HANDLING INFECTIOUS SUBSTANCES

Individuals who work in a laboratory that handles infectious substances are at risk of exposure to the substances they handle

The types of events that can be lead to an infection include:

- Exposure to infectious aerosols
- Spills & splashes
- Accidental needle stick injuries
- Cuts from sharp objects & broken glass
- Bites & scratches from animals or ectoparasites
- Centrifuge accidents
- Secondary spread of infectious materials to nonlaboratory areas

General practices are required for all laboratories handling infectious substances:

1. **A documented safety manual must be available for all staff**

2. **Personnel must receive training on the potential hazards**

3. **Eating, drinking, smoking, storing of either food, personnel belongings, ….etc are not permitted in any laboratory**

4. **Oral pipetting of any substance is prohibited in any laboratory**

5. Long hair is to be tied back or restrained so that it cannot come into contact with hands, specimens, containers or equipment

6. Access to laboratory & support areas is limited to authorized personnel

7. Doors to laboratories must not be left open

8. Open wounds, cuts, scratches & grazes should be covered with waterproof dressings

9. Laboratories are to be kept clean and tidy

10. Protective laboratory clothing must be worn by all personnel, including visitors, trainees and others entering or working in the laboratory; suitable footwear with closed toes and heels must be worn in all laboratory areas

11. Gloves must be worn for all procedures that might involve direct skin contact with biohazardous material or infected animals; gloves are to be removed when leaving the laboratory

12. Protective laboratory clothing must not be worn in nonlaboratory areas; laboratory clothing must not be stored in contact with street clothing

13. The use of needles, syringes and other sharp objects should be strictly limited; needles and syringes should be used only for parenteral injection and aspiration of fluids from laboratory animals

14. Hands must be washed after gloves have been removed and before leaving the laboratory

15. Work surfaces must be cleaned & decontaminated with a suitable disinfection at the end of the day and after any spill of potentially biohazardous material

16. Contaminated materials and equipment leaving the laboratory for servicing or disposal must be decontaminated and labelled

LABORATORY TECHNIQUES

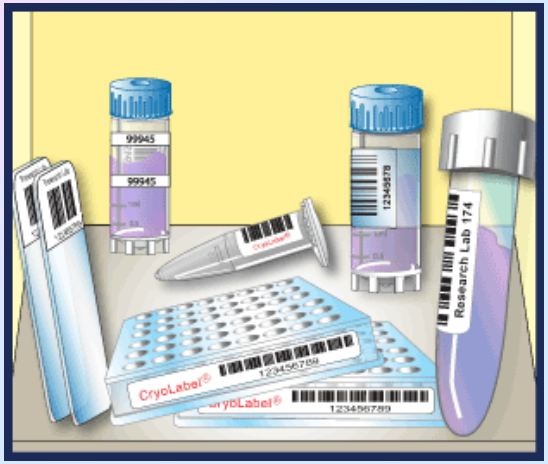
SAFE HANDLING OF SPECIMENS IN THE LAB.:

A) Specimen containers:

- Specimen containers may be of glass or preferably plastic

- No material should remain on the outside of container

- Containers should be correctly labelled to facilitate identification



B) Receipt of specimens:

Laboratories that receive large numbers of specimens should designate a particular room or area for this purpose

C) Opening packages:

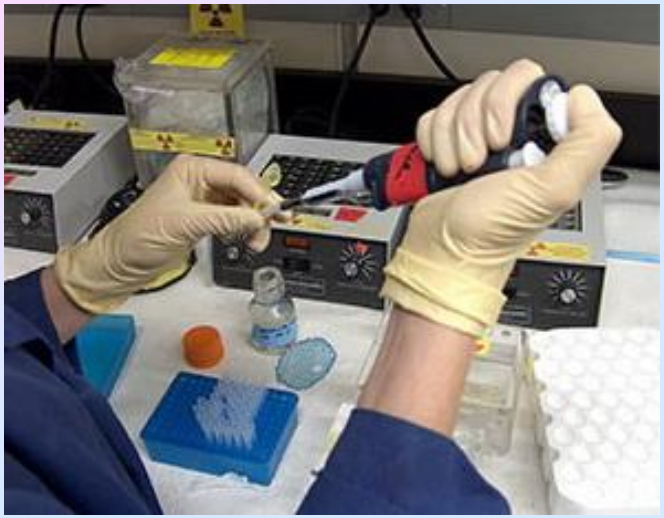
- **Personnel who receive and unpack specimens should be aware of the potential health hazards involved and should be trained to adopt standard precautions**
- **Primary specimen containers should be opened in a biological safety cabinet**
- **Disinfections should be available**

