THE REPUBLIC OF UGANDA
MINISTRY OF HEALTH

UGANDA Supranational® Reference Laboratory

Timely Accurate Diagonostics for a TB-Free Africa

MGIT Culture

Module 3: Biosafety in a TB Culture laboratory

Date:
Venue:
Name:

Outline

- Transmission of TB
- Biohazards in a TB Culture laboratory
- Risk assessment in a TB Culture laboratory
- PPE
- Disinfectants

Transmission of tuberculosis

Mycobacterium tuberculosis is almost always transmitted by patients with active pulmonary disease:

- TB patient expels bacilli in small droplets of respiratory secretions.
- Droplet nuclei of this size, containing 1–3 bacilli, can remain suspended in the air.
- Following inhalation, droplet nuclei are able to reach deep into the lungs to produce infection.

Biohazards in the laboratory

Inhalation hazards: handling of liquids containing TB bacilli generates infectious aerosols:

- Pipetting
- Working with loops
- Inoculation hazards
- Shaking
- Centrifugation
- Spills
- Opening tubes at non-ambient temperatures or pressures

Risk assessment in a TB Culture Lab

Risk is the combination of the likelihood that:

- A specific hazard will be encountered and;
- The consequences of that specific hazard

Analysis of aerosolization leads to the development of measures to mitigate the Hazard

Factors to consider for Risk assessment

Factors relevant to all TB laboratories

- Pathogenicity, dose and transmission route
- Infectious dose, risk group persons
- High-burden settings (MDR and XDR)

Factors related to procedure or type of laboratory

- Direct sputum-smear microscopy
- Processing specimens for culture
- Manipulate cultures

How to conduct risk assessment for TB laboratory

- Identify the inherent hazards
- Decide who might be harmed and how
- Evaluate the risks and decide on precautions
- Record your findings and implement them
- Review your assessment and update it if necessary

Disinfection

Disinfectants recommended for a DST lab are those containing:

- Phenol: 5% in water;
- Chlorine: Sodium hypochlorite 1 or 5 g/l;
- Alcohol: ethanol (denatured ethanol, methylated spirits) or isopropanol are used at 70%.

These are usually selected depending on the material to be disinfected.

Medical fitness of laboratory staff

In accordance with national laws and practices, health surveillance of TB laboratory workers should be performed

- before enrolment in the TB laboratory;
- at regular intervals thereafter;
- after any biohazard incident.

Medical fitness of laboratory staff

- Workers should be educated about the symptoms of TB and provided with ready access to free medical care if symptoms arise.
- Confidential HIV counselling and testing should be offered. Reassignment of HIV-positive workers away from high-risk environments should be considered.

Personal Protective Equipment (PPE)

- Laboratory coats: (With low-risk of infection with TB)
  - Long sleeves and fasten in the front to cover street clothes

