THE CORE FUNCTIONS OF STATE PUBLIC HEALTH LABORATORIES

APHL ASSOCIATION OF PUBLIC HEALTH LABORATORIES

Revised in 2010

The core functions of state public health laboratories were first adopted and published by APHL in 2000. This revision of the original document was created in order to update and standardize the description of each core function and to reflect the changes that have occurred since 2000 with respect to state public health laboratory systems.

APHL Core Functions Revision Workgroup

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Background

According to the Institute of Medicine (IOM) report, *The Future of Public Health,* published in 1988, "Public health is what we, as a society, do collectively to assure the conditions in which people can be healthy."[1] This definition of public health and its overarching core functions, (i.e., assessment, policy development and assurance), which were identified in that report, have led to further descriptions of the many important components of public health. The authors of the 1988 IOM report felt that only if public health is clearly defined and understood would it be adequately supported. In 1994, Edward L. Baker et al. published the results of a working group that described the 10 essential public health services.[2] These services have provided the framework for a national public health performance standards system[3] that measures the performance of state and local public health agencies. The extent to which these state and local public health agencies provide comprehensive services, such as laboratory services in support of the 10 essential public health services, has been the major focus of the national public health performance standards.

In 2000, the Association of Public Health Laboratories (APHL) developed a white paper entitled *Core Functions and Capabilities of State Public Health Laboratories.* The 11 core functions of state public health laboratories were subsequently published in *Morbidity and Mortality Weekly Report* in 2002.[4] A report that followed several years later demonstrated how state public health laboratories, through their core functions, support the 10 essential public health services.[5] Since 2002, it has become clear that a broader, inclusive State Public Health (SPH) Laboratory System is more effective in assuring that

1. Institute of Medicine, The Future of Public Health (Washington, DC: National Academy Press): 1988.
2. Edward L. Baker, et al., "Health Reform and the Health of the Public," Journal of the American Medical Association 272 (1994): 1276-82
3. "National Public Health Performance Standards Program (NPHPSP)" National Public Health Performance Standards Program (NPHPSP), http://www.cdc.gov/od/ocphp/nphpsp/
4. Joyce Witt-Kushner, et al., "Core Functions and Capabilities of State Public Health Laboratories: a Report of the Association of Public Health Laboratories," Morbidity and Mortality Weekly Report 51(2002):1-8.
5 Burton W. Wilcke, Jr., et al., "Tracking Laboratory Infrastructure in Support of Public Health," (presentation, 135th American Public Health Association Annual Meeting and Exposition, Washington, D.C., November 3-7, 2007).

the core functions are fulfilled.[6] Within the last decade, work has been done in measuring the laboratory infrastructure in support of the essential public health services, creating performance standards for public health entities, identifying public health workforce needs and addressing quality systems as they apply to public health laboratory services.

As we move into the 21st century, these 11 core functions of state public health laboratories remain unchanged. However, what has emerged is the realization that laboratory services in support of public health are dependent upon synergistic and effective interactions among many different partners at the state and national level. This revision of the *Core Functions of State Public Health Laboratories* more clearly defines the responsibilities of the State Public Health Laboratory (SPHL) within the SPH Laboratory System.

Just as the onset of the Human Immunodeficiency Virus epidemic of the 1980s highlighted the important role of SPHLs in a public health crisis, the anthrax attacks of 2001 and the influenza pandemic of 2009 further accentuated the role of SPHLs as key players in public health emergencies. Numerous examples of SPHLs' contributions have played out over the last decade, including the characterization of the *E. coli* spinach outbreak of 2006, the expansion of life-saving testing assays in newborn screening, and the more recent involvement of SPHLs in environmental and food testing in response to the Gulf oil spill of 2010. These events reinforce the necessity of having an alliance of laboratories and other partners that collectively make up the public health laboratory system in each state. The response to these events changed the dynamic in the state laboratory system and positively influenced the building of relationships between public and private laboratories.

In its role to assure that the 11 core functions are carried out, the SPHL engages the entire healthcare community to varying degrees in a partnership that has come to be called the SPH Laboratory System. The SPH Laboratory

6. Stan L. Inhorn, et al., "The State Public Health Laboratory System," Public Health Reports 125 Supplement 2 (2010): 4-17.

