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INTERNATIONAL BIOLOGICAL and CHEMICAL THREAT REDUCTION

Biohazard Identification: The First Step in Biological Risk Analysis

Session 2: Creating and Promoting a Culture of Safety and Quality

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Veterinary Laboratory Hazards

Veterinary laboratories and animal facilities routinely handle biological materials that may constitute or contain infectious agents and toxins that may cause adverse animal or public health and economic effects due to uncontrolled release inside or outside the laboratory.

- OIE Terrestrial Manual, Chapter 1.1.4

The first step in minimizing biological risks is to identify all biohazards that pose a risk to safety and security

Implications of a Release

Laboratory accidents happen regularly, and most of the time it is the worker who is at risk. Occasionally, hazards have escaped laboratories and adversely affected people and/or animals

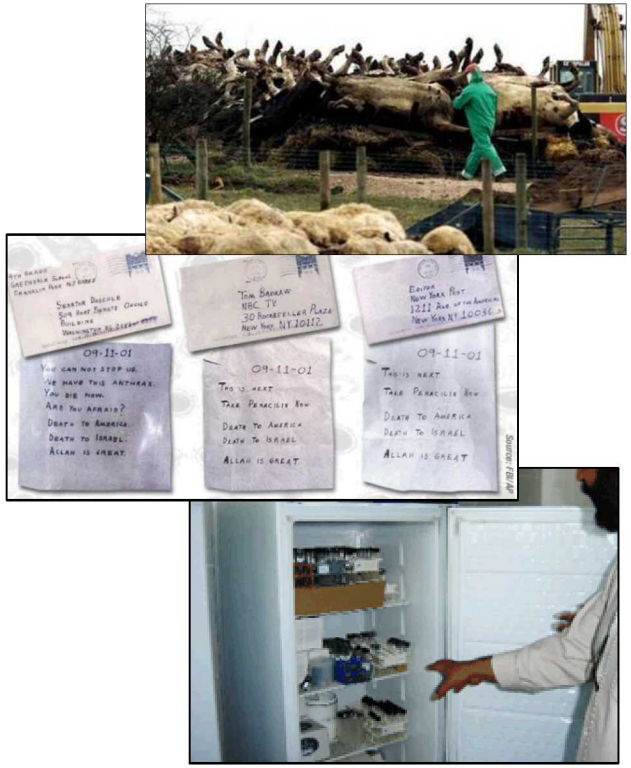
Accidents: Severe consequences

- Singapore diagnostic laboratory
  - Severe Acute Respiratory Syndrome (SARS)
- U.K. Vaccine manufacturer
  - Foot and Mouth Disease outbreak
- U.S. Army Medical Research Institute of Infectious Diseases
  - *Bacillus anthracis* allegedly stolen

Hazard Identification

During the biohazard identification process, it is necessary to identify biological agent characteristics that make the agent hazardous, and potentially make the agent attractive for malicious use or theft

- Hazard identification answers the questions:
  - What can go wrong?
  - What is the risk to individuals (human and animal) inside and outside the laboratory?
  - What is the risk to those in the facility?
  - What is the risk of theft of the biological materials or equipment?
  - What is the risk of selling or destroying the biological materials, equipment, intellectual property, or personal information for personal gain?



Hazard Types

Most hazards fall into the following five categories:

1. The inventory of biological agents stored and handled by the laboratory staff
   - Pathogens that pose risks to human and animal health
   - Biological agents that are important for research, diagnostics (controls), and vaccine development
2. Diagnostic Specimens
   - Most specimens are unknowns
3. Transportation and storage of pathogens
   - Movement and storage can result in an accidental release or theft
4. Physical and chemical hazards
   - Hazards such as sharps, hot liquids, reagents, disinfectants are also considered laboratory hazards
5. Laboratory animals
   - Laboratory infected with microorganisms as well as bites and scratches occur with live animal use

Inventory of Pathogens and Hazards

Maintaining accurate and up-to-date records and inventories of all hazards has many advantages:

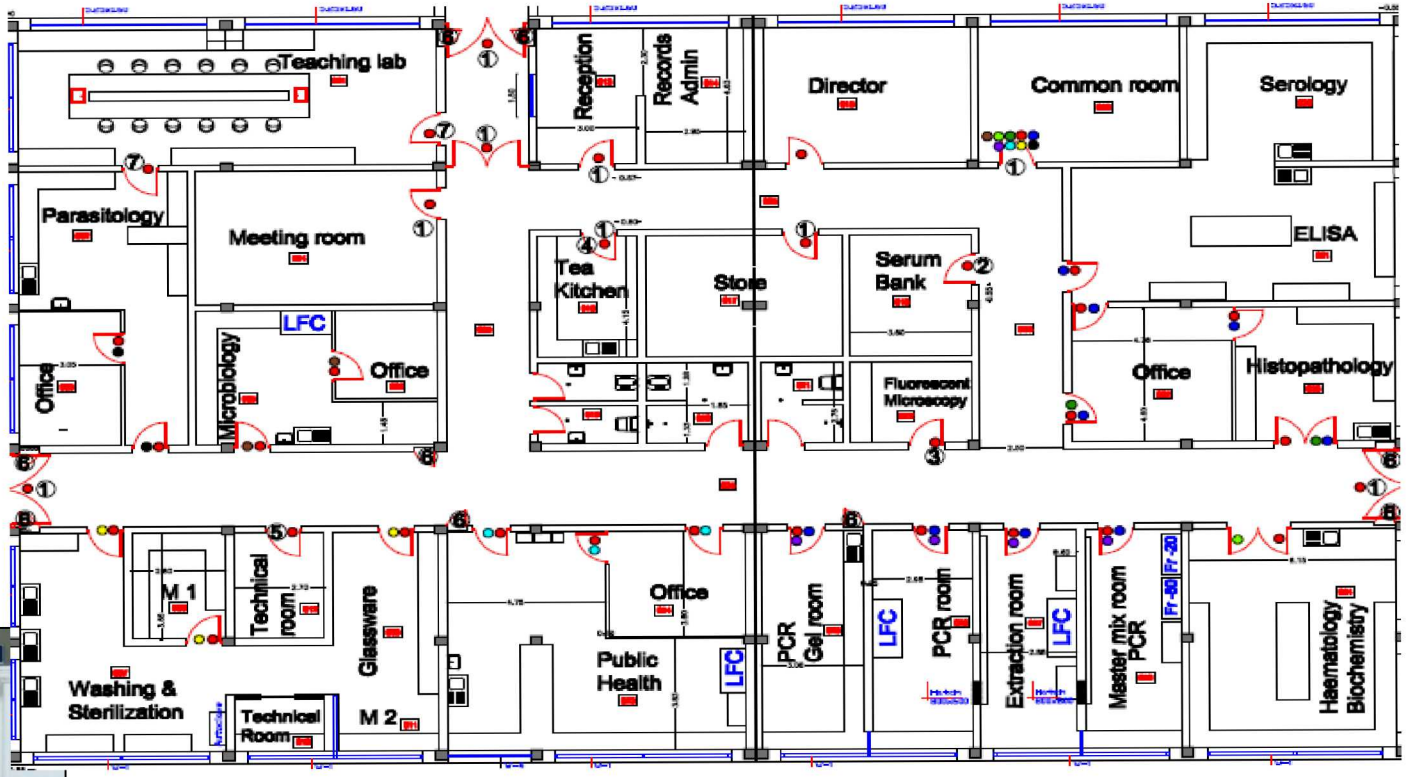
- Ensure that all materials are accounted for and safety and securely stored
- Early recognition of missing materials
- Easy access to biological materials that may be required for research and/or vaccine development
- Accelerates re-evaluation of risk in a laboratory
- Laboratory network standardization, transparency, and consolidation of pathogens

Hazards of Diagnostic Specimens

Clinical samples delivered to diagnostic laboratories are unknowns and must be handled safely and securely during collection, transportation, processing, analysis, and disposal

- Hazard identification and risk assessment must be done to ensure that laboratories are prepared to receive samples that could pose a risk to animal and public health
- Laboratory networks should establish policies and standard operating procedures to identify, analyze and manage these risks
- Clinical veterinarians and farmers must also be made aware of the hazards and risk associated with sample submission

Hazard Identification Laboratory Example



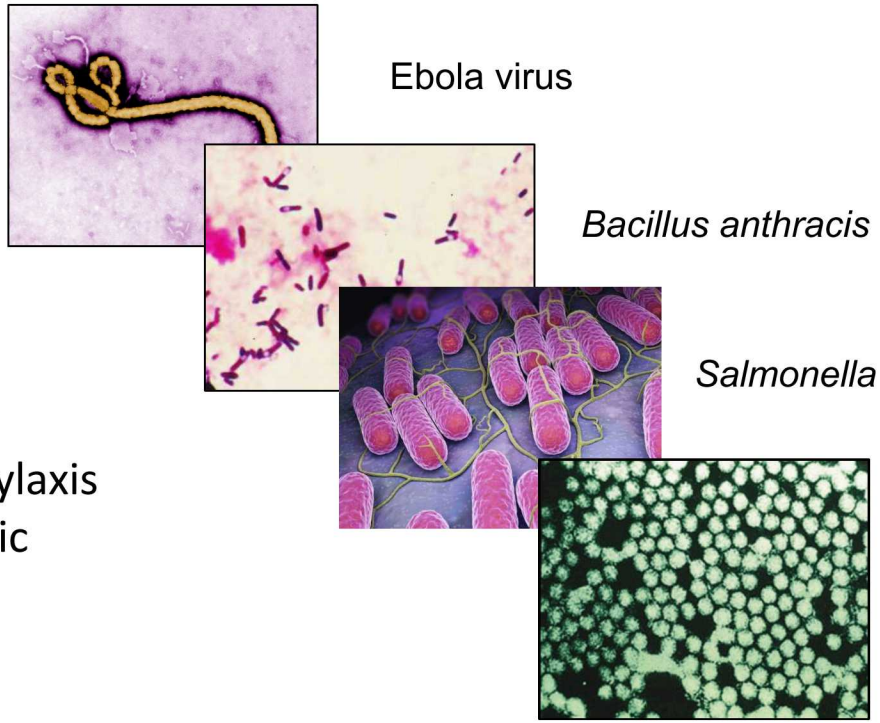
Veterinary Diagnostic Laboratory with several departments including Public Health, PCR, Serology, Parasitology, and Hematology

As a Central Veterinary Laboratory, the Director has authority over the Provincial and Regional Laboratories

Hazard Characterization

It is necessary characterize the hazard by identifying the agent characteristics that may make it hazardous and potentially attractive for malicious use or theft

- Consider
  - Routes of infection
  - Infectious dose
  - Morbidity and mortality rates
  - Stability in the environment
  - Virulence
  - Host range
  - Available treatment and prophylaxis
  - At risks host – Endemic/enzootic
  - Value to an adversary



Ebola virus

Bacillus anthracis

Salmonella dublin

FMDV

- *Hazard characterization is essential to conduct the risk assessment*

Summary

- Veterinary laboratories handle materials that pose a risk to human, animal, and environmental health

- Hazards exist throughout the lab and are found in:
  - Laboratory repositories,
  - Diagnostic samples and testing methods,
  - Sample collection and transportation,
  - Laboratory and clinical cases animals,
  - Physical and chemical materials associated with laboratory procedures

- A standardized approach to hazard identification is the first step in risk analysis and is essential to establish a robust biorisk management system