

**Prevention of Transmission of HIV  
among Health Care Workers(HCW)**  
bio-safety and infection control

# Infection Control is Everyone's Business

Environmental Services

Clerks

Family/Visitors

Physicians

Patients

Administrators  
Ambulatory Care Center

Hospital

Therapists

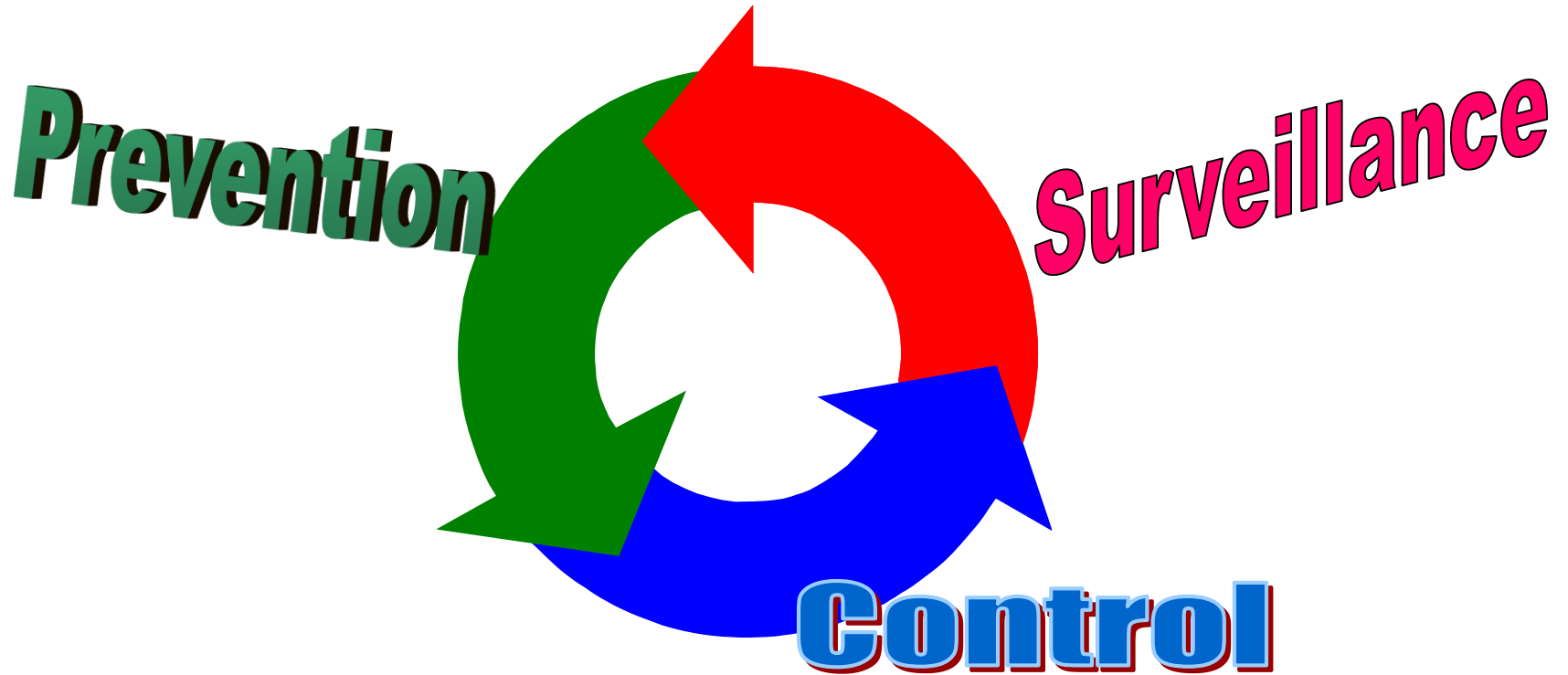
Nurses



CNA/PCA/CMA

You are an important part of Infection Control Program. Your commitment to following proper procedures, hand hygiene, and patient and family teaching can make the difference for you and patients.

# Infection Control: Basic Elements



The basic elements of an infection control program include: policies and procedures for preventing and controlling infections as well as surveillance activities to determine the effectiveness of those policies and procedures.

# BIOSAFETY & INFECTION CONTROL

## OBJECTIVES:

- Knowledge of HIV Transmission in Health Care setting
- Prevent Transmission – Universal Work Precaution
- Deal with Accidental Transmission in Health Care setting

# Risk Assessment

Risk assessments should be done to get the answer of the following

- What are the hazards?
- What might happen?
- How likely is it to happen?
- How serious are the consequences if it happens?
- What are the possible exposures?
- How can I mitigate exposure?
- What is the WORST that can happen?
- **Remember! Familiarity affects your perception of risk!**

# CATEGORY I EXPOSURE RISK

Includes people who are involved in activities in which there is a definite potential for contact with blood, other potentially infectious body materials, or airborne pathogens.

(Direct Dealing)

# CATEGORY II EXPOSURE RISK

Includes people who are involved in tasks where exposure to blood or body fluids might occur as an abnormal event or emergency.

(Indirect Dealing)

# CATEGORY III EXPOSURE RISK

Includes people who are involved in activities that do not entail normal or abnormal exposure to blood or other body fluids but to which universal/standard precautions apply.

(Others)



# Average Risk Of HIV Infection

- |       |                        |             |
|-------|------------------------|-------------|
| • HIV | Percutaneous exposure  | 0.05-0.4 %  |
| • HIV | Mucocutaneous exposure | 0.006-0.05% |
| • HBV | Percutaneous exposure  | 9-30 %      |
| • HCV | Percutaneous exposure  | 3-10 %      |

- Factors**
- **High viral load (1st & last)**
  - **Amount of blood involved in exposure**
  - **Timely PEP ( < 72 hrs)**

# HIV and Direct Contact

**The HIV virus is very fragile and will not survive very long outside of the human body. It is primarily of concern to employees providing first aid or medical care in situations involving fresh blood or other potentially infectious materials.**



# Status Of Universal Work Precautions

- A mainstay in combat, is prevention
- All HCWs must follow it
- All Patients /samples treated as potentially infectious
- May not be followed due to lack of facilities
- May not be followed due to certain degree of **complacency among Doctors and other Health Care Workers**

# Health Care Settings

- Hospitals
- Clinics, examination of patient in the OPD procedures like P/R or P/V
- Operation theatre procedures and ward activities.
- Nursing Homes
- Dispensaries
- Laboratories
- Research centers
- Any setup providing health care

# **Risk factor for occupational infection in health care workers**

## ➤ **Frequency of occupational exposure:**

Contact with blood or bloody body fluids

Accidental needle sticks/sharp instrument injuries occupational area in the hospital

## ➤ **Patient population:**

Hemodialysis patients, IV drug abuse patients, homosexuals,

Prison inmates, developmentally disabled

Immigrants from the highly endemic areas.

# Risk factors (cont...)

➤ **Occupational area in the hospital:**

Hemodialysis unit

Pathology/microbiology & laboratories

Surgery, surgical intensive care

Emergency room, blood bank, dentistry, oral surgery

Gynaecology and obstetrics



# “Universal Precautions”

**“*Universal Precautions*” is the term used to describe a prevention strategy in which all blood and potentially infectious materials are treated as if they are, in fact, infectious, regardless of the perceived status of the source individual.**

In other words, whether or not it is believed that the blood/body fluid is from an individual infected with bloodborne pathogens, it is treated as if it were. This approach is used in all situations where exposure to blood or potentially infectious materials is possible. This also means that certain engineering and work practice controls must **always** be utilized in situations where exposure may occur.



# Universal Precautions

Establish guidelines to be followed at all times when providing care to any person, whether the person is known to be infectious or not.

Blood is the single most prevalent source of HIV, HBV, and other blood borne pathogens in the occupational setting.

**Universal precautions are intended to supplement rather than replace recommendations for routine infection control.**

# Blood - Body Fluids

- The body fluids of all persons should be considered to contain potentially infectious agents.





# Body Fluids (continued)

- Body fluids include:

- **Blood**

- Semen

- Drainage from scrapes and cuts

- Feces

- Vomitus

- Urine

- Respiratory secretions

- Saliva

“Universal precautions” should be used when there is exposure to any body fluid.