System is defined as "an alliance of laboratories and other partners within a state that supports the 10 essential public health services under the aegis of the state public health laboratory. The system members and stakeholders operate in an interconnected and interdependent way to facilitate the exchange of information, optimize laboratory services, and help control and prevent disease and public health threats." The SPHL has a leadership role in developing and promoting the SPH Laboratory System as well as assuring that essential and state-of-the-art laboratory services are provided. SPH Laboratory Systems, in the most general terms, consist of all the participants in public health testing, including those who initiate testing and those who ultimately use the test results.[7] The specific makeup of the "system" varies by state, but typically includes the state public health laboratory and the local public health laboratories in that state. In addition, the system may include clinical, environmental, veterinary, and agricultural laboratories as well as other governmental, non-private, or private facilities, performing laboratory testing of public health significance. In addition, the system includes partners that rely on laboratory test results to inform specific public health programs or responses. The laboratory community as a whole benefits from stronger linkages between all stakeholders. Strengthening state public health laboratory systems is, therefore, a key component to strengthening the overall National Laboratory System in support of improved health outcomes and preparedness activities.

The 11 core functions provide a foundation for measurement of a variety of SPHL quality systems goals. One example is the re-established Healthy People 2020 laboratory objective (Healthy People 2010, objective 23-13) to "increase the proportion of tribal and state public health agencies that provide or assure comprehensive laboratory services to support essential public health services," and the newly established objective to "increase the

7. "Definition of a State Public Health Laboratory System," Association of Public Health Laboratories, http://www.aphl.org/aphlprograms/lss/projects/performance/Documents/Definition_of_a_state_public_health_laboratory_system_June2010.pdf

proportion of public health laboratory systems (including state, tribal, and local) that perform at a high level of quality in support of the 10 essential public health services." The Comprehensive Laboratory Services Survey[8] (CLSS), created by a committee of APHL in collaboration with the Centers for Disease Control and Prevention (CDC) and distributed biennially, is based on the 11 core functions. Given that the term "comprehensive laboratory services" was not defined in Healthy People 2010, APHL adopted the position that such services reflect the full range of activities, not just analytical services, which are carried out by SPHLs and their system partners. In effect, APHL concluded that the fulfillment of all 11 core functions represented the provision of "comprehensive laboratory services to support essential public health services." The CLSS was created to measure the extent to which state public health laboratories were meeting the Healthy People 2010 objective and will also be used to measure the Healthy People 2020 objective. Since the baseline survey in 2006, it has been demonstrated that state public health laboratories have essentially met or exceeded the targets for some core functions (such as disease surveillance and reference testing) but were in need of improvement in other areas (such as food safety, as well as training and education). Additionally, this core functions document, along with the 10 essential public health services document, provides the basis for the Laboratory System Improvement Program (L-SIP).[9] L-SIP was first implemented in 2006[10] as a means for all states' system stakeholders to measure system performance, plan system improvements, implement improvement strategies, and periodically evaluate and reassess while continuously focusing on the goal of quality improvement. Finally, the core functions could well drive the development of standards that could be used for public health laboratory accreditation purposes.

8. Burton W. Wilcke, Jr., et al. "Laboratory Services in Support of Public Health: A Status Report," Public Health Reports 125 Supplement 2 (2010): 40-46.
9. "Promoting System Improvement, " Association of Public Health Laboratories, http://www.aphl.org/aphlprograms/lss/projects/performance/Pages/default.aspx
10. Kathleen C. Milne and Thomas L. Milne, "Public Health Laboratory System Improvement Program: Development and Implementation," Public Health Reports 125 Supplement 2 (2010): 31-39.

This document represents an updated perspective on the 11 core functions. For example, the renamed "Public Health Preparedness and Response" core function now incorporates the multiple Laboratory Response Networks. "Public Health Related Research" is given greater emphasis, challenging the public health laboratory community to support innovative research in the area of public health laboratory systems and services. The future of public health laboratory practice is dependent upon new and progressive ways of defining and showcasing the value and importance of SPHLs and the SPH Laboratory Systems they lead. This document also supports a greater role in advocacy and outreach for SPHLs, consistent with APHL's strategic plan.

In summary, this revised document emphasizes the reality that the SPH Laboratory System—and not the SPHL alone—is responsible for assuring laboratory services in support of public health. It is acknowledged that SPH Laboratory Systems vary significantly, ranging from small state systems with no local laboratories and relatively few partners to large, complex state systems with regional laboratories, many county laboratories and multiple partners. Regardless of the structure of the individual SPH Laboratory System, the SPHL plays a central role in providing or assuring through its system partners the full range of laboratory services required in support of public health.

The Eleven Core Functions of State Public Health Laboratories[11]

- **Disease Prevention, Control and Surveillance**
- **Integrated Data Management**
- **Reference and Specialized Testing**
- **Environmental Health and Protection**
- **Food Safety**
- **Laboratory Improvement and Regulation**
- **Policy Development**
- **Public Health Preparedness and Response**
- **Public Health Related Research**
- **Training and Education**
- **Partnerships and Communication**

Descriptions of the eleven core functions are following:

11. Not listed in order of priority or importance.

Disease Prevention, Control and Surveillance

Provide accurate and precise analytical data in a timely manner in support of the:

- Prevention and control of infectious, communicable, genetic and chronic diseases, and environmental exposure. This may include testing for emerging and re-emerging microbial agents, immune status, antibiotic resistance, screening for inherited neonatal metabolic disorders, environmental toxins, and heavy metals such as blood lead.
- Recognition of outbreaks and other events of public health significance, by the identification and characterization of the causative agents of disease and their origin.
- Population-based surveillance for conditions of public health importance and to guide programmatic decisions.
- Early detection of congenital disorders in newborns leading to timely diagnosis and treatment.
- Monitoring of low incidence and/or high risk diseases, such as antibiotic-resistant tuberculosis, influenza, botulism and rabies.
- Investigation and control of communicable or environmental diseases when testing is not available in the private sector.

Integrated Data Management

Serve as the conduit for scientific data and information in support of public health programs through the:

- Capturing of laboratory data essential for public health analysis and decision making, including detecting trends and sentinel events.
- Use of standardized data formats.
- Influencing public health policy.
- Participation in statewide disease reporting networks.
- Linkage with CDC and other national and international surveillance databases.
- Collaboration with state and national laboratory systems.
- Continuous improvement of laboratory data systems.

Reference and Specialized Testing

Serve as centers of excellence using their expertise, reference and resources in the areas of biological, chemical and radiologic issues of public health importance to:

- Support the diagnosis of and surveillance for unusual and emerging pathogens.
- Confirm atypical laboratory test results.
- Verify results of other laboratories' tests.
- Provide reference services to laboratories that may not have the capability to fully identify disease agents of public health importance.
- Provide diagnostic testing for diseases of public health importance directly to providers when testing is not readily available.
- Test for diseases of public health importance that are too rare and unusual for other laboratories to maintain capacity.

Environmental Health and Protection

Collaborate with partners to coordinate and ensure scientific analysis of environmental and human samples to identify, quantify and monitor potential threats to health by:

- Testing for toxic chemical, radiological, and microbiological contaminants in air, water, soil and hazardous waste.
- Conducting biomonitoring of human specimens in the assessment of toxic chemical exposure.
- Testing of environmental samples in support of federal and state regulations, aiding in the compliance with those regulations.
- Industrial hygiene/occupational health testing to assist in efforts to protect indoor air quality and worker health, such as routine analysis of asbestos, lead, pesticides and radon.
- Participating in the Chemical Laboratory Response Network (LRN-C) and the Environmental Response Laboratory Network (ERLN).

Food Safety

Collaborate in the detection, monitoring, and response to food safety issues by:

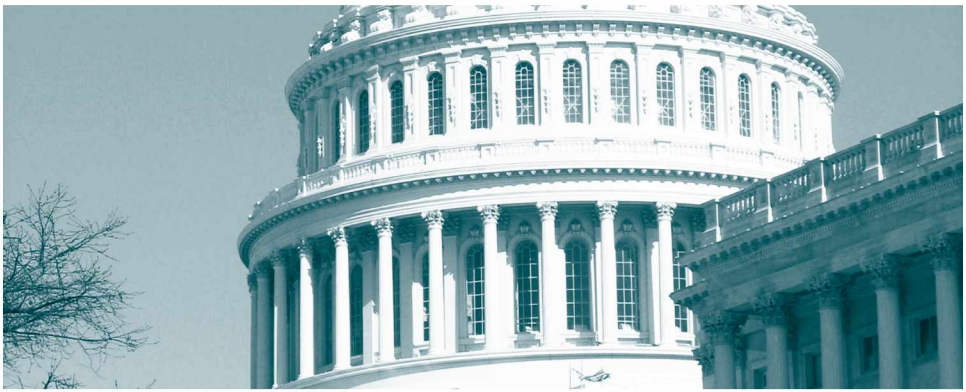
- Testing samples from persons, food and beverages implicated in food-borne illness outbreaks to detect and identify potential food-borne pathogens.
- Characterizing isolates and participating in national strain characterization databases, such as PulseNet, to inform epidemiologic investigations.
- Analyzing food specimens to detect, identify and quantify toxic contaminants such as pesticide residues, heavy metals and volatile organic compounds.
- Monitoring for radioactive contamination.
- Participating in the Food Emergency Response Network (FERN).

