Introduction to Public Health Laboratories

Instructor name
Title
Organization

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Course Topics

Introduction to Public Health Laboratories

1. A Public Health Approach
2. What Are Public Health Laboratories?
3. Core Functions of State Public Health Laboratories
4. Public Health Laboratory Infrastructure
5. Laboratory Safety
6. Using Results To Affect Public Health
Learning Objectives

After this course, you will be able to

• describe the role of public health laboratories
• summarize the core functions of state public health laboratories
• describe the parts that are common to all public health laboratory system infrastructures
• recognize the need for different laboratory levels and safety practices
• explain the necessity for communicating with a laboratory when collecting and submitting samples for testing
• describe how laboratory results are used to affect public health
Topic 1
A Public Health Approach
A Public Health Approach

Surveillance

What is the problem?

Risk Factor Identification

What is the cause?

Intervention Evaluation

What works?

Implementation

How do you do it?

Problem

Response
Public Health Core Sciences

Prevention Effectiveness

Surveillance

Epidemiology

Informatics

Laboratory
Topic 2
What Are Public Health Laboratories?
What Is a Public Health Laboratory?

Video available at: http://vimeo.com/52548635
Working in collaboration with other arms of the nation’s public health system, PHLs provide

- clinical diagnostic testing
- disease surveillance
- advanced skills in laboratory practice

Photo: James Gathany, CDC
The goal of public health laboratories is to protect and improve public health by:

- testing samples
- providing expertise
- communicating scientific information
Clinical Laboratories versus Public Health Laboratories

<table>
<thead>
<tr>
<th>Clinical Laboratories — Individual Health</th>
<th>Public Health Laboratories — Population Health</th>
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<tbody>
<tr>
<td>• Diagnostic testing</td>
<td>• Some diagnostic testing</td>
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<tr>
<td>• Some reference testing</td>
<td>• Reference testing</td>
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<tr>
<td>• Medical management</td>
<td>• Surveillance and monitoring</td>
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<td>• Emergency response support</td>
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<td>• Applied research</td>
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<td>• Workforce development and training</td>
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Newborn Screening

Newborn screening is an example of one of the many functions that a public health laboratory performs.
Knowledge Check

Which of the following are activities and services performed by public health laboratories? (Select all that apply)

A. Conducting blood tests as part of the ongoing management of a patient’s disease

B. Testing samples collected during a disease outbreak

C. Providing screening for all newborns

D. Training public health laboratory personnel
Knowledge Check

Which of the following is the best example of what public health laboratories do as opposed to clinical laboratories?

A. Cholesterol screening
B. Diagnostic testing
C. Routine blood testing
D. Disease surveillance

✅ D. Disease surveillance
Topic 3
Core Functions of State Public Health Laboratories

Photo: James Gathany, CDC
Core Functions of State Public Health Laboratories

Eleven core functions have been established by the Association of Public Health Laboratories, or APHL, to provide a basis for assessing and improving the quality of laboratory activities being conducted.
### Core Functions of State Public Health Laboratories

#### Core Functions 1–3

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<tbody>
<tr>
<td>1</td>
<td>Disease prevention, control, and surveillance</td>
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<td>2</td>
<td>Integrated data management</td>
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<td>3</td>
<td>Reference and specialized testing</td>
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</tbody>
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### Core Functions of State Public Health Laboratories (continued)

<table>
<thead>
<tr>
<th>Core Functions 4–6</th>
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<tr>
<td>4. Environmental health and protection</td>
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<tr>
<td>5. Food safety</td>
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<td>6. Laboratory improvement and regulation</td>
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</table>
### Core Functions 7–9

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<td>7.</td>
<td>Policy development</td>
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<tr>
<td>8.</td>
<td>Public health preparedness and response</td>
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<td>9.</td>
<td>Public health-related research</td>
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### Core Functions 10–11

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<td>10.</td>
<td>Training and education</td>
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<td>11.</td>
<td>Partnerships and communication</td>
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</tbody>
</table>
Knowledge Check

Newborn screenings vary among public health laboratories; however, they all test for which condition?

A. Diabetes
B. Leukemia
C. Jaundice
D. Hypothyroidism
Knowledge Check

Eleven core functions have been established by the Association of Public Health Laboratories, or APHL, to provide a basis for ________ and ________ the quality of laboratory activities being conducted.