D) Use of pipettes & pipetting aids:

1. Pipetting aid must always be used (pipetting by mouth must be prohibited

2. All pipettes should have cotton plugs to reduce contamination of pipetting devices

3. Air should never be blown through a liquid containing infectious agent

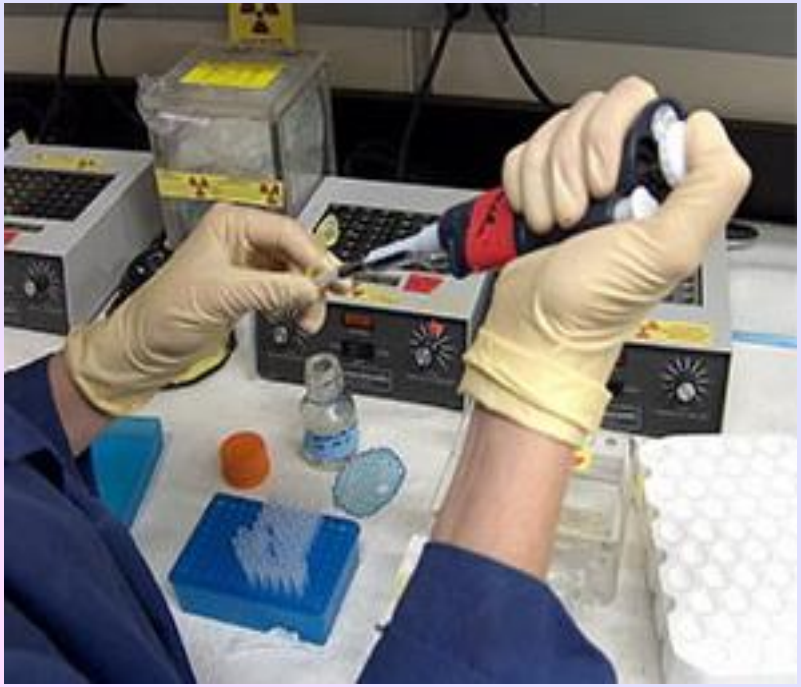


4. Infectious materials should not be mixed by alternate suction and expulsion through a pipette

5. Liquids should not be forcibly expelled from pipttes

6. Contaminated pipettes should be completely submerged in a suitable disinfectant contained in unbreakable container

7. A discard container for pipettes should be placed within the biological safety cabinet, not outside it



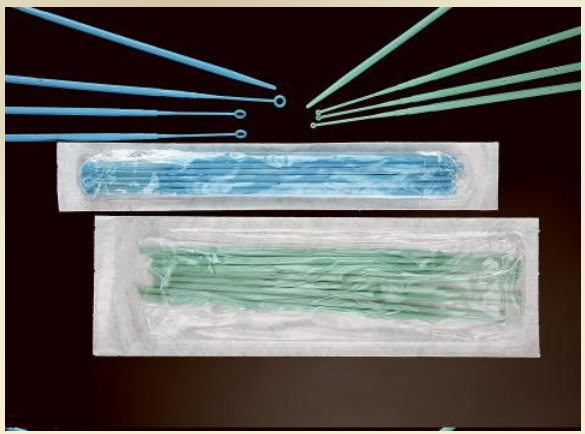
8. Syringes fitted with hypodermic needles must be not used for pipetting

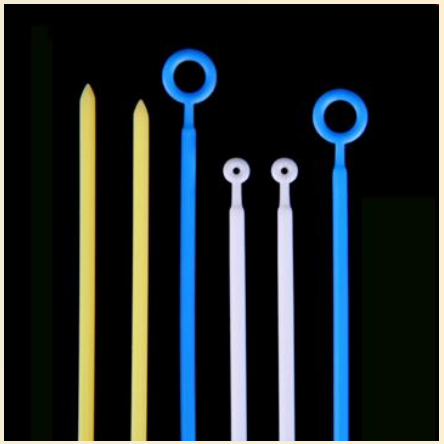
9. Devices for opening septum-capped bottles that allow pipettes to be used and avoid the use of hypodermic needles

10. To avoid dispersion of infectious material dropped from a pipette, absorbent material should placed on the working surfaces

E) Avoiding the dispersal of infectious materials:

- **Microbiological transfer loops should have a diameter of 2-3mm and be completely closed. The shanks should be not more than 6 cm in length to minimize vibration**





- **Disposal transfer loops, which do not need to be resterilized are perferable**

- **Discard specimens & cultures for autoclaving**

- **Working areas must be decontaminated with suitable disinfectant at the end of each work**

F) Use of biological safety cabinets:

- The cabinet must not be used unless it is working properly

- The glass viewing panel must not be opened when the cabinet is in use

- Apparatus and materials in the cabinet must be kept to minimum

- Bunsen burners must not be used in the cabinet
- All work must be carried out in the middle of rear part of the working surface and be visible through the viewing panel

- Traffic behind the operator should be minimized

- **The operator should not disturb the airflow by repeated removal and reintroduction of his or her arms**

- **Surface of the biological safety cabinet should be wiped using appropriate disinfectant after work is completed and at the end of the day**

- **Cabinet fan should be run for at least 5 min before beginning work and after work completion**

- **Paperwork should never be placed inside safety cabinet**

G) Avoiding ingestion of infectious materials & contact with skin & eyes:

Large particles & droplets released during microbiological manipulations settle rapidly on bench surfaces and on the hands of the operator

⇨ **Disposable gloves should be worn and lab. workers should avoid touching their mouth, eyes & face**

⇨ **Food & drink must not be consumed or stored in the lab.**

⇨ **No articles should be placed in the mouth (Pens, pencils, chewing gum .....etc)**

⇨ **Cosmetics should not be applied in the lab.**

⇨ **The face, eyes and mouth should be protected during any operation (result in splashing of potentially infectious materials)**

H) Avoiding injection of infectious materials:

- **Accidental injection may result from sharps injuries e.g. with hypodermic needles (needle-sticks), glass pasteur pipettes, or broken glass**

- **Needle-stick injuries can be reduced by:**

a) **Minimizing the use of syringes & needles**

b) **Using engineered sharp safety devices**

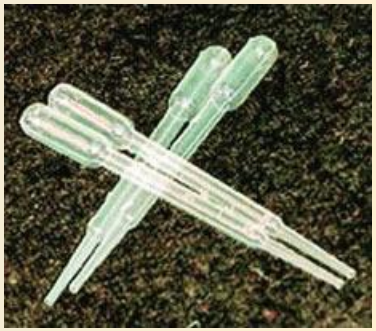
- **Needles should never be recapped**

Plastic Pasteur pipettes should replace those made of glass

I) Separation of serum:

➡ **Gloves, eye & mucous membrane protection should be worn**

➡ **Blood & serum should be pipetted carefully (not poured & pipetting by mouth must be forbidden**



➡ **After use, pipettes should be completely submerged in suitable disinfectant**

➡ **Discarded specimen tubes containing blood clots….etc (should be autoclaved or incinerated)**

➡ **Suitable disinfectants should be available for clean-up of splashes and spillages**

J) Use of centrifuges:

- Centrifuges should be operated according to the manufacturer's instructions

- Centrifuges should be placed at such a level that workers can see into the bowl

- Centrifuge tubes should be made of thick-walled glass or perferably of plastic and should be inspected for defects before use

- Tubes should always be securely capped

- The buckets must be loaded, equilibrated, sealed and opened in a biological safety cabinet

- Buckets and trunnions should be paired by weight with tubes in place correctly balanced

- The interior of the centrifuge bowl should be inspected daily for staining or soiling at the level of rotors

- Buckets, rotors and centrifuge bowls should be decontaminated after each use

- After use, buckets should be stored in inverted position to drain the fluid

K) Use of tissue grinders:

➲Glass grinders should be held in absorbent material in a gloved hand

➲Tissue grinders should be operated and opened in a biological safety cabinet

L) Care & use of refrigerators & freezers:

☑Refrigerators, deep-freezers and dry-ice chests should be defrosted and cleaned periodically

☑Any ampoules, tubes ...etc that have broken during storage removed

☑Face protection and heavy duty rubber gloves should be worn during cleaning

☑After cleaning, the inner surfaces of the cabinet should be disinfected

☑All containers stored in refrigerators, …etc should be clearly labelled with the scientific name of the contents, the date stored and the name of the individual who stored them

☑Unlabelled & obsolete materials should be autoclaved and discarded

☑An inventory must be maintained of the freezer's contents

L) Opening of ampoules containing lyophilized infectious materials:

Ampoules should always be opened in a biological safety cabinet

1. First decontaminate the outer surface of the ampoule

2. Hold the ampoule in alcohol-soaked cotton to protect hands before breaking it at a file scratch

3. Remove the top gently and treat as contaminated material

4. If the plug is still above the contents of the ampoule, remove it with sterile forceps

5. Add liquid for resuspension slowly to the ampoule to avoid frothing

M) Storage of ampoules containing lyophilized infectious materials:

- Ampoules containing infectious materials should never be immersed in liquid nitrogen because cracked or imperfectly sealed ampoules may break or explode on removal

- If very low temperature are required, ampoules should be stored only in the gaseous phase above the liquid nitrogen

- Otherwise, infectious materials should be stored in mechanical deep-freeze cabinet

Standard precautions with blood & other body fluids, tissues & excreta

1) Collection, labelling & transport of specimens:

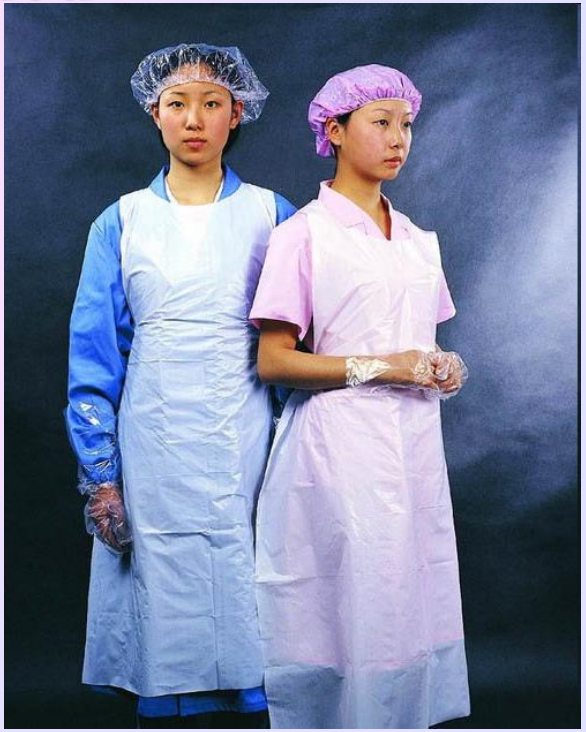
⇨Gloves should be worn for all procedures

⇨Blood should be collected form patients and animals by trained staff

⇨Conventional needle and syringe systems should be replaced by single use safety vacuum devices that allow the collection of blood directly into stoppered transport tubes

2) Opening specimen tubes & sampling contents:

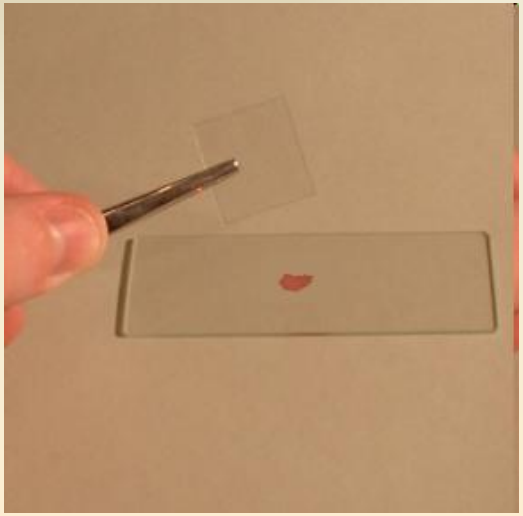
- Specimen tubes should be opened in safety cabinet
- Gloves should be worn, eye and mucous membrane protection is recommended
- Protective clothing should be supplemented with a plastic apron
- The stopper should be grasped through a piece of paper or gauze to prevent splashing



3) Films & smears for microscopy:

☆Fixing and staining of blood, sputum and faecal samples for microscopy do not necessarily kill all organisms or viruses on the smears

☆These items should be handled with forceps, stored appropriately, and decontaminated or autoclaved before disposal



4) Tissues:

- ✔ **Formalin fixatives should be used**
- ✔ **Frozen sectioning should be avoided**
- ✔ **When necessary, the cryostat should be shielded and the operator should ear a safety face shield**

5) Decontamination:

- Hypochlorites and high-level disinfectants are recommended for decontamination

- Freshly prepared hypochlorite solution should contain available chlorine at 1g/L for general use and 5g/L for blood spillages