

# Public Health 101 Series



## Introduction to Public Health Laboratories

Instructor name  
Title  
Organization

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# Course Topics

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## 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

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After this course, you will be able to

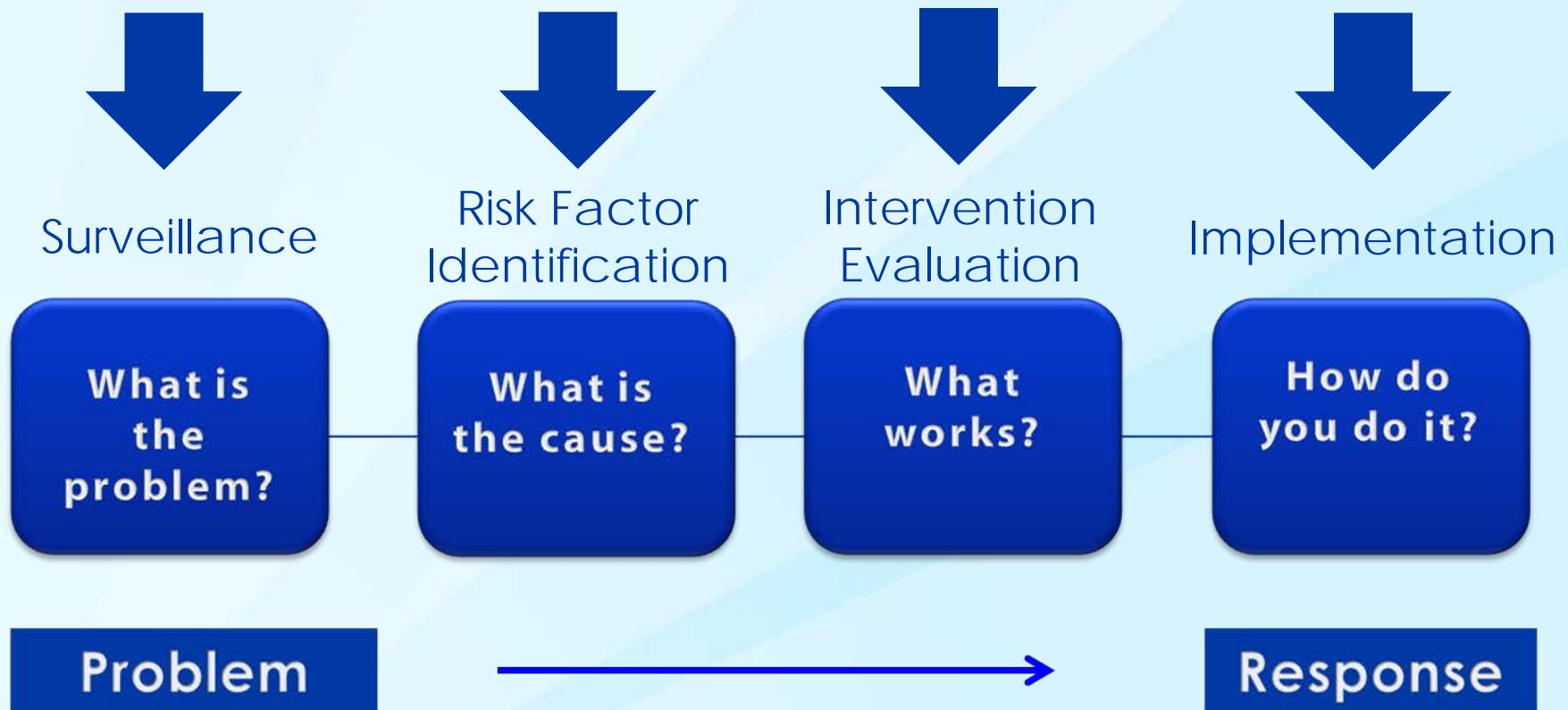
- describe the role of public health laboratories
- summarize the core functions of state public health laboratories
- describe the parts that are common to all public health laboratory system infrastructures
- recognize the need for different laboratory levels and safety practices
- explain the necessity 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



