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Dept. Medical Lab. Techniques
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Lecture-2: Laboratory safety

Microbiology laboratory include **admonitions** such as the necessity to **(1) wear gloves, (2) wash hands after working with infectious materials, (3) disinfect all instruments immediately after use, (4) use water to moisten specimen labels rather than the tongue, (5) disinfect all contaminated waste before discarding, and (6) report to appropriate personnel all accidents or exposures to infectious agents.**

Safety

Programs have been expanded to include the proper handling of biologic hazards encountered in processing patient specimens and handling infectious microorganisms; fire and electrical safety; the safe handling, storage, and disposal of chemicals and radioactive substances; and techniques for safely lifting or moving heavy objects.

Sterilization, Disinfection, and Decontamination

Sterilization is a process that kills all forms of microbial life, including bacterial endospores.

Disinfection is a process that destroys pathogenic organisms, but not necessarily all microorganisms, endospores, or prions. However, some disinfectants will kill endospores with prolonged exposure times.

Decontamination is the removal of pathogenic microorganisms so items are safe to handle or dispose of. Many factors limit the success or degree of sterilization, disinfection, or decontamination in a health care setting, such as **1- organic load** (organisms and other contaminating materials such as **blood** or body **fluids**), **2- the type of**

organisms present, 3- the concentration and exposure time to the germicide. 4- the physical and chemical nature of the surface (hinges, cracks, rough or smooth surfaces),

temperature, pH, humidity, and presence of a biofilm. These processes may be accomplished by a variety of physical or chemical methods.

Methods of Sterilization

The physical methods of sterilization include:

1) Incineration

2) Moist heat

3) Dry heat

4) Filtration

5) Ionizing (gamma) radiation

6) Chemicals (ethylene oxide gas, hydrogen peroxide gas plasma, vaporized hydrogen peroxide, and other liquid chemicals).

Chemical safety of diagnostic microbiologically laboratory should have a chemical hygiene plan that includes guidelines on **proper labeling of chemical containers**, manufacturers material safety data sheets (MSDSs), and the written chemical safety training and retraining programs.

Fire safety is an important component of the laboratory safety program. Each laboratory is required to post **fire evacuation plans that are essentially strategies for finding the nearest exit in case of fire.**

Electrical safety. Electrical cables should be checked regularly for fraying and replaced when necessary. All plugs should be the three-prong, grounded type. All sockets should be checked for electrical grounding and leakage at least annually. No extension cables should be used in the laboratory.

Handling of compressed gases. Compressed gas cylinders (CO2, anaerobic gas mixture) contain pressurized gases and must be properly handled and secured.

Biosafety

Individuals are exposed in various ways to laboratory acquired infections in microbiology laboratories, through that risks from a microbiology laboratory may extend to adjacent laboratories and to the families of those who work in the microbiology laboratory.

Individuals are exposed in various ways to health care– associated infections, transporting specimens and in public areas such as cafeterias, by:

• Rubbing the eyes or nose with contaminated hands

• Inhaling aerosols produced during centrifugation, mixing with a vortex, or spills of liquid cultures

• Accidentally ingesting microorganisms by putting pens or fingers in the mouth

• Receiving percutaneous inoculation (i.e., through puncture from an accidental needle stick)

• Manipulating or opening bacterial cultures in liquid media or on plates, creating potentially hazardous aerosols, outside of a biosafety hood

• Failure to wash hands upon leaving the restroom or other public areas before entering the laboratory**.**

Figure (2): Autoclave bags.

Microbiologists should wear laboratory coats over their street clothes, and these coats should be removed before leaving the laboratory. Most exposures to blood-containing fluids occur on the hands or forearms, so gowns with closed wrists or forearm covers and gloves that cover all potentially exposed skin on the arms are most beneficial. If the laboratory protective clothing becomes contaminated with body fluids or potential pathogens, it should be sterilized in an autoclave immediately and cleaned before reusing. The institution or a uniform agency should clean laboratory coats; it is no longer permissible for microbiologists to launder their own coats. Alternatively, disposable gowns may be use.

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