

ESR Epidemiological Skills Development Programme

Module 2.3

Laboratory Investigation

Course Outline

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Overall aims, objectives and learning outcomes

Purpose of course

To build capacity of field disease investigators to manage the laboratory aspects of outbreak investigations.

Intended audience

This course is part of the level two suite of courses being offered under the ESR NCBID epidemiological skills development programme. This course is intended for disease investigators who are seeking to strengthen their skills, knowledge and understandings associated with the laboratory aspects of outbreak investigations. It is recommended that participants have previously completed Module 2.1 *Outbreak Investigation and Control Course* and are experienced in the investigation of outbreaks.

Overall Objectives

At the end of this course students will be able to:

- Manage specimen and sample collection in accordance with best practice and established protocols
- Identify the appropriate tests needed for diagnosis of a disease
- Interpret the diagnostic and epidemiological significance of reports from laboratory tests
- Communicate effectively with the laboratory team
- Understand the impact laboratory results has on a case definition and how this affects the case status
- Be aware of the future of laboratory testing methods and the limitations and possibilities/potential of laboratory testing
- Understand the New Zealand laboratory system

Competencies

The course will develop competencies in the following areas

- Investigation
- Communication
- Public health science

Desired Learning Outcomes

On successful completion of this course participants will **know/understand**

- The most appropriate communication pathways when dealing with laboratories
- The appropriateness of collection and analysis of specimens
- The strengths and limitations of laboratory investigation of an outbreak
- The limitations of laboratory testing and turnaround times
- The difference between test specificity and sensitivity and false positives and false negatives
- The naming of organisms and their nomenclature
- The difference between genotypic and phenotypic testing methods
- Advantages of different types of molecular testing in outbreak investigation
- The different types of laboratories in New Zealand and what services they offer

On successful completion of this course participants will **be able to**

- Take food, environmental, water and clinical samples in accordance with protocols
- Identify the appropriate tests needed for the diagnosis of a disease
- Interpret graphs, charts and test results from the laboratory in the context of the outbreak
- Communicate the laboratory findings to the outbreak team
- Coordinate laboratory requests including test selection during an outbreak
- Manage the administration of sample collection, transportation and results

Session content overview

Session 01: Introduction and scene setting

- Welcome, housekeeping, introductions.
- Overview of the Epidemiological Skills Development Programme
- Overview of this course including learning objectives
- The steps in an outbreak investigation

Session 02: Laboratory investigation in New Zealand

- How does the New Zealand laboratory system operate
- Hospital vs. community vs. specialist/reference laboratories and their limitations
- Services offered by different laboratories
- Infection prevention, detection and control specialist advice
- Realities of laboratory diagnostics

Session 03: Identifying appropriate testing

- Appropriateness of testing
- The difference between screening and diagnostic tests
- Signs and symptoms of illnesses, risk factors/history to help identify pathogens
- Laboratory services – who to contact and specimen reception
- Resources available

Session 04: Collection and analysis of specimens

- Protocols for specimen collection
- Water sampling
- Food sampling
- Environmental sampling
- Clinical specimens
- Seeking assistance and advice
- Completing laboratory forms

Session 05: Confirming the diagnosis (Laboratory testing and reporting)

- Typing methods used by laboratories for intra-species discrimination
- Interpreting laboratory results and how to report your organisms correctly.
- Molecular typing methods-advantages and disadvantages
- The effect that laboratory findings have on case definitions and case status

Session 06: Laboratory component of outbreak investigation

- Importance of the laboratory in outbreak investigation
- Communication pathways with the laboratory
- Organising sampling and results during an outbreak
- Keeping track of outbreak samples
- Strengths and limitations of laboratory sampling during outbreaks
- Importance of laboratory results in an epidemiological study
- Taking part in multi-jurisdictional outbreaks
- The effect that laboratory findings have on outbreak case definitions

Session 07: The Public Health Laboratory

- Realities and limitations of laboratory diagnostics
 - What the Public Health Laboratory can and cannot test for
 - Selection of appropriate tests
 - Test sensitivity
 - Result turnaround times
- Importance of sampling correctly for suspected pathogens
 - Selection of appropriate samples
 - Sample collection, storage and transport requirements
 - Pathogen viability
- Interpreting diagnostic tests
 - Significance of presence/absence and enumeration test results
 - When further confirmation/typing is required

Session 08: The Enteric Reference Laboratory

- What is the Enteric Reference laboratory and its roles
- Methods and tests used by the laboratory
- Interpreting reference laboratory test results
- Role of Enteric Reference Laboratory during outbreaks
- Realities of laboratory testing
 - What happens if an organism can't be identified
- The use of Pulsed Field Gel Electrophoresis (PFGE) in an outbreak
- Tour of the Enteric Reference Laboratory

Session 09: Case study

- In this session we take a real life example of a disease outbreak and show how the combination of epidemiological and laboratory techniques can shed light on sources of infection and inform public health interventions. At the end of this session you will have a greater appreciation of the detective work that goes into investigating disease outbreaks.

Session 10: Research into laboratory testing methods

- In this session we look at research occurring between ESR and Massey University and other laboratories answering questions around human and animal health diagnostics. Examples will draw from research into diagnostic tests for leptospirosis, an important occupational disease in meat workers and farmers in New Zealand. This session will build on session 3: identifying appropriate tests.

Assessment

Students will **pass** the course if they

- Achieve a score of 50% or higher on the course test given on the final day