# Public Health Core Sciences



# Topic 2

## What Are Public Health Laboratories?



# What Is a Public Health Laboratory?



Video available at: <http://vimeo.com/52548635>

# Public Health Laboratories

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Photo: James Gathany, CDC

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

# The Goal of Public Health Laboratories

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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

Clinical Laboratories — Individual Health	Public Health Laboratories — Population Health
<ul style="list-style-type: none"><li>• Diagnostic testing</li><li>• Some reference testing</li><li>• Medical management</li></ul>	<ul style="list-style-type: none"><li>• Some diagnostic testing</li><li>• Reference testing</li><li>• Surveillance and monitoring</li><li>• Emergency response support</li><li>• Applied research</li><li>• Workforce development and training</li></ul>

# Newborn Screening

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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

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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

# Topic 3

## Core Functions of State Public Health Laboratories

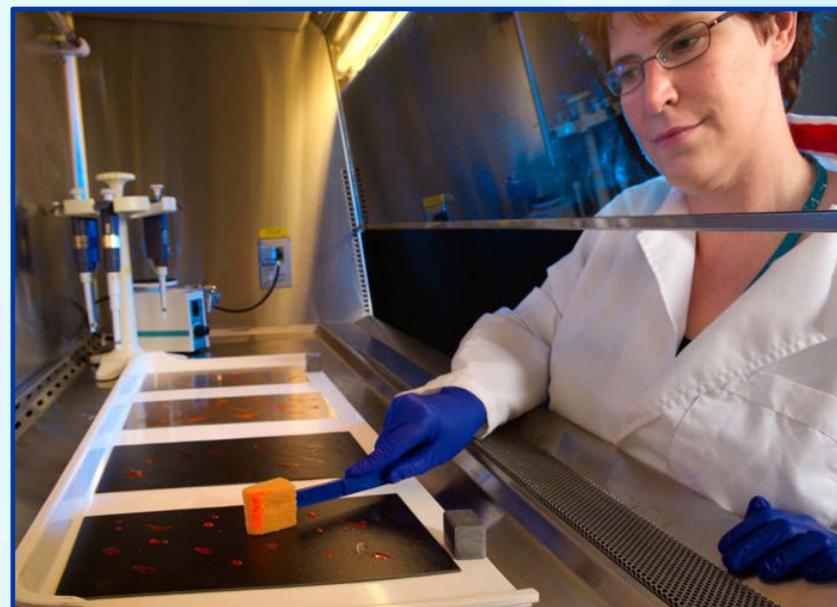


Photo: James Gathany, CDC

# Core Functions of State Public Health Laboratories

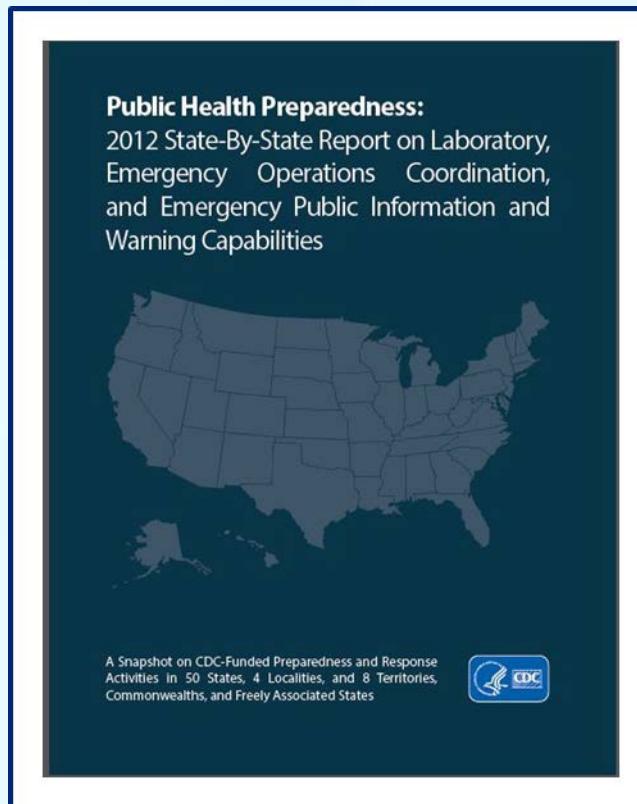


Photo: CDC

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

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## Core Functions 1–3

1. Disease prevention, control, and surveillance
2. Integrated data management
3. Reference and specialized testing

# Core Functions of State Public Health Laboratories (continued)

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## Core Functions 4–6

4. Environmental health and protection
5. Food safety
6. Laboratory improvement and regulation

# Core Functions of State Public Health Laboratories (continued)

## Core Functions 7–9

7. Policy development
8. Public health preparedness and response
9. Public health-related research

# Core Functions of State Public Health Laboratories (continued)

## Core Functions 10–11

10. Training and education
11. Partnerships and communication



## Knowledge Check

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

- A. Diabetes
- B. Leukemia
- C. Jaundice
- D. Hypothyroidism





## Knowledge Check

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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

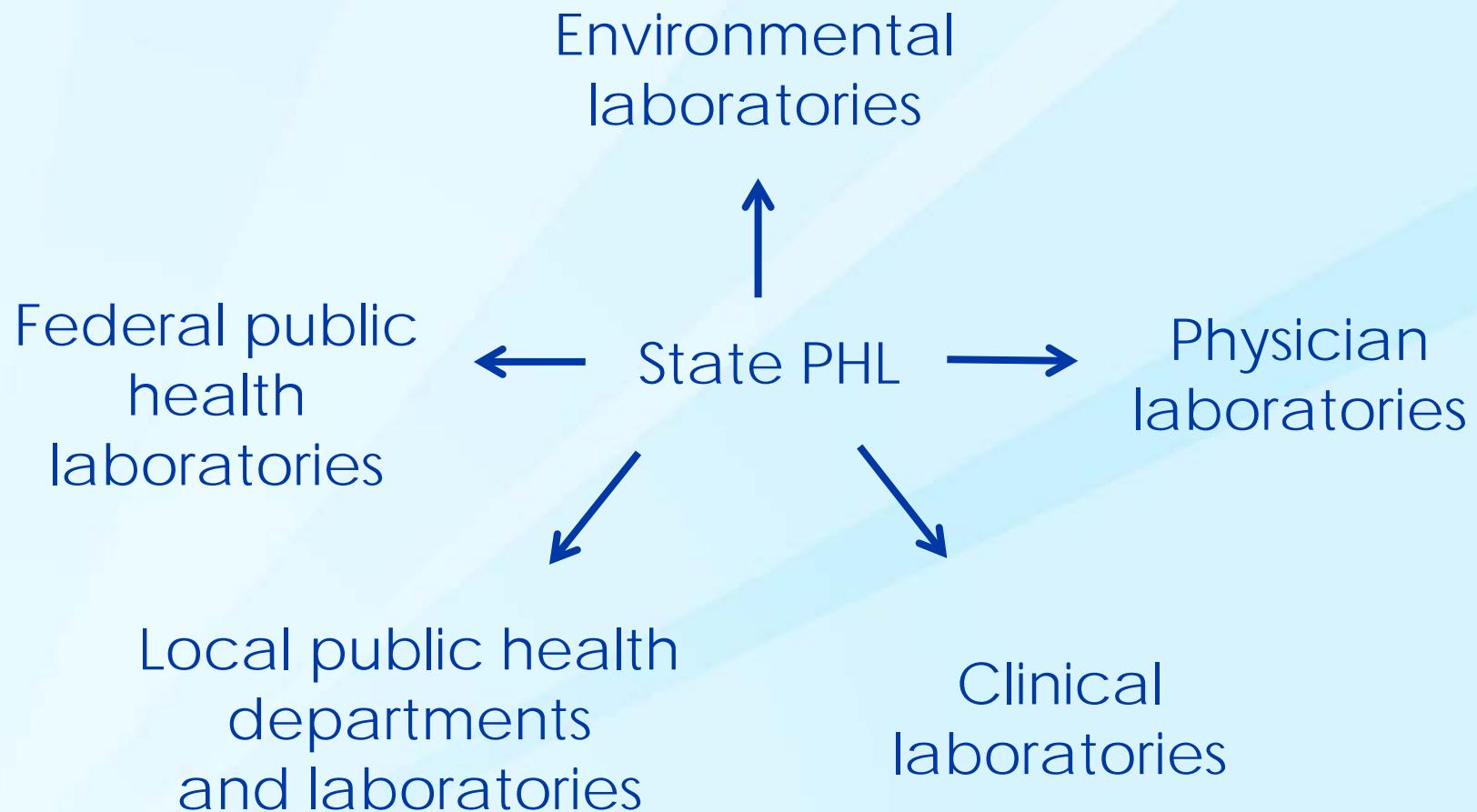
- A. assessing, maintaining
- B. assessing, improving
- C. maintaining, standardizing
- D. Improving, standardizing

# Topic 4

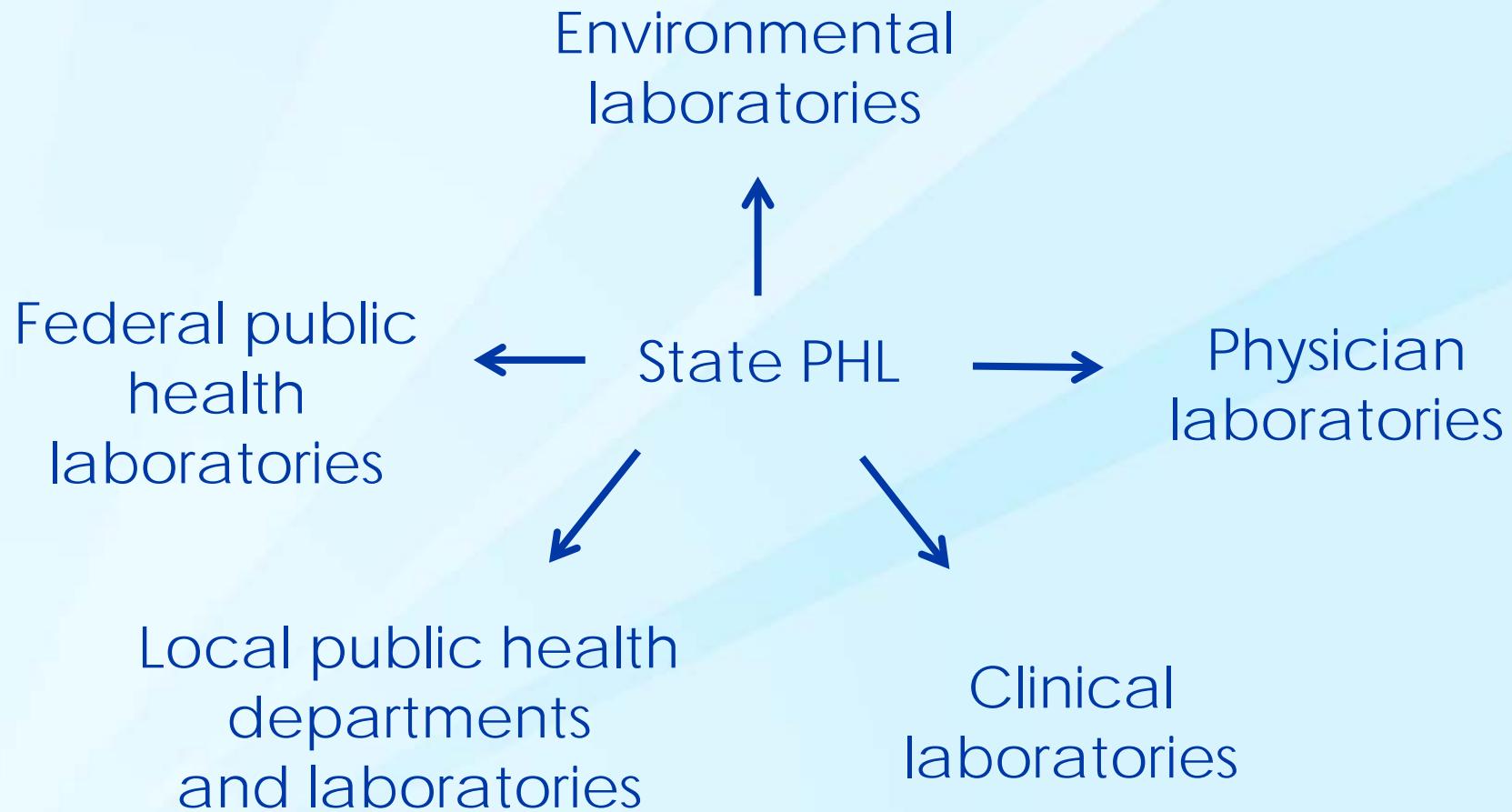
## Public Health Laboratory Infrastructure