# Universal precautions

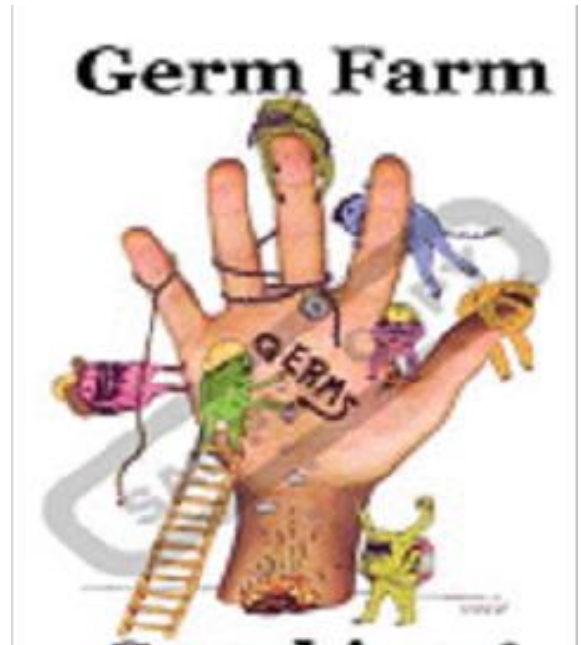
- Universal precautions apply to blood, other body fluids containing visible blood, semen, and vaginal secretions.
- Universal precautions also apply to tissues and to the following fluids: cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluids.
- Universal precautions do not apply to feces, nasal secretions, sputum, sweat, tears, urine, and vomitus unless they contain visible blood.
- Universal precautions do not apply to saliva except when visibly contaminated with blood or in the dental setting where blood contamination of saliva is predictable.

# Major Components of Universal Work Precaution

- **Hand washing**
- **Careful handling of sharps**
- **Safe techniques**
- **Sterilization**
- **Disinfection**
- **Disposal of disposable/reusable as appropriate**
- **Adherence to correct hospital sterilization and disinfections protocol**
- **Use of personal barriers / Personal Protective Equipments**
- **Immunization against HBV**

# HAND WASHING/ DECONTAMINATION

- Why needed.....???
- Skin flora
  - Resident flora
  - Transient flora
- Types
  - Simple
  - Hygienic
  - Surgical Scrubbing
- **Hand washing is one of the most important (and easiest) practices used to prevent transmission of infections**



# Skin Provides a Barrier

**Unbroken skin forms an impervious barrier against bloodborne pathogens. However, infected blood can enter your system through:**

- **Open sores**
- **Cuts**
- **Abrasions**
- **Acne**
- **Any sort of damaged or broken skin such as sunburn or blisters**



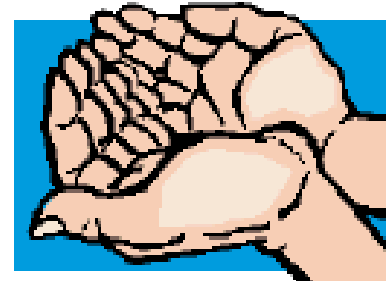
# **Reasons Healthcare Workers state for poor adherence to hand hygiene:**

- ☑ Handwashing agents cause irritation and dryness**
- ☑ Not enough or poor placement of sinks**
- ☑ Too busy**
- ☑ Patients' needs take priority**
- ☑ Belief that if you wear gloves, you don't need to clean hands**
- ☑ Low risk of acquiring infection from patients**



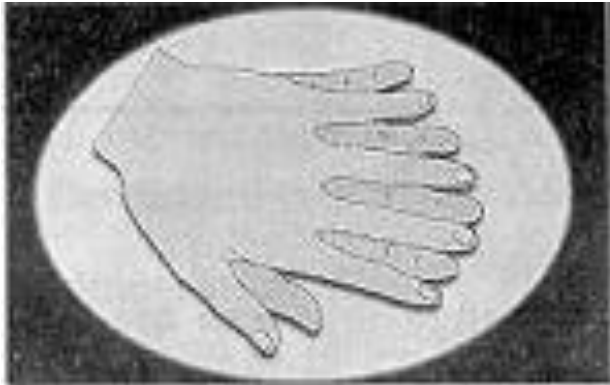
# Hand Washing Procedures

- Ensure that each hand sink is supplied with dispensable soap and disposable paper towels.
- Wet hands thoroughly under warm water.
- Dispense soap into wet hands.
- Vigorously rub hands together for one minute, paying particular attention to nails, cuticles, spaces between fingers, and under jewelry.
- Thoroughly rinse hands.



# HAND WASHING

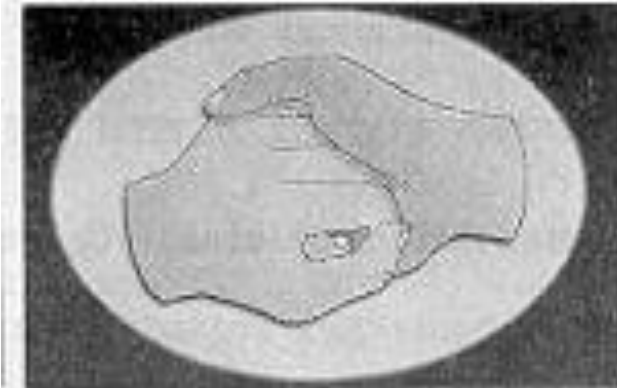
ALWAYS FOLLOW THE PROPER METHOD OF HAND WASHING



Step 1  
Wash palms and fingers



Step 2  
Wash back of hands



Step 3  
Wash fingers and knuckles



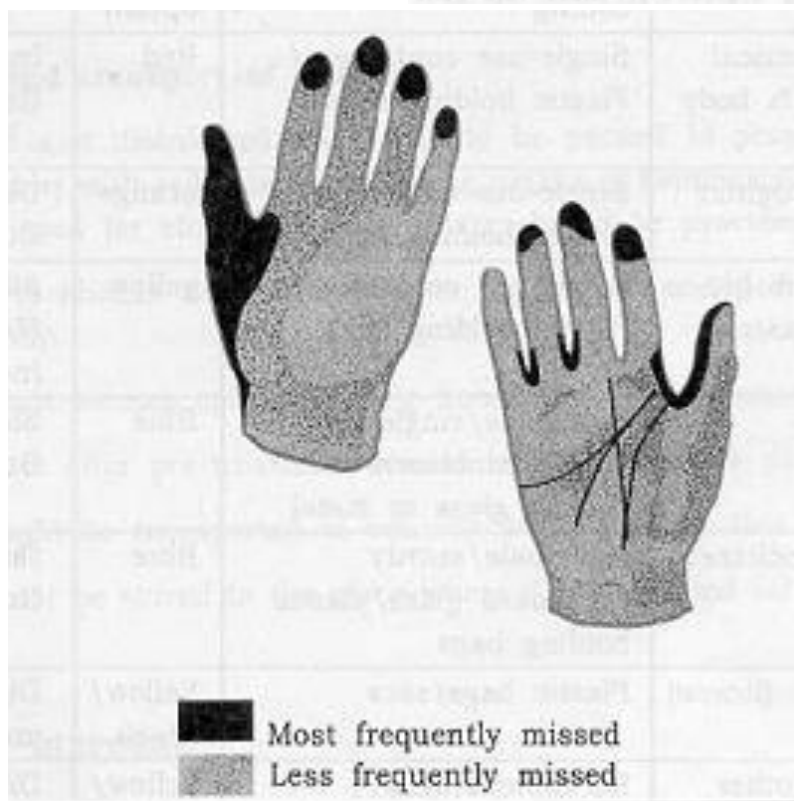
Step 4  
Wash thumbs

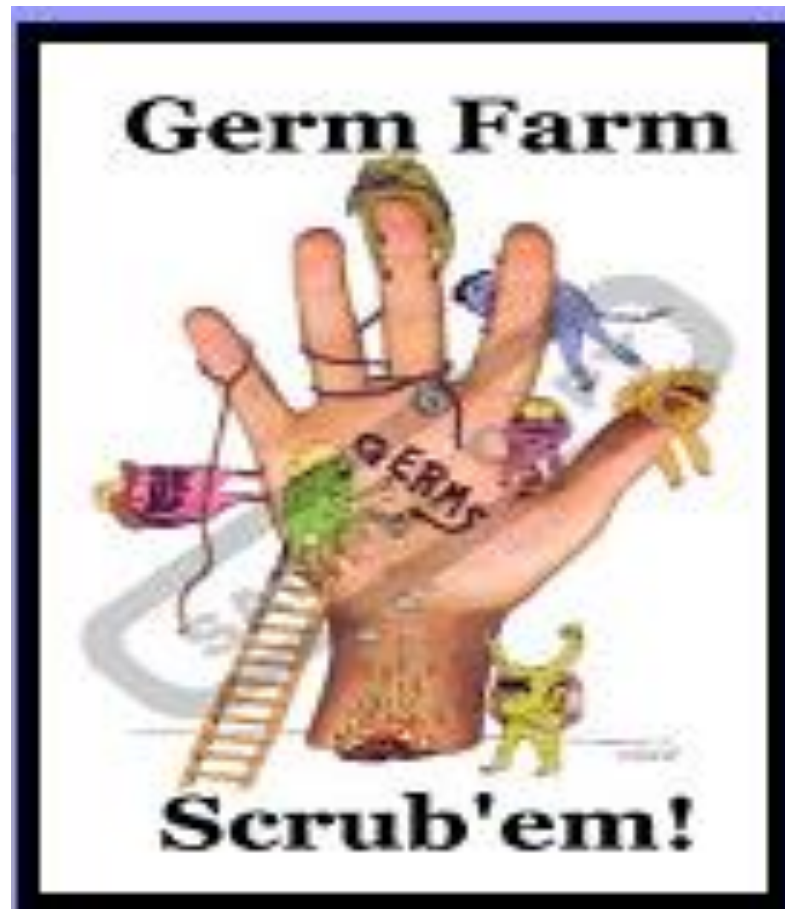


Step 5  
Wash finger tips



Step 6  
Wash wrists





- Wash for 15 seconds
- Ensure that all surfaces are washed
- Dry hand using paper towels

# HAND WASHING/ DECONTAMINATION(contd..)

- Hygienic hand washing
  - Antiseptic detergent used
  - Before invasive procedure
  - Before handling immune compromised patients
  - Before & after use of gloves

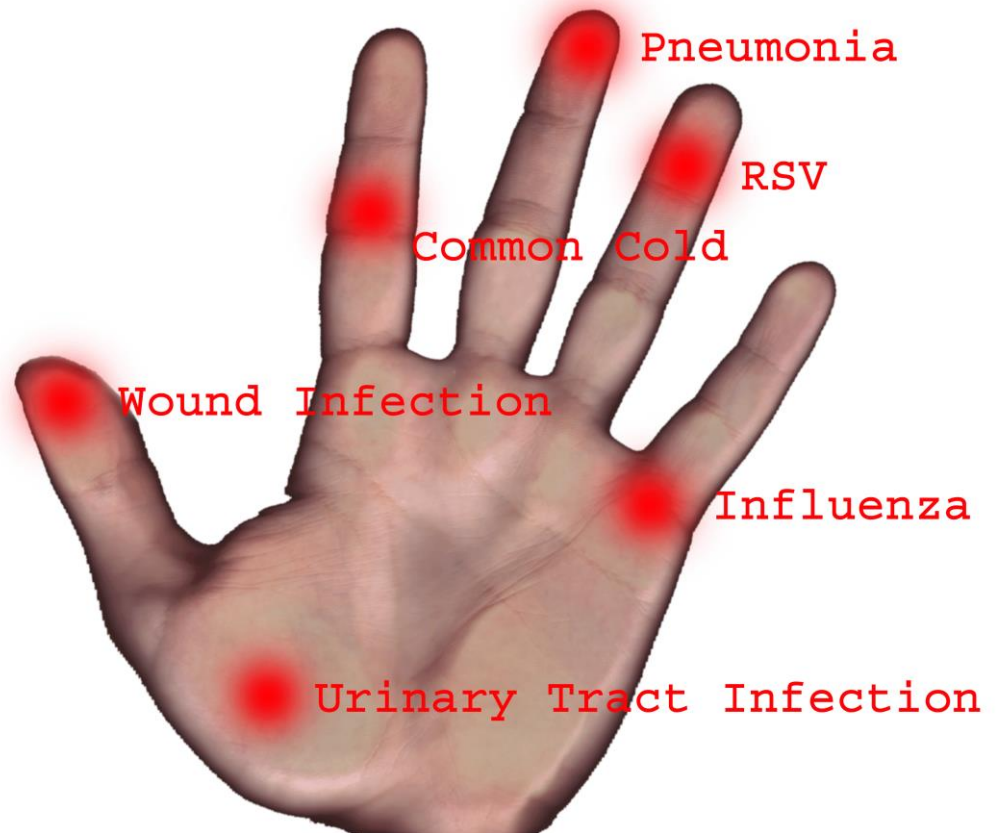
# HAND WASHING/ DECONTAMINATION(contd..)

- Remove & kill transient flora
- Decrease resident flora to significant
- Soap / detergent used with good scrubbing of nails / fingers, clean up to elbow done before surgical intervention / procedures



# Remember to do YOUR part for Patient Safety

**Follow Good Hand Hygiene Practices !**



Please remember hand hygiene is the most important means of preventing infection in you and others

# PPE

## (Personal Protection Equipment)

Personal protection equipments:

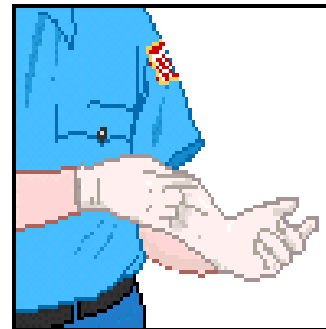
- Gloves
- Gowns
- Eye protection
- Face shields
- Masks
- Mouthpieces and resuscitation devices etc.





# Personal Protective Equipment

**The best protection against exposure is to ensure you are wearing the appropriate personal protective equipment (PPE). To protect yourself, it is essential to have a barrier between you and the potentially infectious material.**



# Standard Universal Precautions

**Know what personal protective equipment (PPE)  
you should wear for each task you perform**

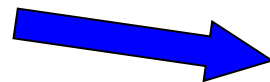
**Job Task List:**

**USE THESE**

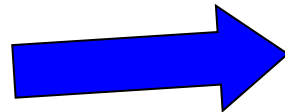
**Gloves**



**Mask/Eye  
Protection**



**Gown**



**TO HANDLE THESE**

**Blood and body fluids,  
soiled patient care  
equipment, or used  
linen**

**When splashing of blood  
or body fluid is  
possible**

# Gloves

- **Gloves should be made of latex, nitrile, rubber, or other water impervious materials.**
- **Inspect gloves before use**
- **Double gloving can provide an additional layer of protection.**



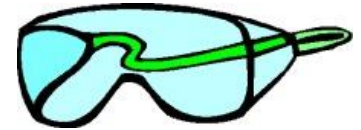
# Gloves

- **It serves a bilateral purpose**
- **If you have cuts or sores on your hands, you should cover these with a bandage or similar protection as an additional precaution before donning your gloves.**
- **Don't touch the outside of used gloves**



# Goggles, Face Shields & Aprons

- Use goggles if there is a risk of splashing or vaporization of contaminated fluids
- Face shields provide additional face protection for the nose and mouth.
- Face shields may be worn in addition to goggles to provide additional face protection. A face shield will protect against splashes to the nose and mouth.
- Aprons protect the body



# **Contaminated Clothing**

- **Remove clothing that is contaminated with blood as soon as possible**
- **Use Universal Precautions when handling contaminated laundry**
- **Place clothing in approved & labeled bags or containers**

# PROTECTIVE ATTIRES

## Dressing

- Water proof adhesive on broken skin or on blood oozing area

## Gloves

- Disposable vinyl
- latex surgical (invasive procedure)
- heavy duty rubber

# WATER PROOF ADHESIVE





# Guidelines for Blood collection(contd..)

1. Use gloves and take special care if there is a cut or scratches on hands
2. Take care to avoid contamination of hands and surrounding area with blood
3. Use disposable/autoclaved syringes and needles
4. Use 70% ethanol or isopropyl alcohol swabs/sponges for cleaning the puncture site
5. Use thick dressing pad or absorbent cotton below forearm while drawing blood and tourniquet above

# Guidelines for Blood collection(contd..)

6. Tourniquet must be removed before the needle is withdrawn
7. Place dry cotton swabs and flex the elbow to keep this in place till bleeding stops
8. Place used needle and syringe in a puncture resistant container containing disinfectant
9. Do not recap the needle
10. Do not remove needle from syringes

# Guidelines for Blood collection(contd..)

11. Use disposable screw-capped vials to avoid risk of leakage, breakage or spill
12. Seal specimen container securely. Wipe off the exterior of container free of any fluid with disinfectant
13. Vials placed in plastic bag appropriately
14. Plastic boxes with proper label “caution” used to transport the specimens to the lab.
15. Wash hands following completion of blood collection

# U.W.P. BY LAB.WORKERS



# INCORRECT WAY OF IV ACCESS



# CORRECT IV COLLECTION



# CORRECT METHOD OF IV ACCESS



# NEVER HANDLE SAMPLE WITHOUT GLOVES





# SAMPLES ON LAB FORM



# SERUM SEPRATION WITHOUT GLOVES



# SOILED LAB FORM



# Rational Injection Practice

- **Reduce unnecessary** injections
- Avoid injectable antibiotic if oral possible
- Use once a day antibiotic instead multiple
- Adequate stock of disposable at site
- Do not boil/autoclave during injection session
- Limit blood/blood product transfusion
- No need to wear glove while **SC/IM** Inj.

# Rational Injection Practice

## CORRECT PRACTICE

### DOs

- Pass syringes and needles in a tray preferably cut it with needle cutters.
- Putt needle and syringes in 2% hypochlorite solution if needle cutter is not available
- Remove cap of needle near the site of use
- Pick up open needle from tray/drum with forceps
- Destroy syringes by burning their tips/of if cutters not available.

# Rational Injection Practice

## INCORRECT PRACTICE

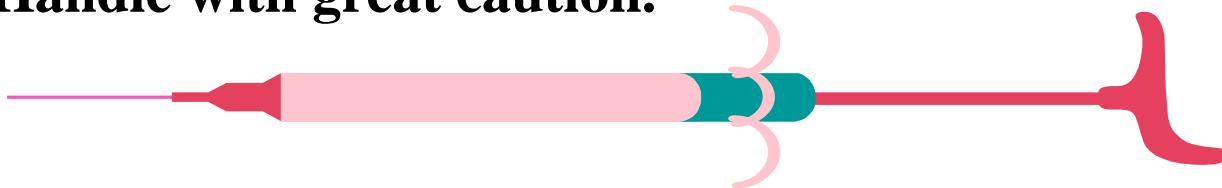
### DON'Ts:

- Never pass syringe and needle on directly to next person
- Do not bend/or break used needle with hands.
- Never test the fineness of the needle's tip before use with bare or gloved hand.
- Never pick up open needle by hand.
- Never dispose it off by breaking it with hammer/stone.



# BE CAREFUL WITH SHARPS

- ↪ **Do not recap by hand**
- ↪ **Use safety syringes, needle-less IV system and other safety products whenever possible.**
- ↪ **Replace sharps containers when 3/4 full**
  - **Make sure that the sharps container is not overfilled. Replacing sharps container when it is 3/4 full reduces the risk of getting stuck with needle protruding from over-filled box.**
- ↪ **Immediately dispose of sharps in sharps container**
  - **Contaminated sharps are lethal weapons!  
Handle with great caution.**

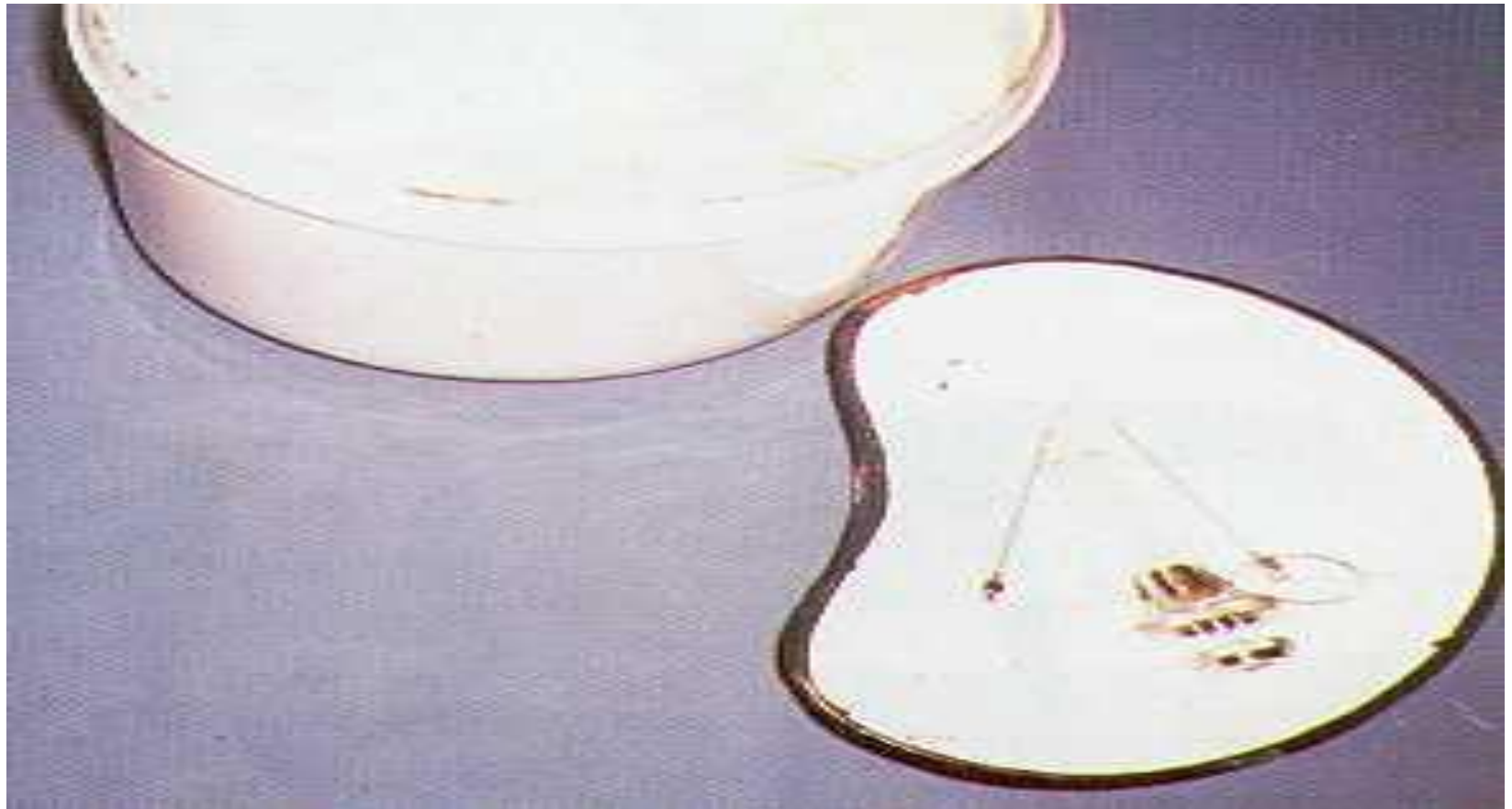


# DISINFECT SHARPS





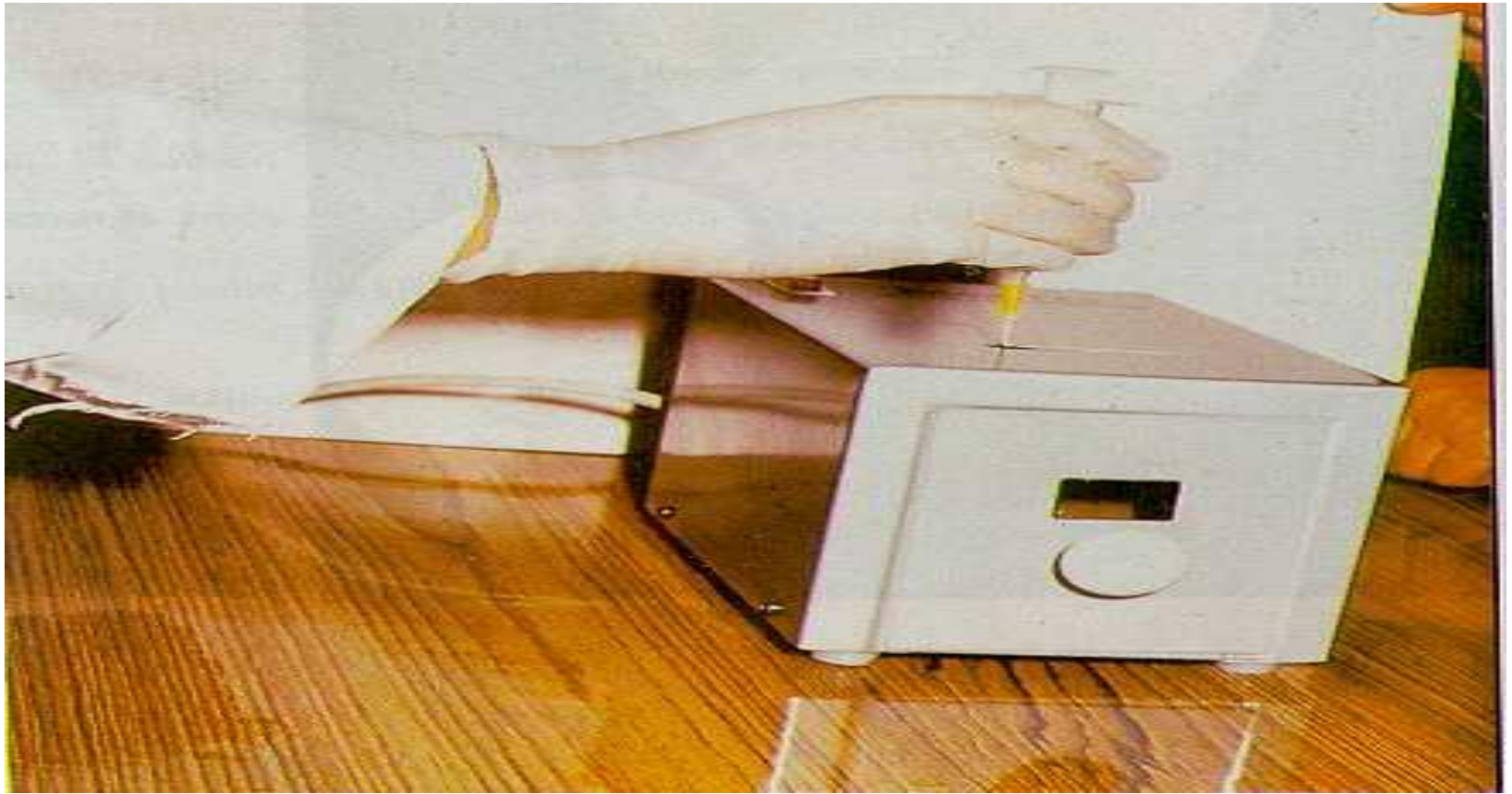
# CONTAINERS FOR SHARPS



# RECAPPING OF NEEDLE



# NEEDLE /SYRINGE CUTTER



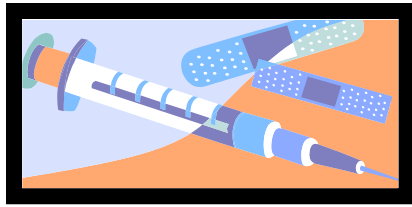
# Needles - Sharps



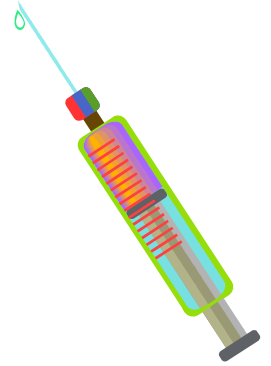
Frequently, Health Care Workers are punctured or cut by improperly disposed needles and broken glass, potentially exposing them to any infectious material that may have been on the glass or needle. For this reason, it is especially important to handle and dispose of all sharps carefully.

**Needles must be disposed of in sharps containers.**

**Improper disposal of needles can result in injury to housekeepers, custodians and others.**



# Needles - Sharps



- ❖ Needles should never be recapped.
- ❖ Needles should be picked up using tools such as forceps or pliers, or by using a broom or dustpan.
- ❖ Needles shall be disposed of in labeled sharps containers only.
  - Sharps containers shall be closable, puncture-resistant, leak-proof on sides and bottom, and must be labeled or color-coded.
  - When sharps containers are being moved from the area of use, the containers should be closed immediately before removal or replacement to prevent spillage or protrusion of contents during handling or transport.

# SAFE HANDLING & DISPOSAL OF SHARPS



- Always dispose of your **own sharps**
- **Never pass** used sharps directly from one person to another
- During exposure-prone procedure, the risk of injury should be minimized by ensuring that the **operator has the best possible visibility**, e.g. by positioning the patient, adjusting good light source and controlling bleeding.
- **Protect finger** from injury by using forceps instead of finger for guiding suturing.
- **Never recap, bend or break disposable needles.**

# SAFE HANDLING & DISPOSAL OF SHARPS(contd..)

- Directly after use, place needles and syringes in a rigid container until ready for disposal.
- Locate sharps disposal containers close to the point of use, e.g. In patient's room, on the medicine trolley and in the treatment room etc.
- Dispose used sharps in a **puncture resistant container**.
- Never place used sharps in other waste containers.
- Keep all sharps and sharps disposal containers out of the reach of children.
- **Prevent overflow** by sending sharps disposal containers for decontamination or incineration when three-quarters full.

**Warning!!**

**Accidental puncture from contaminated needles and other sharps can result in transmission of bloodborne pathogens.**





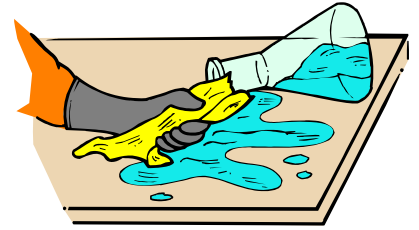
# Broken Glassware

- Broken glassware that has been visibly contaminated with blood must be sterilized with an approved disinfectant solution before it is disturbed or cleaned up.
  - Glassware that has been decontaminated may be disposed of in an appropriate sharps container: i.e., closable, puncture-resistant, leak-proof on sides and bottom, with appropriate labels.
- Broken glassware should not be picked up directly with the hands. Sweep or brush the material into a dustpan.
  - Uncontaminated broken glassware may be disposed of in a closable, puncture resistant container such as a cardboard box.