Laboratory Improvement and Regulation

Provide leadership for laboratory improvement in areas of public health importance by:

- Promoting quality improvement programs for partner laboratories through activities such as training, consultation, and proficiency testing.
- Developing and overseeing statewide laboratory improvement programs to ensure the reliability of laboratory data used for environmental monitoring and communicable disease surveillance and control.
- Promoting safe laboratory practice through education, training, and consultation.
- Assessing and improving the State Public Health Laboratory System by implementing the Laboratory System Improvement Program (L-SIP).
- Guiding the creation of and supporting enforcement of regulations and laws that contribute to laboratory improvement.

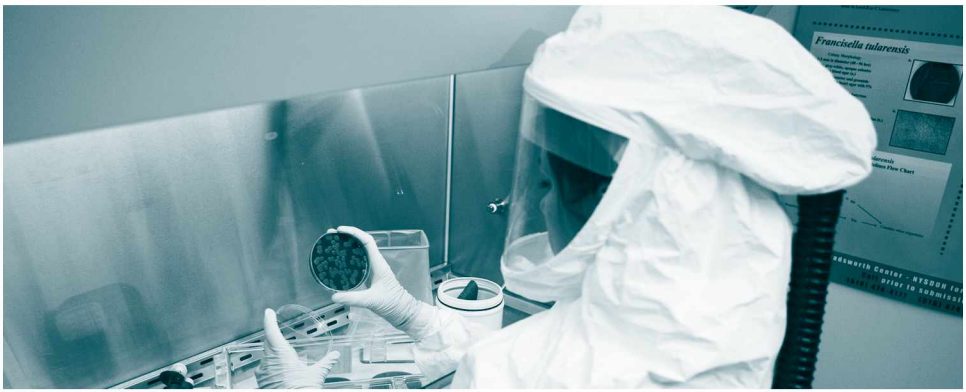
Policy Development



Play a role in the development of state and federal health policy by:

- Generating scientific evidence that informs public health practice and law.
- Monitoring the impact of public health laboratory practice on health outcomes.
- Serving as centers of expertise, reference and resources in the areas of biological, chemical and radiologic issues of public health importance.
- Participating in the development and evaluation of standards related to the operation and performance of laboratories involved in public health testing.
- Advocating for the use of sound reasoning in the application of laboratory science and system infrastructure sustainment.
- Engaging in strategic planning at local, state and national levels.

Public Health Preparedness and Response



Fulfill a key partnership role in local, state and national disaster preparedness and response by:

- Functioning as a Laboratory Response Network (LRN) Reference laboratory for biological agents and as an LRN Chemical Laboratory at a level designated by CDC.
- Assuring the triaging of environmental samples for the rapid identification of threat agents (chemical, biological, radiological, and nuclear – CBRN); and food samples as a part of the Food Emergency Response Network (FERN).
- Planning for and ensuring that surge capacity is available during a public health emergency.
- Having a Continuity of Operations Plan in the event of a disruption of laboratory services.
- Participating in the Environmental Response Laboratory Network (ERLN).

Public Health Related Research

Engage in research to improve and expand the scientific and policy basis of public health laboratory practice and assure their optimal application in support of the public health system by:

- Developing, evaluating and implementing new technologies and methodologies.
- Partnering with other public health disciplines.
- Collaborating with academic institutions to carry out clinical and translational science.
- Conducting public health systems and service research.
- Working with the private sector to foster scientific innovation.

Training and Education

Facilitate access to training and education by:

- Sponsoring training opportunities to improve scientific and technical skills within the public health laboratory system.
- Supporting management and leadership development opportunities.
- Participating in the training of both domestic and international scientists.
- Partnering with academia to provide experiential learning opportunities.
- Providing continuing education in the area of laboratory practice.

Partnerships and Communication

Support their respective state public health laboratory systems by:

- Highlighting the importance of laboratory contributions in support of public health.
- Maintaining a strong communication plan that links all system partners.
- Utilizing information technology for robust connectivity.
- Engaging traditional and non-traditional partners.
- Coordinating activities through the use of a laboratory program advisor, (i.e., laboratory system coordinator).
- Linking the SPH Laboratory System to appropriate national surveillance networks.

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