Washington State Public Health Laboratories
Microbiology Services

The Department of Health’s Washington State Public Health Laboratories act as reference laboratories to perform testing in support of public health activities. The primary functions of the Microbiology Laboratory are to perform diagnostic and confirmatory testing for uncommon diseases of public health significance and to perform subtyping and strain characterization to assist with detection and monitoring of outbreaks in the state. These functions are important since surveillance case definitions for nearly all communicable notifiable conditions require laboratory confirmation.

Diagnostic and Confirmatory Testing

For most notifiable conditions, clinical laboratories provide rapid testing and are the first and best option for diagnostic testing. Washington State Public Health Laboratories (PHL) do not perform any testing for many notifiable conditions such as viral hepatitis and fungal infections, for which testing is readily available at clinical laboratories. In contrast, diagnostic testing is available in Washington only at PHL for several rare infectious conditions, including botulism, animal rabies, and certain suspected agents of bioterrorism due to either complicated methodologies or need for a high level of biosafety handling. PHL also can test for organisms not typically encountered by clinical laboratories. PHL has identified Babesia, Trichinella, transmission of vaccinia virus (smallpox vaccine), and species of malaria for clinicians, and has ruled out Bacillus isolates suspected by clinical laboratories of being B. anthracis (causative agent of anthrax).

Under Washington Administrative Code 246-101, clinical laboratories must submit certain positive specimens to PHL for confirmatory testing including: isolates for Vibrio, Salmonella, shiga toxin-producing E. coli (e.g., E. coli O157), Burkholderia mallei or B. pseudomallei, Brucella, Franciscella tularensis (agent of tularemia), B. anthracis, Neisseria meningitidis, Haemophilus influenzae in patients under five years of age.
**Bordetella pertussis**, *Corynebacterium diphtheria* (agent of diphtheria), and *Yersinia pestis* (agent of plague); isolates or specimens for suspected novel influenza, serum positive for measles, rubella or syphilis; stool that has tested positive for shiga toxin; and cultures of certain highly antibiotic-resistant organisms (vancomycin-resistant *Staphylococcus aureus*). For these agents, local health jurisdictions can also request testing at PHL to establish the diagnosis for individual cases. Such testing is encouraged for situations of potential public health importance, such as timely diagnosis of highly communicable and severe conditions.

**Subtyping and Strain Characterization**

Although PHL may not conduct initial diagnostic testing for all notifiable conditions, clinical laboratories are required to submit certain specimens from their diagnostic testing to PHL for further characterization useful for patient care or public health investigations. For example, susceptibility testing is done on all isolates of *Mycobacterium tuberculosis* to identify resistant strains and ensure appropriate treatment of the patients.

In addition, subtyping of many agents is performed at PHL to detect outbreaks of communicable diseases. Speciation of *Legionella* or *Shigella* and serotyping of *Salmonella* may not directly guide therapy for the patient, but can help local health jurisdictions recognize outbreaks. Pulsed field gel electrophoresis (PFGE) further characterizes species of enteric bacteria to differentiate among hundreds of strains. PFGE testing is routinely conducted on all isolates of *Salmonella*, STEC (shiga toxin-producing *E. coli*, e.g., *E. coli* O157:H7), *Listeria*, and *Vibrio* submitted by clinical laboratories to PHL. Grouping is done for all isolates of *Neisseria meningitidis* to detect cases that might be related and typing is done for all isolates of *H. influenzae* to detect type B, which is vaccine preventable.

PHL is one of three laboratories in the state participating in national and international influenza surveillance networks for routine subtyping of isolates, essential for tracking the virus. In addition, PHL will characterize influenza isolates that cannot be subtyped by clinical laboratories. This is particularly important for influenza case patients who may have been exposed to novel viruses. The goal is to identify new influenza strains entering the human population, such as occurred
in 2009. For surveillance purposes, PHL also perform antiviral resistance screening for a selected set of influenza specimens.

**Special Investigations**

Support is available from PHL during communicable disease outbreak investigations. Local health jurisdictions are encouraged to consult with the Office of Communicable Disease Epidemiology for direct patient testing as well as food testing during suspected enteric outbreaks. Cases and contacts needing follow-up testing, for example to return to work or to a childcare setting, can be tested on request. If an outbreak is suspected PHL can also do additional strain characterization, such as PFGE on isolates of *Shigella*.

Finally, some diagnostic tests are requested so rarely that PHL does not attempt to maintain proficiency. These tests are done by the Centers for Disease Control and Prevention (CDC), either the main laboratories in Atlanta or the Division of Vectorborne Diseases in Fort Collins. Examples of conditions tested by CDC include Q fever (serology or culture), arboviral diseases (e.g., dengue, chikungunya), *Cryptococcus gattii* (species identification to differentiate from *C. neoformans*), hepatitis E, human rabies, and psittacosis. Communicable Disease Epidemiology can facilitate sending specimens to the appropriate CDC lab for testing.

Local health jurisdictions can expedite public health laboratory testing by providing consultation to health care providers with questions about appropriate testing and by reminding reporting laboratories to submit specimens as required by notifiable conditions regulations. Staff in both the Office of Communicable Disease Epidemiology and the Public Health Laboratories are available whenever needed to assist local health jurisdictions in carrying out their public health responsibilities.

**Resources**