# PHL System Infrastructure



# PHL System Infrastructure (continued)



# PHL System Infrastructure (continued)

States and Territories

— Perform tests on behalf of the jurisdiction

Federal

— Becomes involved when additional assistance is needed

Environmental

— Focuses on testing samples of air, food, soil, water, and zoonotic-related illnesses

Private (physician or clinical)

— Identifies initial cases associated with an outbreak



## 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
- C. Federal laboratories
- D. Private clinical laboratories



## Knowledge Check

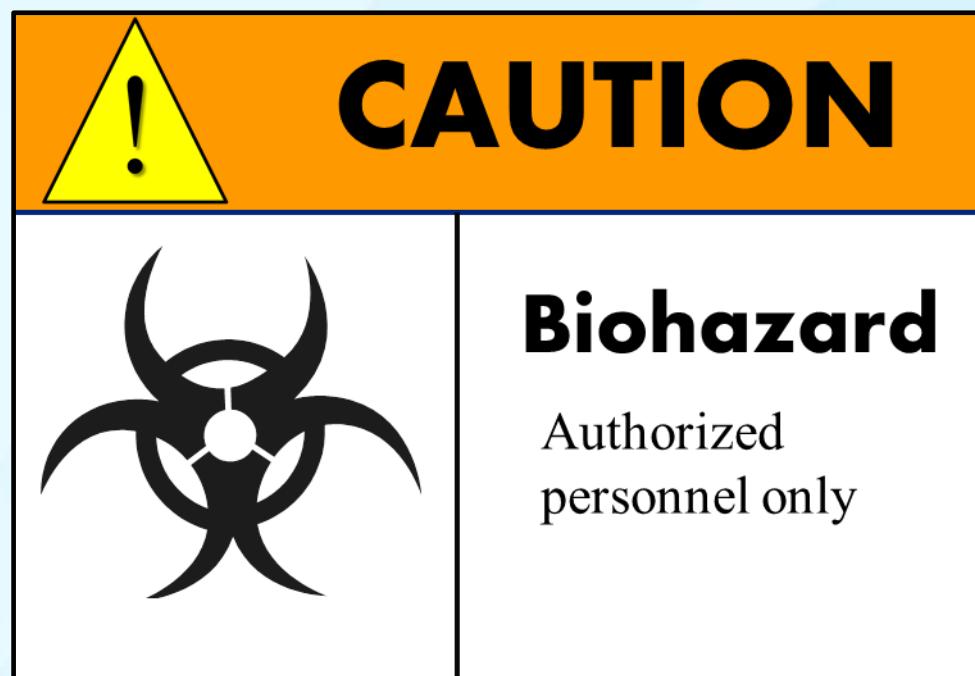
In the event of a salmonellosis outbreak, what role might a federal laboratory perform?

- 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



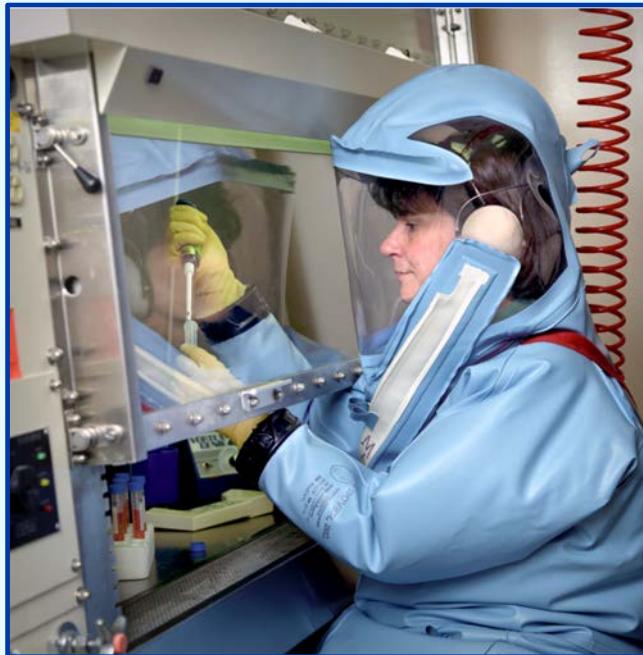
# Topic 5

## Laboratory Safety



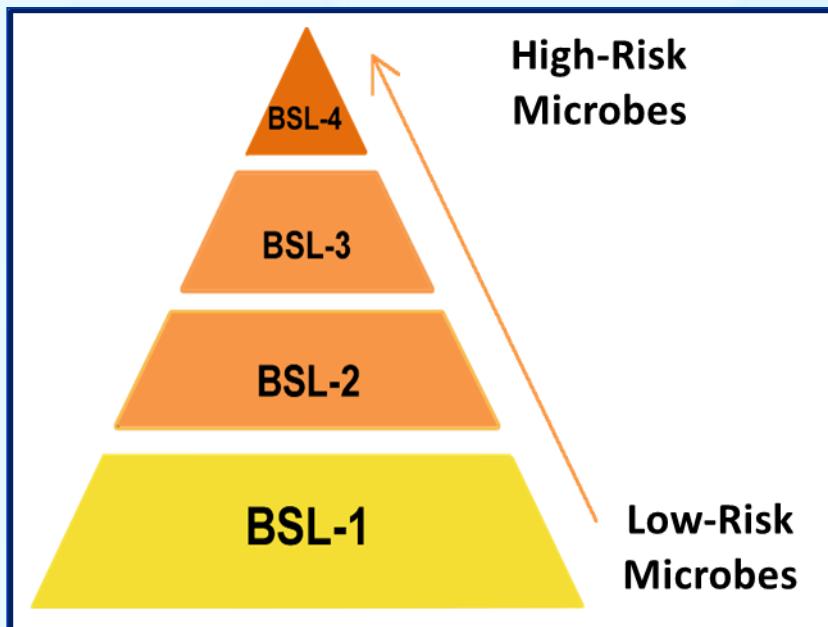
# Laboratory Safety Overview

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Each laboratory must have key safety principles and procedures in place that minimize the risk for contamination and exposure to the pathogens being tested

# Laboratory Biosafety Levels



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

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## Federal Entities

Occupational Safety and Health Administration (OSHA)

Clinical Laboratory Improvements Amendments (CLIA)

U.S. Department of Agriculture (USDA)

U.S. Department of Justice (DOJ)

U.S. Environmental Protection Agency (EPA)

Food and Drug Administration (FDA)

Centers for Disease Control and Prevention (CDC)

National Institutes of Health (NIH)

# Laboratory Safety Considerations

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- 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

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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

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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

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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





