ALMUSTAQBAL UNIVERSITY

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Medical Laboratories Techniques Department

Stage : Fourth year students
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Safe Practices for the Microbiology Laboratory

Microbiology is a branch of science that deals with the study of microorganisms like bacteria, viruses, fungi, algae and other protozoa. It also includes their interactions with human and the environment. To study microbiology well, we need a special laboratory which is called "Microbiology Lab".

What is a Microbiology Lab?

Microbiology lab is a specialized laboratory designed for conducting experiments and researches on microorganisms .This type of laboratory is equipped with specialized tools and equipment to handle microorganisms safely, as well as sterile environments and containment systems to prevent the spread of infection and infectious agents.

Microbiology labs are used for a variety of important purposes such as :
1. unknown microorganisms identification,
2. testing the effectiveness of antibiotics,
3. vaccines development and researching the genetic makeup of microorganisms.

The work done in microbiology labs is critical for understanding and combating infectious diseases,
Microbiology labs are also essential and vital in clinical settings, where they play a crucial role in diagnosing and treating patients with infectious diseases.

Microbiology Lab Safety Rules
The microbiology lab is considered as a controlled environment to prevent contamination. Safety measures in the microbiology lab are to be followed . Understanding these precautionary steps will help to avoid contamination , accidents and injuries .

The most important microbiology lab safety rules:

1. Make sure that you wash your hands with disinfectant soap when you arrive at the lab and also before leaving.
2. Wash your hands before wearing and after taking off the disposable gloves.
3. Keep the workspace clear, decontaminated and free of any unnecessary materials.
4. Always wear your laboratory personal protective equipment, (PPE) when dealing with any biological material, like gloves, safety goggles, closed toed shoes and the laboratory coat to prevent bio-hazardous materials from contact with the eyes and skin.
5. Disinfect the work area and sterilize all the needed equipment before beginning any work.

To avoid culture contamination, make sure that you:
a.Treat all human fluids, cells, tissues, blood and organs as infectious agents and they should be handled carefully.
b. Dispose of any used tools like needles, blades or broken glass in the sharps containers.

c. In case of biohazardous waste, make sure to dispose it in accordance with policies.
d. Eating, drinking, chewing gum and smoking is prohibited in the laboratory.
e. Make sure that Equipment is decontaminated before removal from the laboratory for service or repair.
f. In case of any procedures like the biological material manipulation that could generate an aerosol, they should be done within a biosafety cabinet (BSC). and any materials that are removed from inside the cabinet should be decontaminated with 70% isopropyl alcohol.
g. In case of using infectious agents in a laboratory, a biohazard warning sign incorporating the universal biohazard symbol must be posted on the work area.

The biohazard signs are very important to keep people safe by:
Preventing exposure to dangerous materials.

Biohazard signs label dangerous areas, waste, labs and any place where biological material, pathogens could be found.
Without signs, people would not be aware enough of the potentially dangerous areas.
Biohazards include: bacteria, viruses, fungi, parasites, or any human body fluids.

• Pathogens: agents that cause disease

These best practices will help you safely contain microorganisms in your lab.

1. **Treat all microorganisms as potential pathogens.**
   While the majority of microorganisms are not pathogenic to humans and have never been shown to cause illness, under unusual circumstances a few microorganisms that are not normally pathogenic can act as pathogens. Treat all microorganisms–especially unknown cultures–as if they are pathogenic.
2. **Sterilize equipment and materials.**
   All materials, media, tubes, plates, loops, needles, pipettes, and other items used for culturing microorganisms should be sterilized by autoclaving. Otherwise, use disposable commercially sterilized products.
3. Understand the operation and safe use of all equipment and materials needed for the laboratory.

4. **Disinfect work areas before and after use.**
5. Use a disinfectant, such as a 10% bleach or 70% ethanol solution in safety-labeled wash bottles, to wipe down benches and work areas both before and after working with cultures.

6. **Wear protection.**
   Wear goggles or glasses when handling liquid cultures or spread plating. Laboratory coats and gloves are strongly recommended.

7. Keep all personal belongings (including cell phones) in a separate area. Wash your hands before handling these items.
8. **Wash your hands.**
   Use a disinfectant soap to wash your hands before and after working with microorganisms. Gloves is to be worn as extra protection.
9. **Never pipette by mouth.**
   Use pipette bulbs or pipetting devices for dispensing of liquid cultures.

10. **Do not eat or drink in the lab, nor store food in areas where microorganisms are stored.** Keep your fingers out of your mouth, and wash your hands before and after the laboratory activity.

11. **Label everything clearly.**
    All cultures, chemicals, disinfectant, and media should be clearly and securely labeled with their names and dates. If they are hazardous, label them with proper warning and hazardous information.
12. **Autoclave or disinfect all waste material.**
    All items to be discarded after a class, such as culture tubes, culture plates, swabs, toothpicks, wipes, disposable transfer needles, and gloves, should be placed in a biohazard autoclave bag and autoclaved 30 to 40 minutes at 121 °C at 20 psi.

If NO autoclave is available and not working with pathogens, the **Non pathogene** materials can be covered with a 10% bleach solution and allowed to soak for at least 1 to 2 hours.

13. **Clean up spills with care.**
Use lab cleanup and disposal supplies to keep the lab safe and clean. Cover any spills involving a bacterial culture, or broken culture tubes, completely saturate the spill area with disinfectant with a 70% ethanol or 10% bleach solution; then cover with paper towels. After allowing the spill to sit with the disinfectant for a short time, (10 minutes). Carefully remove the saturated paper towels, dispose of them in the biohazard waste, in a biohazard autoclave bag to be autoclaved and clean the area again with disinfectant.

Never pick up glass fragments with your fingers or stick your fingers into the culture itself; instead, use a brush and dustpan.

12. Consider everything a biohazard. Do not pour anything down the sink. Autoclave liquids and broth cultures to sterilize them before discarding

Biological waste:

Biological waste must be disposed of an important distinction should be made between biological waste that has been inactivated before disposal, and biological waste that has not been inactivated before disposal. The latter has to be treated as hazardous medical waste and should be transported to an incinerator that is suited for the incineration of hazardous medical waste.

Decontamination of spills :
The following procedure is recommended for decontaminating spills. Isolate the area to prevent anyone from entering. Wear gloves and protective clothing (gown or lab coat; mask if the spill may contain a respiratory agent or if the agent is unknown). Absorb or cover the spill with disposable towels. Saturate the towels with an appropriately diluted intermediate or high level disinfectant (e.g., a phenolic formulation or household bleach). Place disinfectant-soaked towels over the area and leave them in place for at least 15 minutes before removing and discarding them. Wipe area using clean disinfectant-soaked towels and allow area to air dry. Place all disposable materials used to decontaminate the spill into a biohazard container. Handle the material in the same manner as other infectious waste.