Session 003 — Biological Risk Assessment and Laboratory Biosafety

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Course: Biosafety and Bioprotection: Fundamentals and Advanced Practices for Containment Laboratories

Purpose of Document:

This overview is designed to help participants navigate the Session 3 video. It highlights main conceptual sections, key points, and transitions to organize the lecture. It is intended as a navigation and orientation tool and does not replace the lecture.

SECTION 1 — Introduction to Risk Assessment

Main focus: Provides overview of risk evaluation in high-containment laboratories; distinction between theoretical project and practical operational assessment.

Key points:

- Biological risk assessment as a critical part of lab planning.
- Identification of hazards, potential consequences, and mitigation measures.
- Recognition that risks cannot be completely eliminated; focus on mitigation.
- Role of sustainability and environmental protection in lab operations.

Rhetorical questions / Listen-for cues:

- Why is redundancy and risk assessment essential in a BSL-3 lab?
- Who is responsible for operational protection?

Orientation cue: Establishes conceptual basis for operational protection and redundancy.

SECTION 2 — Types of Laboratory Risks

Main focus: Classifies hazards and potential risks in containment labs.

Key points:

- Biological risks: viruses, bacteria, fungi, GMOs.
- Operational scenarios: aerosol generation, direct contact, accidental inoculation.
- Consideration of vulnerable populations (humans, animals, plants) and environmental impact.
- Importance of evaluating probability, exposure, and consequences.

Rhetorical questions / Listen-for cues:

- How does risk assessment guide lab design and operation?
- Which factors determine required containment level?

Orientation cue: Guides application of a risk-based approach to containment decisions.

SECTION 3 — Methodology for Risk Assessment

Main focus: Considers stepwise framework for conducting biological risk assessment using international standards.

Key points:

- Information Gathering: agent characteristics, lab environment, personnel competency, procedures.
- Risk Identification: define hazards and pathways of exposure.
- Risk Analysis: evaluate likelihood and severity of incidents.
- Risk Evaluation: determine acceptability of risk, prioritize by likelihood and impact.
- Risk Treatment: implement controls proportional to risk.
- Continuous Review: monitor and adjust risk management measures.

Rhetorical questions / Listen-for cues:

- How to prioritize risks in BSL-3 labs?
- What measures ensure minimum operational impact in case of failure?

Orientation cue: Provides operational guidance to anticipate and mitigate failures.

SECTION 4 — Case Studies and Practical Examples

Main focus: Applies risk assessment in diverse laboratory scenarios.

Key points:

- Operational incidents and mitigation: autoclaves, freezers, generators.
- Use of dual systems and verification to prevent exposure.
- Personnel coordination and institutional protocols.
- Examples from Brazil, Fiocruz, and Texas laboratories.

Rhetorical questions / Listen-for cues:

- What lessons do real operational case studies provide?
- How does redundancy prevent incidents in practice?

Orientation cue: Connects theoretical risk principles to practical scenarios.

SECTION 5 — Risk Assessment Tools and Strategies

Main focus: Develops tools for structured risk assessment and documentation.

Key points:

- Bowtie analysis, WHO guides, national strategies.
- Clear terminology and shared understanding among personnel.
- Integration of hazard identification, exposure pathways, and mitigation measures.
- Dynamic adaptation to new hazards and emerging pathogens.
- Emphasis on transparency, consistency, and proportionality.

Rhetorical questions / Listen-for cues:

- Which tools facilitate systematic risk assessment?
- How to adapt procedures to evolving laboratory hazards?

Orientation cue: Considers use of structured tools for comprehensive risk evaluation.

SECTION 6 — Summary and Learning Objectives

Main focus: Reinforces core principles of biological risk assessment and operational readiness.

Key points:

- Define biological risk and understand its significance in laboratory biosafety.
- Identify and classify hazards in high-containment labs.
- Apply systematic risk assessment methods to operations.
- Evaluate, implement, and review risk mitigation measures effectively.
- Understand interaction between operational practices, environmental protection, and sustainability.

Rhetorical questions / Listen-for cues:

- What are the key takeaways for implementing risk assessment in BSL-3 labs?
- How will these principles guide daily laboratory operations?

Orientation cue: Reinforces operational preparation, risk management, and readiness for future sessions.