



# BIOSAFETY IN PUBLIC HEALTH LABORATORIES

## Introduction to Biosafety in Public Health Laboratories

Advances in biotechnology and biomedical research have led to the establishment of highly sophisticated laboratories with different biorisk levels in several fields such as microbiology, immunology, genetics, and nanotechnology among others. Some research laboratories, such as those dealing with highly pathogenic substances, genetically modified organisms, and infectious outbreaks impose greater health concerns due to their high potential biological risk on humans and the environment combined. These biological risks can be controlled and contained by the correct implementation of internationally recognized procedures such as proper handling of laboratory equipment, adequate facilities, recognition and containment of laboratory emergencies, and the proper training and education of laboratory personnel.

The World Health Organization (WHO) has long recognized that safety and, specifically, biological safety are important international issues and a major concern to public health. WHO published the first edition of the Laboratory biosafety manual in 1983 and in all the later editions the main pillars of Biorisk Management are highlighted: Biosafety and Biosecurity. Biosafety mainly helps identify the potential risks associated with different laboratories depending on their biorisk classification. Understanding the risks aid in implementing necessary preventive measures which is the first and main step in biorisk management in public health laboratories. Biosecurity, on the other hand, ensures the protection, control and accountability for valuable biological materials within laboratories to prevent their unauthorized access, loss, misuse or intentional release. Biosafety and biosecurity include several control measures that may overlap. Implementing the appropriate safety procedures and secure measures will ensure the protection of the laboratory staff, and through them, the environment and public health.

## Biosafety in Public Health Laboratories Programs

The training in Biosafety in Public Health Laboratories consists of three programs, with three months duration for each program:

[Program 1: Biosafety and Biosecurity in Public Health Laboratories](#)

[Program 2: Risk Management in Public Health Laboratories](#)

[Program 3: Management of Public Health Laboratories](#)

**Residents who complete the nine-month program requirements will be awarded a Professional Diploma**

## Eligibility Criteria

- Bachelor's degree from a recognized university in health, medicine, behavioural, or social sciences, or any other related field of science.
- Preferably with work experience in a health-related field
- Demonstrated ability to study in English

**In All Programs:**

<b>Training Delivery method</b>
- In-class method
- Blended learning method

<b>Training Language</b>
- Arabic
- English

## Who Should Apply

The programs are useful for public health professionals working for ministries of health, non-governmental organizations, and scientists/personnel working in medical research laboratories. Since this programs focus on management courses, this programs could help professionals seeking leadership positions in the biomedical industries.

## Program Overview

The main aim of this program is to review the basic and major concepts of Biosafety. This program will introduce residents to basics of public health which is essential to get residents acquainted with the major challenges and issues that may endanger the general safety of public health. The program will also discuss the different aspects of biosafety and biosecurity that include distinguishing laboratories with different risk levels as identified by the WHO, identifying biorisks associated with medical laboratories, coming up with preventive measures, and understanding the different protective measures that should be implemented in every laboratory. These measures include administrative, engineering, and personal protection procedures. This program will also introduce residents to the different laboratory incidents and emergency situations and the appropriate procedures that should be taken to contain, reduce, and deal with such incidents.

## Learning Outcomes

By the end of the program, residents will be able to:

- Understand the common challenges that face public health
- Distinguish between laboratories with different biorisk levels
- Identify the different health risks associated with any laboratory
- Apply different preventive measures after identifying the risks.
- Implement the necessary protective procedures in cases of incidents and emergencies

## Training Courses

- Introduction to Public Health
- Biosafety in Public Health Laboratories
- Biorisk classification
- Biorisk Assessment and Management

## Field Work

Residents spend eight weeks in the field work in order to be exposed to real-life situations and to practice the skills they gain with the guidance of a dedicated mentor. The following field projects are expected to be conducted during the field work period:

- Identify potential risks in medical laboratories and know how to respond to emergency situations
- Apply research findings to raise awareness to biomedical biosafety in laboratories.

### Program Overview

The main aim of this program is to cover the essential details of developing and maintaining the safety settings in public health laboratories. The main focus will be on the containment and protection of workers mainly in the high-risk group laboratories dealing with hazardous biological materials (i.e. pathogens). Pathogens can be defined as any infectious agents ranging from viruses, bacteria, fungi, parasites and prions. The program is designed to help the residents identify and understand the biology of laboratory acquired infections by going in depth into the basics of microbiology and infection transmissions and accordingly the design of laboratories containing these different types of samples. This program will also help residents to develop rules, regulations, and practices that will maintain containment which is required to prevent potentially hazardous biological materials from escaping and spreading into the environment. The program will also focus on the safe shipping and handling of various biological materials.

### Learning Outcomes

By the end of the program, residents will be able to:

- Identify the challenges associated with laboratory acquired infections
- Explain the concepts of containment and develop methods for maintenance
- Choose the appropriate biosafety cabinets with matching features to the respective laboratories
- Develop building design complementing safety standards in agreement with WHO.
- Develop safe practices and protocols such as SOPs and MSDS that will aid in implementation.
- Identify the challenges associated with the shipment of biological samples and methods to tackle them.

### Training Courses

- Laboratory Acquired Infections
- Risk Mitigation: Engineering Controls
- Risk Mitigation: Safe Practices
- Shipping Regulated Biological Material
- Applied Research in Laboratory and Biosafety

### Field Work

Residents spend seven weeks in the field work in order to be exposed to real-life situations and to practice the skills they gain with the guidance of a dedicated mentor. The following field projects are expected to be conducted during the field work period:

- Identify potential risks associated with handling biological samples such as bacteria and viruses in medical laboratories and know proper containment practices
- Develop and implement safety documents and procedures that entail handling samples, equipment, and laboratory space
- Implement the regulations that entail transport of biological samples.

### Program Overview

The main aim of this program, which is intended for advanced residents, is to master the essential skills of laboratory and safety management. The main focus of this program will be on maintaining laboratory biosecurity, managing emergencies and waste disposal, all of which are significant factors that need to be managed effectively for a safe working environment. Different aspects of laboratory management will be discussed such as space and personnel management, laboratory policies and forms development, and scientific writing. This program will also introduce residents to the major concepts of Biosecurity such as building security, personnel security, transportation and information security. All of these factors contribute to maintain security and protection from biological and physical threat that could endanger the health of the personnel, surrounding environment and public health in general. Biological and Chemical waste disposal management are also two important topics that will be discussed in this program . Together with emergency management this program would sum up the most important factors that need proper regulations and a solid management system to maintain all aspects of safety in public health laboratories.

### Learning Outcomes

By the end of the program, residents will be able to:

- Explain the foundations of laboratory management
- Explain the main aspects of biosecurity
- Manage the disposal of hazardous waste
- Manage Emergencies
- Develop policies and regulations to contain and prevent emergencies in medical laboratories

### Training Courses

- Introduction to Public Health Laboratories Management
- Biosecurity Management
- Biological Waste Management
- Chemical Waste Management
- Emergency Management in the laboratory

### Field Work

Residents spend seven weeks in the field work in order to be exposed to real-life situations and to practice the skills they gain with the guidance of a dedicated mentor. The following field projects are expected to be conducted during the field work period:

- Recognize and acknowledge the different roles and responsibilities handled by the personnel and administration and learn to coordinate between them
- Develop and implement safety documents and procedures that entail handling samples, equipment, and laboratory space
- Develop and implement security regulations based on the nature of the laboratory.
- Manage emergency responses and develop strategies to minimize/prevent them.

Residents who complete the three-month program requirements will be awarded Technical diploma issued by International Academy of Public Health (IAPH) and accredited by Agency for Public Health Education Accreditation (APHEA).



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