	
	HCV Positive	
	HCV Negative	
	HCV Not Known	

Name and Signature……. Date…….

References and Further Readings

1 Guideline on the use of safety engineered syringes for intramuscular, intradermal, and subcutaneous injections in healthcare settings, WHO, 2016

2 Making all injections safe in India – vision 2020; Discussion Paper; Global Health Strategies

3 Handbook on safe injection practices; National Centre for Disease Control (NCDC), Ministry of Health & Family Welfare, Government of India; July 2014

4 Injection Practices in India; IPEN Study Group; WHO South East Asia Journal of Public Health; 2012; 1(2); 189-200

5 Guide book on safe injection practices; Indian Academy of Paediatrics; technical collaboration with BD, India; 2012

6 CDC. Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for post exposure prophylaxis. MMWR Recomm Rep 2001;52:1-52.

7 Protecting Healthcare Workers: Preventing needle stick injuries toolkit World Health Organization 2005
https://www.who.int/occupational_health/activities/pnitoolkit/en/

8 National AIDS Control Organization. Management of Occupational exposure including Post exposure prophylaxis for HIV. NACO, Ministry of Health and Family Welfare, Government of India, New Delhi; 2009.

9 Wilburn SQ, Eijkemans G. Preventing needlestick injuries among healthcare workers: a WHO-ICN collaboration. International journal of occupational and environmental health. 2004 ;10(4):451-6