Safety and biosecurity

Lecture.1

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Occupational Safety and Health

Occupational safety and health is defined as the science concerned with preserving human safety and health, by providing a safe working environments free from the causes of accidents, injuries, or occupational diseases.

Occupational safety and health are involved in all areas of life. When we deal with electricity or household electrical appliances, it is essential to follow safety rules and their principles, and when driving cars or even walking on the streets, we need to follow safety rules and principles.

Biosafety and biosecurity

Biosafety is the prevention of large-scale loss of biological integrity, focusing both on ecology and human health. The maintenance of safe conditions in biological research to prevent harm to workers, nonlaboratory organisms, or the environment.

The primary goal of any biosafety program is to contain potentially harmful biological agents.

Biosecurity is a strategic and integrated approach to analyzing and managing relevant risks to human, animal and plant life and health and associated risks for the environment.

Technical Definitions

Biohazard: An agent of biological origin that has the capacity to produce deleterious effects on humans, i.e. microorganisms, toxins and allergens derived from those organisms; and allergens and toxins derived from higher plants and animals.

Hazardous waste is defined as a waste or a mixture of several wastes that pose a threat to human health or other living organisms, whether in the short

or long time as: -

A- Non-degradable and durable in nature.
B- B- Or it may cause harmful cumulative effects.

To control hazardous waste and reduce its damage to the environment and public health, many countries have put in place legislation to control hazardous waste and dispose of it in safe ways to reduce its potential risks to humans, animals and plants, but these controls were recently introduced and their application is relatively due to the presence of many The abuses that are carried out outside the scope of control, as there are many cases in which dangerous levels of toxic substances are discovered in them, and for the ease of classifying these wastes, they have been placed into five main groups:

1. Radioactive materials

2. Chemicals

3. Biological waste

4. Flammable waste

5. Explosives

Laboratory Biorisk Management: System or process to control safety and security risks associated with the handling or storage and disposal of biological agents and toxins in laboratories and facilities.

Key Components of Biorisk Management

1-**Biorisk Assessment:** Process of identifying the hazards and evaluating the risks associated with biological agents and toxins, taking into account the adequacy of any existing controls, and deciding whether or not the risks are acceptable.

2-**Biorisk Mitigation:** Actions and control measures that are put into place to reduce or eliminate the risks associated with biological agents and toxins.

3-**Performance:** The implementation of the entire biorisk management system, including evaluating and ensuring that the system is working the way it was designed. Another aspect of performance is the process of continually improving the system.

Biorisk Management = Assessment, Mitigation, Performance

Why we need Biosafety?

Some unfortunate examples of disease outbreaks in research labs:

1950-1976:

•A survey of 5000 labs showed 3921 cases of disease outbreaks.

•Most commonly reported were: Hepatitis, tuberculosis, typhoid, brucellosis, rabbit fever

2003-2014:

•SARS infects researchers in a lab in Singapore.

•AUS. and a Russian scientist are infected by Ebola. One survives one dies.

•Polio virus escapes from two Indian labs.

Why we need Biosecurity?

Biosecurity as the third component of biorisk management focuses on securing biological materials. The current focus on biosecurity evolved from a series of events that made the need for more focus on security around laboratories clear.

In 2001, at least five envelopes containing Bacillus anthracis spores (the etiologic agent of the disease anthrax) were mailed to U.S. Senators and media organizations.

At least 22 individuals contracted anthrax as a result of the mailings; five of the individuals died. After a nearly ten-year investigation, known as Amerithrax, it was determined through genetic analysis that the spores in the letters were derived from a single spore-batch of Bacillus anthracis (Ames strain), isolated from a cow in Texas and distributed to a number of research laboratories, including the United States Army Medical Research Institute for Infectious Diseases (USAMRIID). On February 19, 2010, the Justice Department, the FBI, and the U.S. Postal Inspection Service formally concluded the investigation into the 2001 anthrax attacks, which determined that Dr. Bruce Ivins, a USAMRIID employee, acted along in planning and executing these attacks.