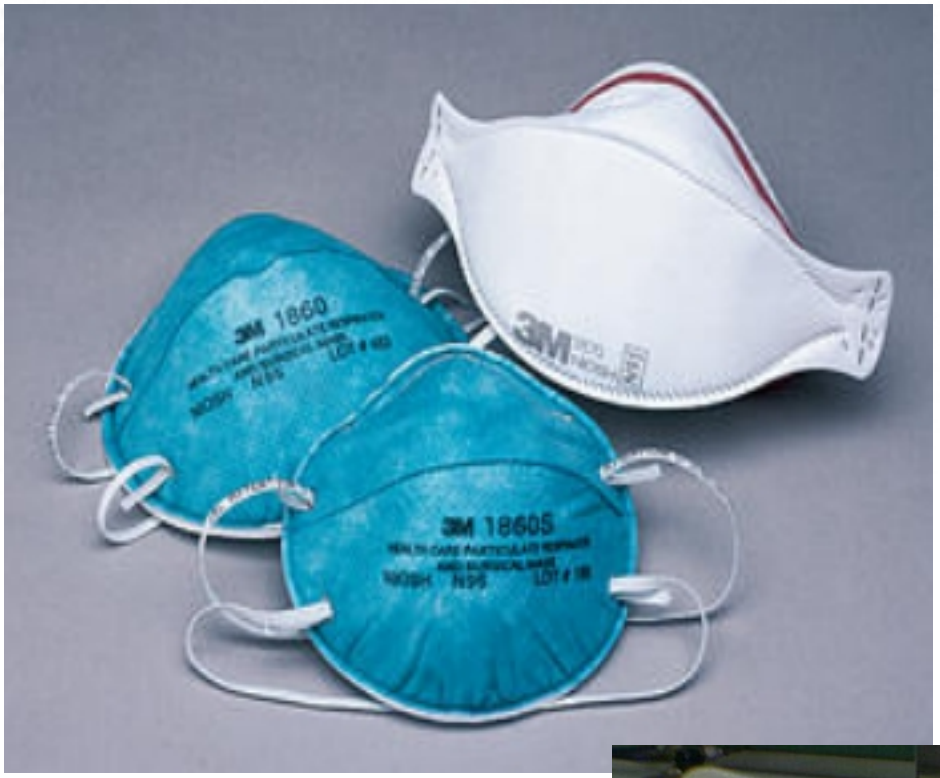
- Laboratory gowns (High risk of infection)
  - Long sleeves with an elasticized cuff, open at the back and should cover street clothing

Personal Protective Equipment (PPE)

- Respirators (N95 and FFP2)
  - Not required in low- and moderate-risk TB laboratories
  - May be required in high-risk TB laboratories following risk assessment

- Gloves (Required all risk groups)
  - Disposable microbiologically approved latex, vinyl or nitrile

Respirators



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PPE

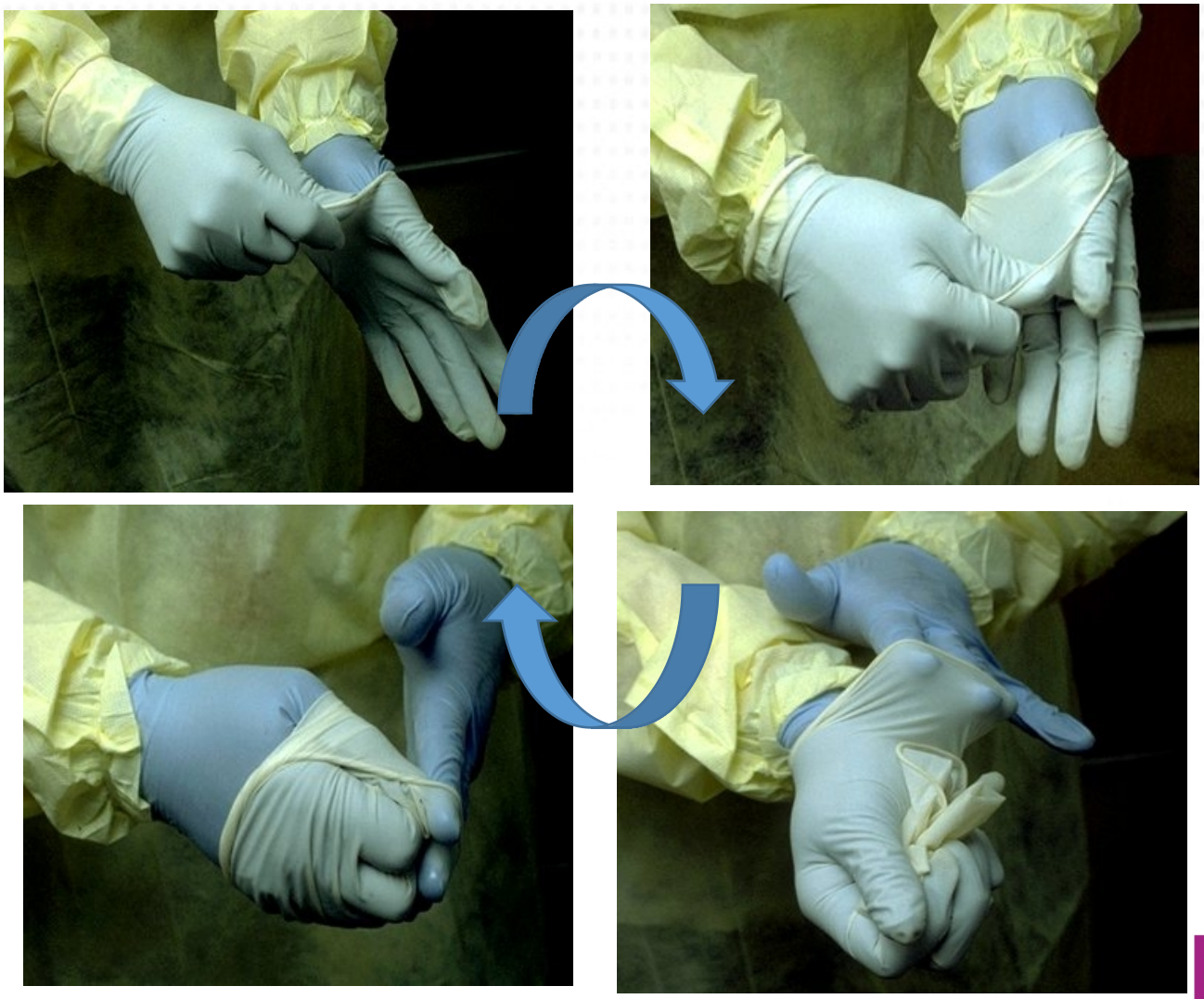
Surgical masks

- Not designed to protect the user from inhaling infectious aerosols and therefore should not be used for respiratory protection

Laboratory Gown

- should be worn for specimen processing, TB culture and DST
- Gowns should close and tie at the back
- Gowns must be long-sleeved and cuffed
- Gloves should be pulled over the cuff for maximum protection
- Fabric should be water-resistant

Example: Doffing Gloves



Emergency preparedness plan

The plan should provide an operational procedure for:

- Responses to natural disasters, such as fires, floods, earthquakes or explosions
- Risk assessments associated with any new or revised procedure
- Managing exposures and decontamination
- Emergency evacuation of people from the premises

Emergency preparedness plan

- Emergency medical treatment of exposed and injured persons
- Medical surveillance and management of persons exposed to an incident
- Epidemiological investigation
- Continuing operations after an incident.

Factors to consider for emergency preparedness

- Location of high-risk areas and identification of at-risk personnel
- Identification of procedures according to the level of risk
- Identification of responsible personnel and their duties
- Treatment and follow-up facilities, that can receive exposed or infected persons
- How emergency equipment will be provided

GROUP EXCERCISE

- Define a biological spill?

- David a laboratory technician has accidently dropped and spilled an *Mtb* positive MGIT isolate in the containment. Describe the procedure he would follow to manage such an incidence?

Spill clean-up kit

Two spill response kits should be prepared: one placed outside the containment laboratory and one placed inside the laboratory. The kits should include the items listed below:

- Disinfectant, Ethanol, respirators and gloves
- Laboratory gowns (disposable gowns)
- Dustpan and brush (for disposal if necessary)
- Chloramine tablets (10 tablets), paper towels
- Soap, sharps container, biohazard bags and goggles .

Assessment

- How is TB transmitted?
- List some of the sources of biohazards in culture lab?
- Describe the steps you would take to carry out a risk assessment in a culture lab?
- What disinfectants are used in a culture lab?
- What are the components of a spill kit?

Summary

- TB is transmitted through aerosols
- Conduct an appropriate risk assessment for a DST TB lab prior to selection of the appropriate PPE.
- 5% Lysol should freshly be prepared.
- Good lab practice should be maintained at all times.
- Having an emergence preparedness plan in place is key in effective occurrence management.

References

- GLI TB training package http://www.stoptb.org/wg/gli/trainingpackages.asp

Acknowledgments

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CHALLENGE TB

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