# BLOOD SPILL

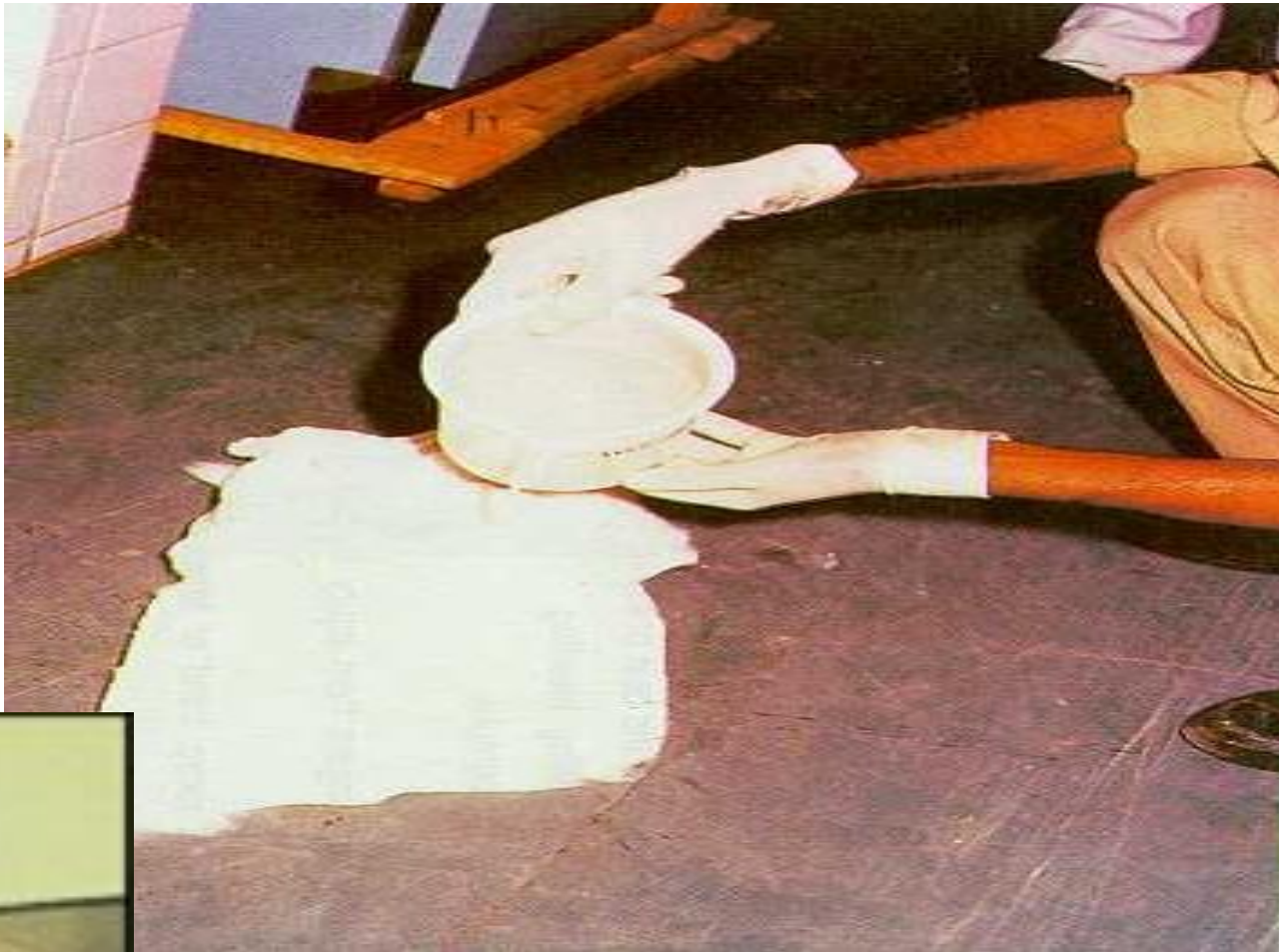


# Spill Cleanup



- **Carefully cover the spill with paper towels or rags**
- **Gently pour 10% solution of bleach over the towels or rags**
- **Let wait for 10 minutes**
- **Wear gloves to collect & dispose of waste**

# TREAT WITH DISINFECTANT

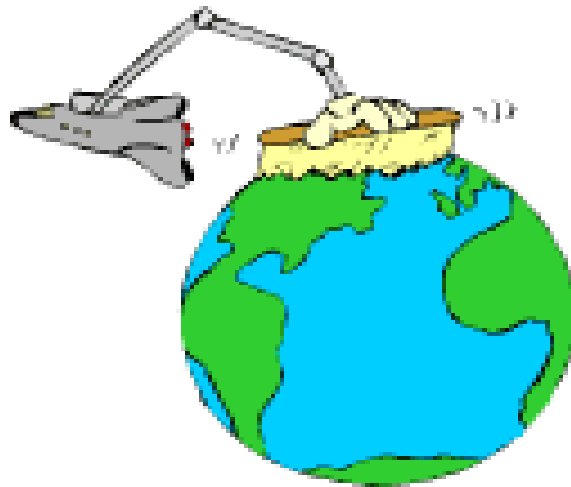


# MOPPING OF AREA

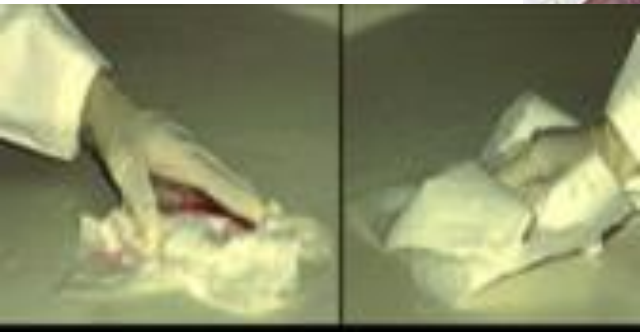


# Clean Up Procedures

- Disinfecting environmental surfaces is important in minimizing the spread of infection.



# FLOOR CLEANING



# DISINFECTANTS & sterilizers



- Autoclaving at 121 C for 20 minutes at 15 lbs pressure
- Dry heat- 170 c for 1 hour
- Boiling for 20-30 minutes
- Chemical disinfectants
- Sodium hypochlorite : 1 gm/L
- Calcium hypochlorite 1.4 gm/L
- 0.1% chloramine, ethanol, povidone iodine (PVI)
- Formaline 3-4 %, glutaraldehyde: 2% for 30 minutes



	Dry heat	Autoclave	Ethylene oxide	2% glutaraldehyde	Formaline	Gama radiation
gloves		+				+
Platstic syringe			+			
Glass syringe		+				
Needles		+				+
Endoscopic instruments				+	+	
Suction tubes	+		+			
Suction bottles		+	+	+	+	+
Cautery cable			+	+	+	+
Cautery points				+	+	+
Laryngoscopes				+	+	+
Catheters			+	+		+

# Disinfectants

	Dry heat	Autoclave	Ethylene oxide	2% glutaraldehyde	Formaline	Gama radiation
Endotracheal tubes			+	+	+	+
Cath lab matn			+	+		+
Blankets	+					+
Mattresses	+					+
Suturing needle	+					+
Blades/ scissors	+					+

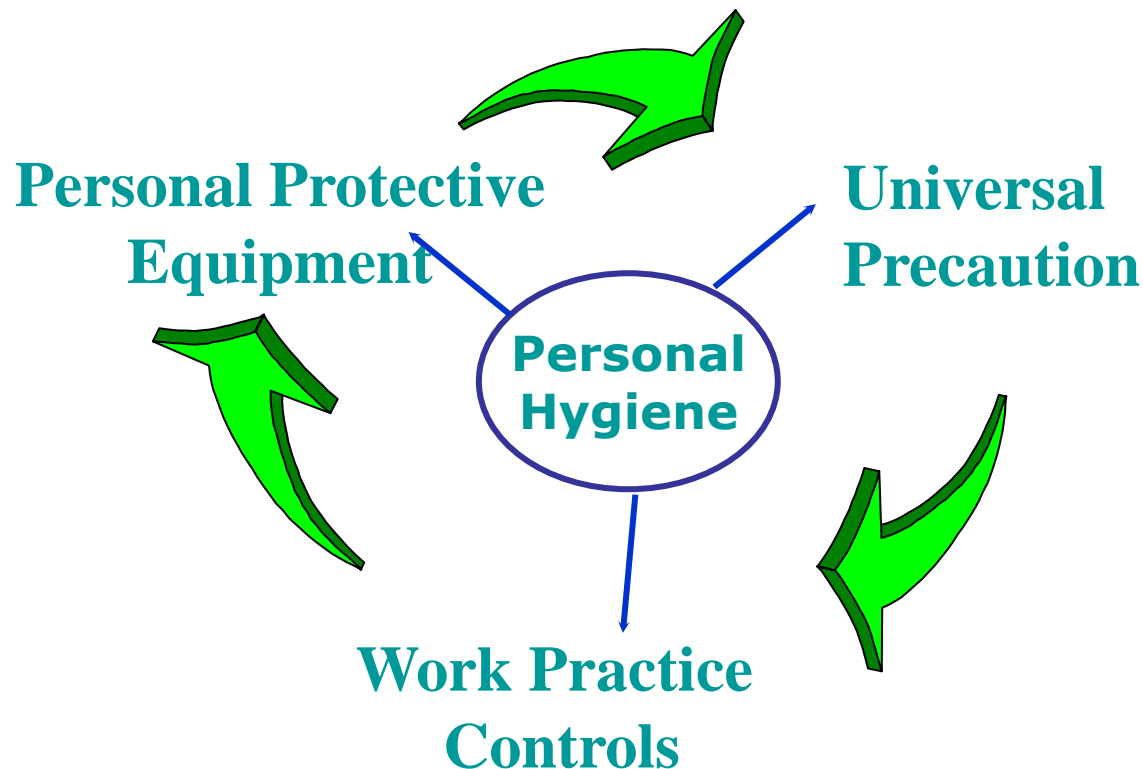


# **The Most Important Step**

**is to Anticipate and Avoid  
all possible contact with  
infectious materials.**

# Methods of Compliance

- Universal Precautions
- Engineering and Work Practice Controls
- Personal protective equipment



