



“Developing a Biosecurity Training Program for Preparedness for Future Disasters and Increasing the Vocational Skills of Microbiology Laboratory Health Professionals” (MicroLabSecure)

MODULE 3

EMERGENCY RESPONSE AND CRISIS MANAGEMENT

1. Scope of the Training Module

This module is a practical training module designed to ensure that microbiology laboratories can operate in a safe, sustainable, and organized manner during disasters and emergencies. The module focuses on laboratory service continuity in large-scale disasters such as earthquakes, biosafety, crisis communication, leadership, energy resilience, personnel safety, critical sample management, and collaboration with pre-determined sibling laboratories. It aims to enable participants to make rapid decisions during a disaster, prioritize effectively, and sustain laboratory services within safe limits.

The module consists of three main sections:

1. Resilient Laboratory Approach
2. Earthquake Bag Preparation Activity
3. Sibling Laboratory Model

The first section evaluates the laboratory’s crisis management capacity through high-intensity earthquake scenarios occurring at night and during the day. This section addresses the command chain, safe shutdown, continuity of operations planning (COOP), energy management, communication resilience, and processes for protecting critical assets.

The second section is an interactive earthquake bag preparation activity designed to enhance participants’ awareness of individual preparedness, prioritization, and sustainability during disasters. Participants experience decision-making processes under limited resources, changing scenarios, and crisis conditions.

The third section examines the operational collaboration model between a laboratory affected by a disaster and a supporting “sibling laboratory.” This section evaluates inter-laboratory test transfer, data management, sample transfer, written collaboration protocols, alternative center planning, and the establishment of regional resilience networks.

The module has been delivered using theoretical knowledge, scenario-based discussions, group work, tabletop exercises, and practical training techniques.

1a. Purpose of the Training Module

The purpose of this training module is to equip microbiology laboratory staff with the necessary knowledge, skills, and awareness to maintain laboratory service continuity while protecting biosafety during disasters and emergencies, to manage crisis processes effectively, and to establish resilient laboratory systems.

In addition, the module aims to:

- Sustain laboratory organizational continuity during disasters,
- Ensure personnel safety,



“Developing a Biosecurity Training Program for Preparedness for Future Disasters and Increasing the Vocational Skills of Microbiology Laboratory Health Professionals” (MicroLabSecure)

- Maintain critical diagnostic services,
- Protect communication and the command chain,
- Plan for energy and data continuity,
- Develop sibling laboratory collaborations,
- Strengthen a culture of preparedness before disasters.

1b. Objectives of the Training Module

The objective of this module is to enable microbiology laboratory specialists, researchers, technicians, and other health professionals to reach a level of competence where they can manage laboratory operations in a safe, sustainable, and organized manner during disasters and emergencies.

By the end of the module, participants will be able to:

- Make fast, accurate, and prioritized decisions during a disaster,
- Implement a minimum service model during a crisis,
- Assess personnel safety and biosafety risks together,
- Initiate and manage safe shutdown procedures,
- Use alternative communication methods,
- Plan energy, data, and critical equipment management,
- Prioritize critical samples and tests,
- Coordinate within the sibling laboratory model,
- Increase individual, institutional, and regional preparedness levels,
- Manage post-disaster recovery and phased return to normal services.

2. Learning Outcomes of the Training Module

By the end of this module, participants are expected to acquire the following knowledge and skills:

- Identify laboratory risks during disasters and emergencies,
- Explain the concept of a resilient laboratory,
- Adapt the Incident Command System (ICS) approach to the laboratory environment,
- Establish a disaster command chain,
- Plan safe shutdown processes,
- Develop a continuity of operations plan (COOP),
- Define minimum service levels,
- Perform critical test prioritization,
- Plan energy resilience and generator strategies,



“Developing a Biosecurity Training Program for Preparedness for Future Disasters and Increasing the Vocational Skills of Microbiology Laboratory Health Professionals” (MicroLabSecure)

- Evaluate UPS and critical device management,
- Develop strategies for protecting critical biological materials and -80°C archives,
- Apply alternative communication methods in case of communication failure,
- Use the SITREP (Situation Report) logic,
- Organize personnel and assign tasks during disasters,
- Develop individual preparedness through earthquake bag preparation,
- Improve prioritization and decision-making skills under resource constraints,
- Plan inter-laboratory collaboration within the sibling laboratory model,
- Evaluate sample transfer and data continuity processes,
- Explain the basic principles of written collaboration protocols,
- Plan post-disaster reconstruction processes.

3. Training Methods and Techniques

The following training methods and techniques were used in this module:

- Theoretical presentations
- Scenario-based learning
- Problem-solving-oriented group work
- Tabletop exercises
- Role-playing and crisis simulations
- Interactive decision-making exercises
- Discussion sessions
- Risk assessment applications
- Disaster management algorithms
- Case analysis
- Brainstorming sessions
- Practical earthquake bag preparation activity
- Laboratory disaster management simulations

Participants gained hands-on experience in decision-making, prioritization, and team coordination under limited resources and different crisis scenarios.

4. Content – Scope

4.1 Resilient Laboratory Approach



“Developing a Biosecurity Training Program for Preparedness for Future Disasters and Increasing the Vocational Skills of Microbiology Laboratory Health Professionals” (MicroLabSecure)

This section covers the organizational, technical, and managerial approaches required to ensure the operational continuity of a microbiology laboratory during a disaster. The goal is not only for the laboratory to remain physically standing but also to continue providing critical diagnostic services in a safe, controlled, and prioritized manner.

Content topics include:

- Basic principles of disaster management
- Laboratory disaster command chain
- Incident Command System (ICS) approach
- Leadership loss and automatic command transfer
- Communication failure scenarios
- Physical assembly protocols
- Communication network (call-tree) systems
- Radio and alternative communication methods
- Continuity of operations plan (COOP)
- Level 0-1-2-3 service model
- Safe shutdown
- Critical test prioritization
- Management of blood cultures, CSF, and critical samples
- Biosafety cabinet management
- Energy resilience
- Generator and UPS planning
- -80°C ultra-low temperature freezer protection strategies
- Critical material protection and transfer processes
- Chemical and gas safety
- Data security and manual record-keeping systems
- 72-hour crisis management approach
- Post-disaster reconstruction and phased normalization

Practical discussions were held based on night-time earthquake scenarios and daytime earthquake scenarios while the laboratory was actively operating. Participants evaluated personnel, energy, communication, biosafety, and service continuity issues that may arise at different times of day and developed their decision-making skills regarding command chain, safe shutdown, critical test prioritization, and reconstruction processes.



“Developing a Biosecurity Training Program for Preparedness for Future Disasters and Increasing the Vocational Skills of Microbiology Laboratory Health Professionals” (MicroLabSecure)

4.2 Earthquake Bag Preparation Activity

This section is a practical group activity designed to enhance participants’ individual disaster preparedness, prioritization, resource management, and sustainability awareness.

During the activity, participants:

- Created an earthquake bag under limited weight capacity,
- Prioritized between basic needs and laboratory-specific requirements,
- Reorganized their bags according to unexpected crisis scenarios,
- Gained experience in fast, reasoned decision-making under resource constraints.

Items evaluated in the activity included:

- Water and nutrition
- Safety equipment
- Personal health needs
- Hygiene supplies
- Communication devices
- Basic lighting and energy support
- Laboratory-specific emergency equipment

The activity aimed to make participants realize that individual preparedness is essential in addition to institutional plans during disasters.

Additional crisis scenarios were also incorporated, such as:

- Power outages,
- Collapse of network and communication infrastructure,
- Prolonged hospital stays,
- Personnel loss or team reduction,
- Cold weather conditions,
- Deterioration of hygiene conditions,
- Psychological stress and fatigue.

Participants practiced adapting to changing conditions, reprioritizing, and making decisions with limited resources.

4.3 Sibling Laboratory Model

This section discusses the collaboration model between a laboratory affected by a disaster and a supporting sibling laboratory. The aim is to demonstrate that service continuity during disasters can



“Developing a Biosecurity Training Program for Preparedness for Future Disasters and Increasing the Vocational Skills of Microbiology Laboratory Health Professionals” (MicroLabSecure)

be maintained not only through internal resources but also through pre-planned inter-laboratory support mechanisms.

Content topics include:

- Sibling laboratory concept
- Continuity of operations plan (COOP) approach
- Operational resilience model
- Critical test transfer
- Alternative laboratory capacity planning
- Sample transfer protocols
- Data management and continuity of laboratory information management systems
- Development of written collaboration protocols
- Test compatibility and standardization
- Personnel support and shift planning
- Critical biological material transfer
- Regional and national laboratory networks
- Alternative center planning
- Drills and field applications

Participants evaluated, across different disaster scenarios, which tests would be transferred to the sibling laboratory, how capacity management would be handled, how sample and data flow would be maintained, and how inter-laboratory coordination would be ensured. In this way, a regional resilience approach that prevents interruptions in diagnostic services during disasters was discussed.

5. Conclusion

Disasters and emergencies pose serious threats to microbiology laboratories not only in terms of physical damage but also in terms of biosafety, data security, energy continuity, personnel organization, and the continuity of critical diagnostic services.

This module has provided a comprehensive and practical training approach that supports laboratory staff in being prepared for disasters, acting in an organized and safe manner during crises, prioritizing effectively, and sustaining laboratory service continuity.

Through topics such as the resilient laboratory model, safe shutdown processes, energy and communication resilience, individual preparedness activities, and sibling laboratory collaboration, both the theoretical knowledge levels and practical crisis management skills of the participants were enhanced.



“Developing a Biosecurity Training Program for Preparedness for Future Disasters and Increasing the Vocational Skills of Microbiology Laboratory Health Professionals” (MicroLabSecure)

It is expected that this training approach will contribute to reducing laboratory-related risks in future disasters, protecting biosafety, sustaining critical diagnostic services, and supporting overall health service continuity.

REFERENCES

1. World Health Organization. Laboratory Biosafety Manual. 4th ed. Geneva: WHO; 2020.
2. World Health Organization. WHO Guidance on Preparing for National Response to Health Emergencies and Disasters. Geneva: WHO; 2021.
3. World Health Organization Europe. Preparedness 2.0: Strategy and Action Plan on Health Emergency Preparedness, Response and Resilience in the WHO European Region 2024–2029. Copenhagen: WHO Regional Office for Europe; 2024.
4. Clinical and Laboratory Standards Institute. GP36: Planning for Laboratory Operations During a Disaster. Wayne (PA): CLSI; 2014. World Health Organization. Laboratory biosecurity guidance. Geneva: World Health Organization; 2024. Available from: <https://www.who.int/publications/i/item/9789240095113>.
5. Sancak B, Eser Ö, editors. Afet ve Salgınlarda Mikrobiyoloji Laboratuvarı. Ankara: Akademisyen Yayınevi; 2024.
6. Centers for Disease Control and Prevention, National Institutes of Health. Biosafety in Microbiological and Biomedical Laboratories. 6th ed. Atlanta (GA): CDC; 2020. Available from: <https://www.cdc.gov/labs/bmbl/index.html>.