A. assessing, maintaining
B. assessing, improving
C. maintaining, standardizing
D. Improving, standardizing

B. assessing, improving
Topic 4
Public Health Laboratory Infrastructure
PHL System Infrastructure

Environmental laboratories

Federal public health laboratories

State PHL

Physician laboratories

Local public health departments and laboratories

Clinical laboratories
PHL System Infrastructure (continued)

- Environmental laboratories
- Federal public health laboratories
- Local public health departments and laboratories
- State PHL
- Physician laboratories
- Clinical laboratories
PHL System Infrastructure (continued)

States and Territories
- Perform tests on behalf of the jurisdiction
- Becomes involved when additional assistance is needed
- Focuses on testing samples of air, food, soil, water, and zoonotic-related illnesses
- Identifies initial cases associated with an outbreak

Federal

Environmental

Private (physician or clinical)
Knowledge Check

Which laboratory serves as the center of the public health laboratory system infrastructure?

A. Local public health laboratories

B. State public health laboratories  [Correct Answer]

C. Federal laboratories

D. Private clinical laboratories
In the event of a salmonellosis outbreak, what role might a federal laboratory perform?

A. Collect specimens required for testing

B. Send specimens to clinical laboratories for confirmation of initial findings

C. Confirm cases through testing

D. Provide guidelines and recommendations for testing Salmonella bacteria
Topic 5
Laboratory Safety

CAUTION

Biohazard
Authorized personnel only
Laboratory Safety Overview

Each laboratory must have key safety principles and procedures in place that minimize the risk for contamination and exposure to the pathogens being tested.
In biologic laboratories, one of four biosafety levels are assigned, with Level 1 being the lowest risk and Level 4 the highest.
### Laboratory Safety Governance

<table>
<thead>
<tr>
<th>Federal Entities</th>
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<tbody>
<tr>
<td>Occupational Safety and Health Administration (OSHA)</td>
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<td>Clinical Laboratory Improvements Amendments (CLIA)</td>
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<tr>
<td>U.S. Department of Agriculture (USDA)</td>
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<td>U.S. Department of Justice (DOJ)</td>
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<td>U.S. Environmental Protection Agency (EPA)</td>
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<td>Food and Drug Administration (FDA)</td>
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<td>Centers for Disease Control and Prevention (CDC)</td>
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<td>National Institutes of Health (NIH)</td>
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Laboratory Safety Considerations

- What type of samples to collect
- What method(s) to use to collect the samples
- How to store the samples
- Which laboratory can receive and test the samples
- How to pack, label, and ship the samples
Shipping Samples

Before shipping samples,

- determine if the specimen is appropriate for the designated PHL
- identify correct packing and shipping techniques
- ensure specimens have correct documentation and labels
Knowledge Check

True or false?

Safety principles and practices are the same for all laboratories.

A. True

B. False

✓
Topic 6
Using Results To Affect Public Health
Electronic Laboratory Reporting (ELR)

- Laboratory Response Network (LRN)
- Food Emergency Response Network (FERN)
- PulseNet
Using PHL Results

After public health data from ELRs are collected and disseminated, data are used to:

- monitor trends and detect changes,
- identify or confirm an outbreak,
- provide guidance and immediate action,
- guide public policy,
- determine disease history,
- prioritize resource allocation,
- provide a baseline for epidemiologic research, and
- identify environmental hazard and exposures.
Knowledge Check

Which of the following describe how public health laboratory data are used to affect public health?

A. Guide public policy
B. Determine disease history
C. Detect changes
D. All of the above

Answer: D. All of the above
Course Summary

During this course, you learned to

- describe the role of public health laboratories
- summarize the core functions of state public health laboratories
- describe the parts that are common to all public health laboratory system infrastructures
- recognize the need for different laboratory levels and safety practices
- explain the necessity for communicating with a laboratory when collecting and submitting samples for testing
- describe how laboratory results are used to affect public health
Resources and Additional Reading


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For more information, please contact the Centers for Disease Control and Prevention

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Telephone: 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
Visit: http://www.cdc.gov | Contact CDC at: 1-800-CDC-INFO or http://www.cdc.gov/info

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Course Activity
(if time permits)
Salmonellosis Outbreak

Local and State PH Departments and Laboratories

Clinical Laboratories

Federal PHL

Physician Laboratories

Photograph: Janice Haney Carr