# Engineering Controls

## New Definition

“... means controls (e.g., sharps disposal containers, self-sheathing needles, safer medical devices, such as sharps with engineered sharps injury protections and needle-less systems) that isolate or remove the blood-borne pathogens hazard from the workplace.”

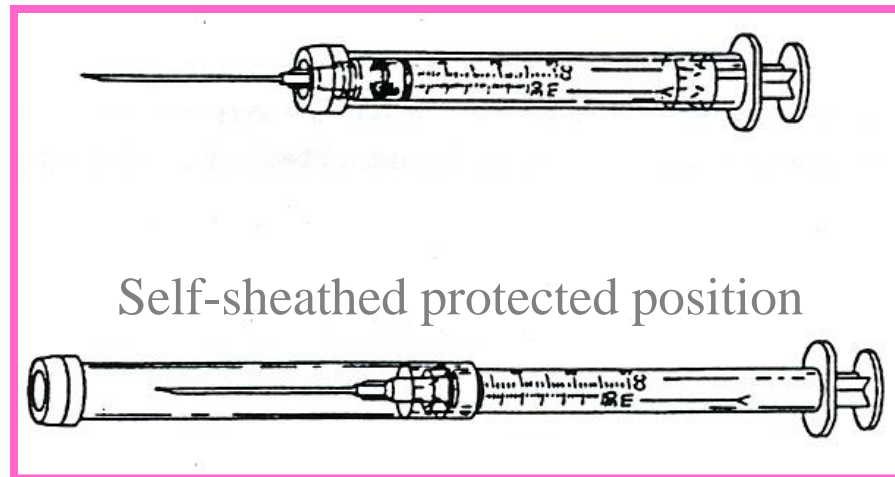
“Where engineering controls will reduce employee exposure either by removing, eliminating, or isolating the hazard, they must be used.”



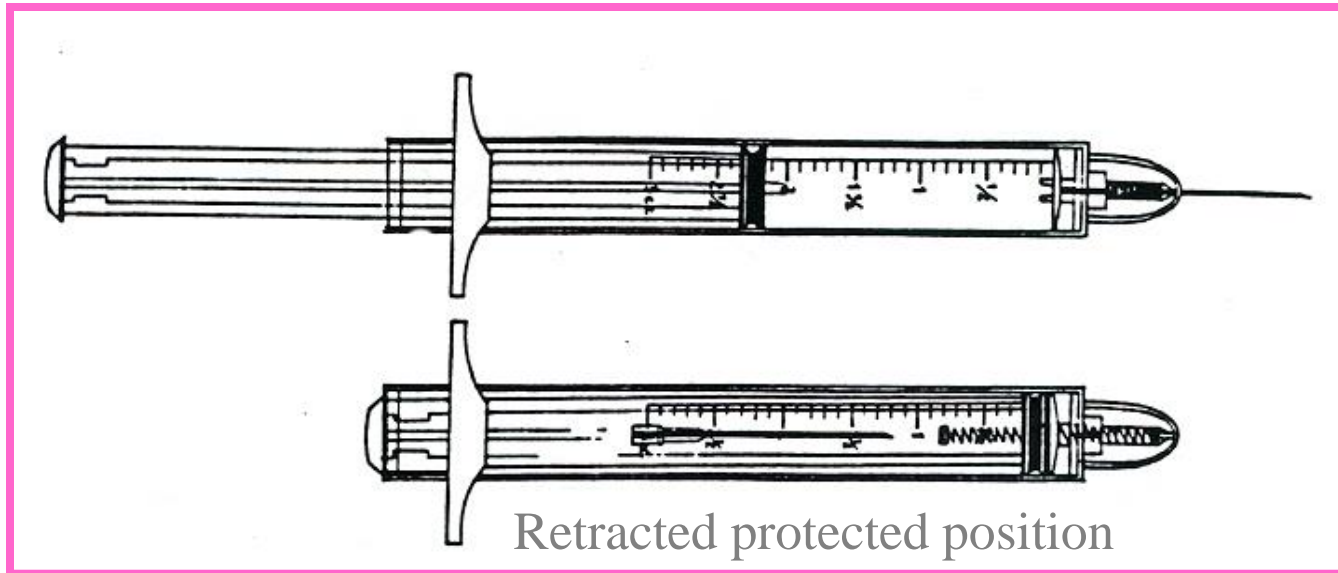
## Engineering Controls

- Safer medical devices
- Leak proof sharp disposal container
- Special container for containment of biological waste and material
- Biological safety cabinets
- Mechanical pipetting devices
- Safety caps for centrifuge tubes

