Laboratory issues for Epidemiologists

World Health Organization

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Design and layout
Agence Crayon Bleu: +33 (0)4 72 61 09 99

World Health Organization

CONTACTS

For further information please contact:

World Health Organization (WHO)
Communicable Diseases (CDS)
International Health Regulations
Coordination Programme (IHR)
Avenue Appia 20
1211 Geneva 27
Switzerland
Web: www.who.int/ihr

WHO Lyon Office for National Epidemic
Preparedness and Response
58, avenue Debourg
69007 Lyon
France

Tel: +33 (0)4 72 71 64 70
Fax: +33 (0)4 72 71 64 71
E-mail: oms@lyon.who.int
Web: www.who.int/ihr/lyon

Main competency to be acquired:

- identify the role of the laboratory in public health surveillance

Specific learning objectives:

- understand how the laboratory can contribute to epidemiological surveillance
- understand the principles of laboratory-based surveillance

Quality Control

Main competencies to be acquired:

- work with the laboratory to improve quality assurance

Specific learning objective:

- ensure that the corresponding laboratory has the highest possible level of quality assurance

Interpretation of results

Main competencies to be acquired:

- interpret laboratory test results taking into account sensitivity, test specificity and causality criteria

Specific learning objectives:

- think critically when:
  - interpreting positive and negative results
  - interpreting positive highly specific test results
- interpret laboratory results according to:
  - context
  - frequency of disease
  - test (sensitivity and specificity)
  - host relationship
- interpret names of tests and unities:
  - critical thinking if the identified pathogen is the responsible pathogen

→ Foreword

Epidemiology and laboratory medicine are two disciplines that are closely interrelated. However, they are not always optimally connected on a functional and organizational level.

In order to improve collaboration between these two disciplines, in 2002 WHO met with its partners in the global Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET) to identify the possible reasons for this lack of cohesion.

During this workshop, it was identified that Field Epidemiologists may not always fully understand the laboratory's role and limitations in support of field investigations; this can lead to a breakdown in communications, with frustrations both on the part of the epidemiologist and the laboratory specialist.

After the workshop, a smaller working group was established to design a training module to help address these training gaps. This working group included experts in epidemiology, laboratory and training from the following organizations: the European Programme for Intervention Epidemiology Training (EPIET), Field Epidemiology Training Program (FETP) - India, Institut Pasteur, Ministry of Health (MoH) – Thailand, the Public Health Agency of Canada (Canadian Field Epidemiology Program), and WHO India. The result of this global collaboration is before you in the shape of a training package designed to provide Field Epidemiologists with basic laboratory training as it pertains to field investigations.

This CD-ROM contains a basic set of training materials and recommendations to help trainers organize their training session on "Laboratory issues for Epidemiologists" (Lab for Epi). It is intended for classroom use, not for self-directed learning. It is meant as a guide, not a final training package, as we recognize that trainers should adapt the curriculum to meet local needs.

To maximize learning for the trainees, facilitators must have the appropriate training and expertise in each subject area.

The materials contained in the CD-ROM were peer-reviewed and pilot-tested by FETP India in January 2006. We welcome your feedback and suggestions to improve the materials, including pointing out any errors you may find.

→ Acknowledgements

We would like to thank all participating partners for their contribution to this package:

Canadian Field Epidemiology Program, Public Health Agency of Canada	http://www.phac-aspc.gc.ca/cfep-pcet/index.html
European Programme for Intervention Epidemiology Training	www.epiet.org
Field Epidemiology Training Program India	www.cdc.gov/descd/india.html
Institut Pasteur	www.pasteur.fr
MoH Thailand	http://eng.moph.go.th/
WHO India	www.whoindia.org

We also gratefully acknowledge the work of the investigation teams who conducted the real field work behind the materials we have developed. Finally we would like to thank all the different colleagues and partner agencies who reviewed parts of the materials or provided input towards its development.