# Course Summary

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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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- Centers for Disease Control and Prevention. Core functions and capabilities of state public health laboratories. MMWR Recommend Rep 2002;51(No. RR 14). <http://www.cdc.gov/mmwr/PDF/rr/rr5114.pdf>.
- Centers for Disease Control and Prevention (CDC). Multistate outbreak of listeriosis linked to whole cantaloupes from Jensen Farms, Colorado. Atlanta, GA: US Department of Health and Human Services, CDC; 2012. <http://www.cdc.gov/listeria/outbreaks/cantaloupes-jensen-farms/index.html>.
- Centers for Disease Control and Prevention (CDC). Recognizing the biosafety levels [Online training module]. Atlanta, GA: US Department of Health and Human Services, CDC; 2012. [http://www.cdc.gov/learning/quick\\_learns.html](http://www.cdc.gov/learning/quick_learns.html).
- Association of Public Health Laboratories (APHL). About public health labs. Silver Spring, MD: APHL; [undated]. <http://www.aphl.org/aboutaphl/aboutphls/pages/default.aspx>.
- Centers for Disease Control and Prevention (CDC). West Nile virus. Atlanta, GA: US Department of Health and Human Services, CDC; 2012. <http://www.cdc.gov/westnile/index.html>.

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

1600 Clifton Road, NE, Atlanta, GA 30333

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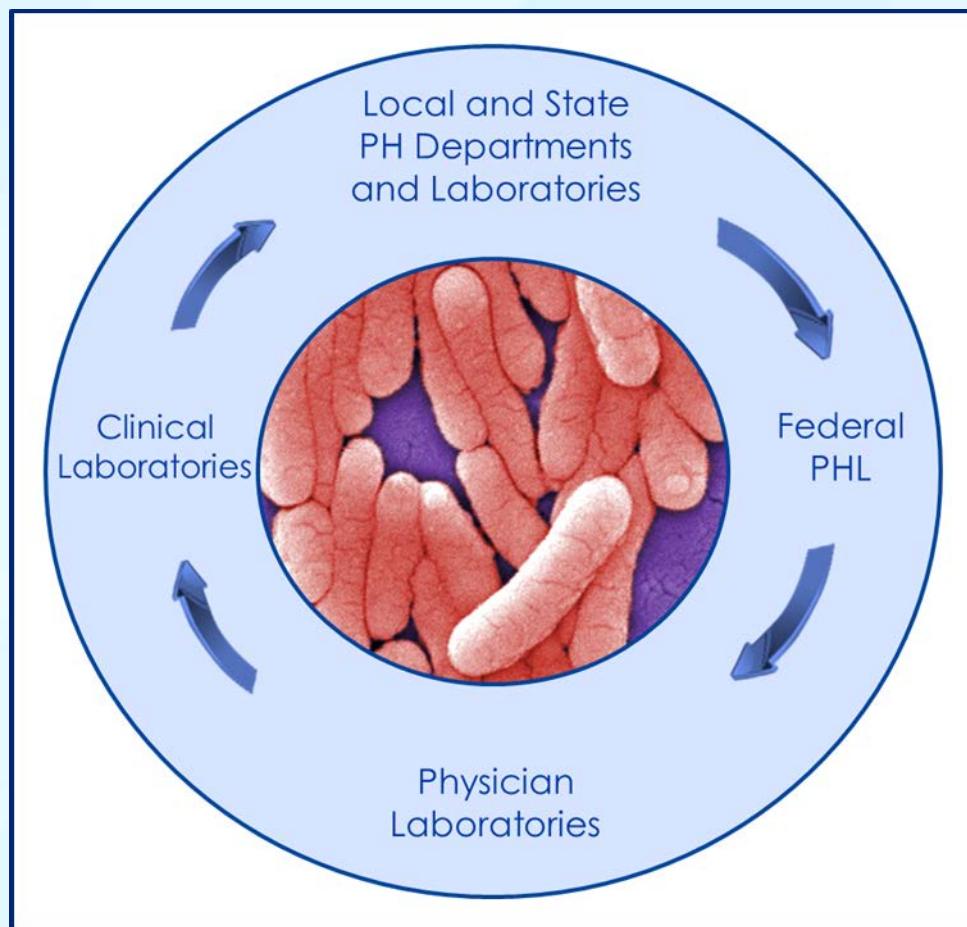
Visit: <http://www.cdc.gov> | Contact CDC at: 1-800-CDC-INFO or <http://www.cdc.gov/info>

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## Course Activity (if time permits)

# Salmonellosis Outbreak



Photograph: Janice Haney Carr