# Hypodermic syringes with “Self-Sheathing” safety feature

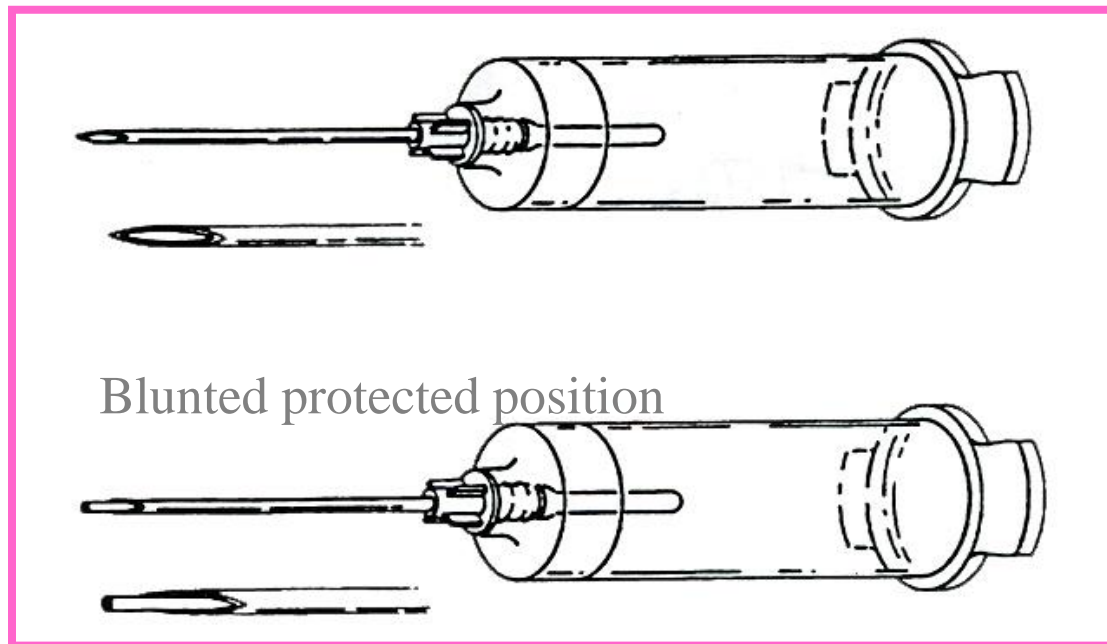


# Hypodermic syringes with “Retractable Technology” safety feature

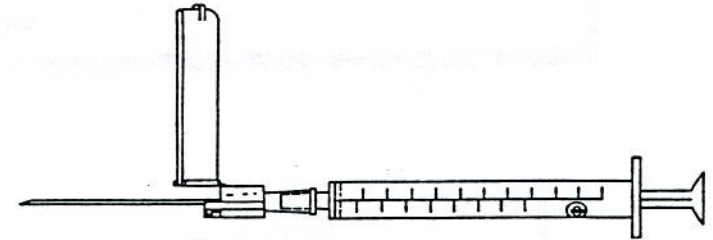




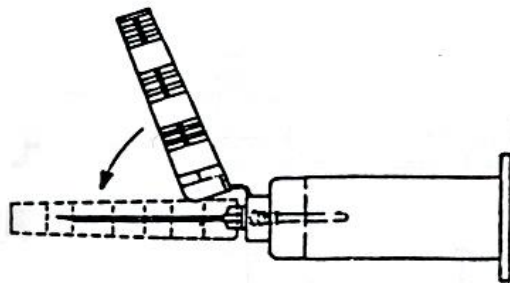
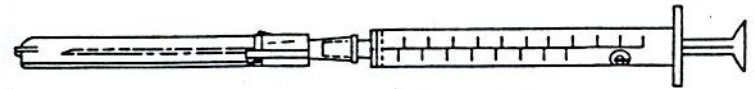
# Phlebotomy needle with “Self-Blunting” safety feature



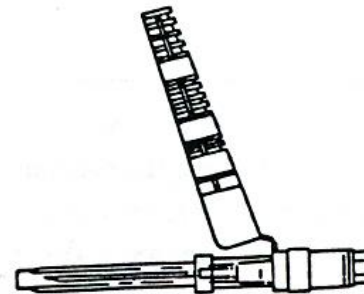
# “Add-on” safety feature



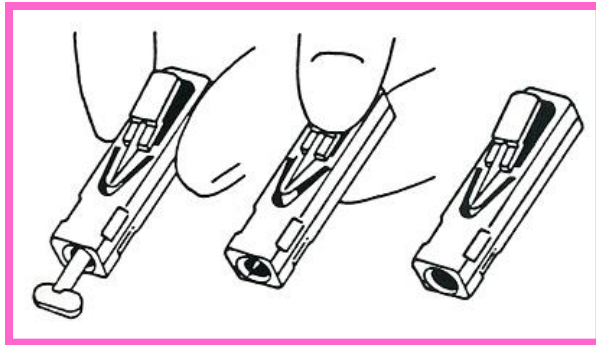
Attached to syringe needle



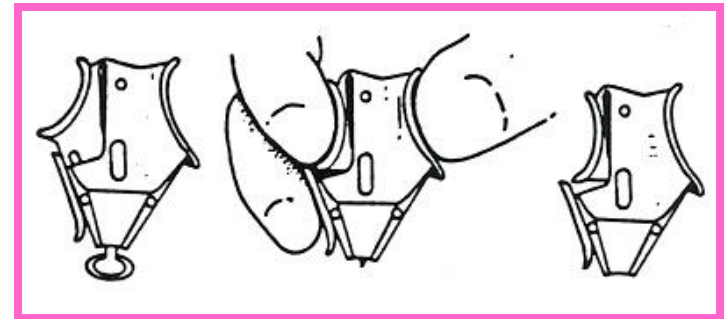
Attached to blood tube holder



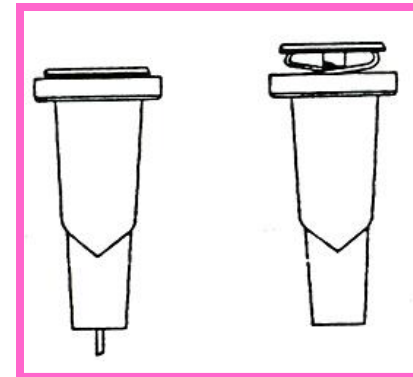
# Retracting lancets with safety features



Before    During    After

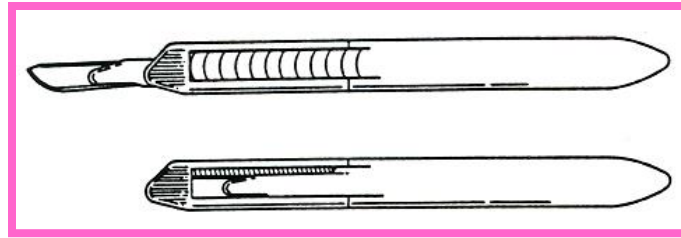


Before    During    After

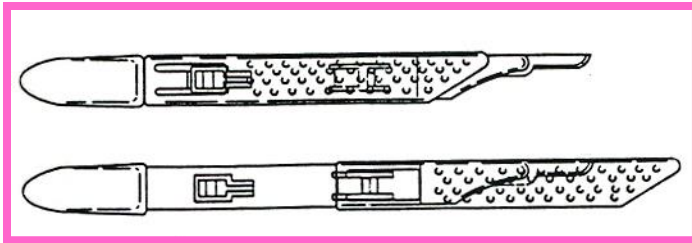


In use    After use

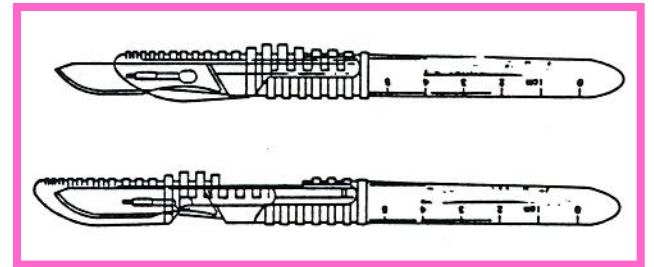
# Disposable scalpels with safety features



Retracted position



Protracted position



Protracted position

# Ventilation Devices

- Fume Hood
- Laminar Flow Hoods
- Biological Safety Cabinet

# Fume Hoods



- Fume hoods protect workers from chemical vapors.
- Handle hazardous chemicals in fume hoods whenever possible.

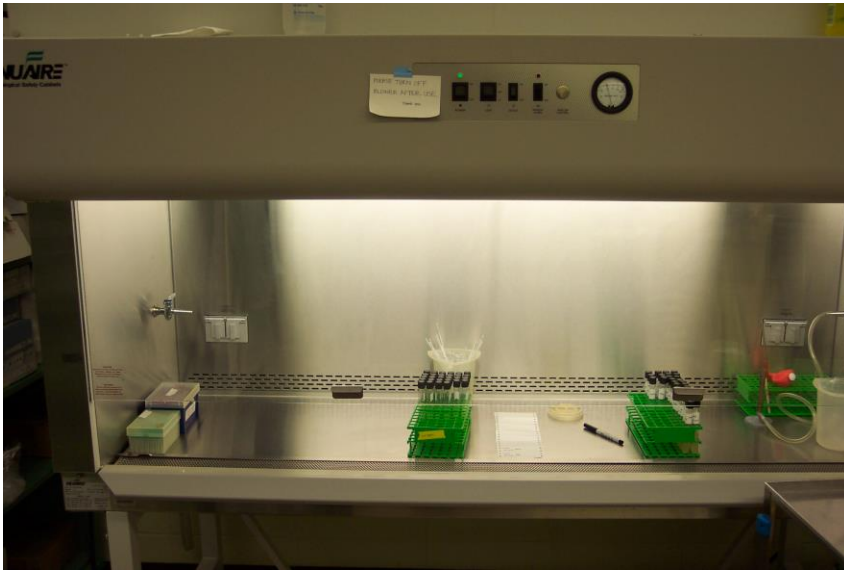
# Laminar Flow Hoods



- These hoods are only appropriate for very few purposes and they are often misused.
- Don't work with any hazardous in a laminar flow hood.
- They protect the working surface only, NOT the worker!

# Biological Safety Cabinets (BSC)

- BSCs work to protect workers and material from microbes.
- Avoid working with volatile chemicals in a BSC.





# Summary

- It is up to you to protect yourself, your co-workers, the community, and the environment!
- Universal Work Precaution is fundamental
- Communicate about hazardous materials &/or hazards
- PLAN, PLAN, PLAN...Implement (Act)
- When in doubt, ASK!!!!