Typing

Main competency to be acquired:

- identify situations in which specific typing methods should be used

Specific learning objectives:

- identify the situations in which typing is relevant, including:
  - confirmation of an outbreak when epidemiological methods lack sensitivity
  - identification of the cause of disease (environmental reservoir)
  - description of the phylogeny of pathogens
- identify typing methods adapted to the situation

Antimicrobial resistance

Main competencies to be acquired:

- identify the need and use for antimicrobial susceptibility testing
- interpret antimicrobial resistance results

Specific learning objectives:

- identify the need for anti-microbial susceptibility testing according to:
  - prevalence of antimicrobial resistance
  - antibiotics selected
  - enquiries on antibiotic resistance patterns
  - development of laboratory-based surveillance systems for antibiotic resistance
- think critically when interpreting antibiotic resistance results based on:
  - quality assurance levels of the laboratory
  - methods used

Role of the laboratory in surveillance

- for each type of sample, be able to:
  - take it safely and ethically
  - document it
  - label it
  - provide patient information
  - identify a tracking system
- for each type of sample, be able to:
  - package and store it taking into account UN rules for safe transport
  - identify the best shipping method
- identify criteria to choose a laboratory on the basis of:
  - dangerousness of pathogen
  - type of analysis to be done

Microbiological methods

Main competency to be acquired:

- identify key laboratory methods relevant to selected syndromes and / or suspected pathogens

Specific learning objectives:

- understand how key microbiological methods work
- understand the pros and cons of each microbiological method
- review the principles of immunology that are required to understand laboratory methods
- understand how epidemiologists can make use of various microbiological techniques
- consider, according to the context: limited time frame for antigen/pathogen detection; time-lag for antibody detection (detection window)
- consider, for each method: time-lag to obtain results, cost, qualification needs, sensitivity, specificity, limitations

About this training package

What are the main objectives of the present training?

The main objectives of this training module are to:

- facilitate communication and understanding between the two disciplines of epidemiology and laboratory medicine
- provide the Field Epidemiologist with a better understanding of basic microbiology techniques and analysis and interpretation of results
- convey the laboratory perspective of public health investigations to field epidemiologists

in order to improve collaboration between these two disciplines and to enhance the quality of field investigations as well as day-to-day interaction.

How long is the training course?

If delivered in its entirety, the module takes one week to conduct. However, it is possible to separate the components of the module into smaller sections. Note that it is important to identify the prerequisite lectures needed for each case study.

How to use this CD-ROM

This CD-ROM runs automatically on most computers. If it does not open automatically for whatever reason, you can open the main CD-ROM and double-click on "LABforEPI_START.exe". To exit, press "Q" (quit) on the bottom left side of the screen.

Who is the target audience?

The main target audience is that of Field Epidemiologists working at all levels of public health, as well as epidemiologists conducting routine surveillance activities who may have to deal with laboratory activities (including laboratory-based data).

How is the content organized?
The learning objectives of the different sections of the module are listed on pages 7-10 of this booklet.

The CD-ROM contains 9 sections:
1 - Communication
2 - Sampling
3 - Transport
4 - Microbiological methods
5 - Typing
6 - Antimicrobial resistance
7 - Role of the laboratory in surveillance
8 - Quality Control
9 - Interpretation of results

The training materials are divided into 3 types of documents:
- lectures
- cases studies
- background documents

The materials are sorted by:
- sections
- types of documents

LEARNING OBJECTIVES BY SECTION

COMMUNICATION

Main competency to be acquired:

- engage in key positive interactions with laboratory specialists

Specific learning objective:

- take into account the needs and objectives of the different stakeholders (clinicians, laboratory, veterinary and environmental agencies) during collaboration between epidemiologists and laboratory specialists.

SAMPLING

Main competency to be acquired:

- identify which sample is adapted to a specific syndrome and situation

Specific learning objectives:

- think critically while working with laboratory experts, at each step: planning the sampling; sampling analysis; reporting and documentation; feedback
- estimate the number of samples needed to confirm the cause of the outbreak
- follow ethical principles when collecting samples
- define sampling strategy related to affected organ or syndrome for most common situations
- seek external advice and consider brainstorming discussions in the case of non-typical picture

TRANSPORT

Main competency to be acquired:

- collect, label, package and transport samples appropriately and safely

Specific learning objectives: