

Canadian Public Health Laboratory Network

Réseau des laboratoires de santé publique du Canada

Core Functions of Canadian Public Health Laboratories

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Background

Canadian Public Health System

In the late 1800s and early 1900s, the world-wide concern for public health was strong – major pandemics were raging and causing thousands (sometimes millions) of lives to be lost. Despite the reduction of major infectious disease during the decades that followed, the approach of the 21st century led to an apparent resurgence as new epidemics reached our borders: Severe Acute Respiratory Syndrome (SARS), Avian Influenza (H5N1) and Pandemic H1N1. By this point, the false sense of security had been recognized for what it was and our government was addressing the problem. Issues being addressed included the increased public health risks associated with such factors as:

- increased global travel and trade;
- increased antimicrobial resistance;
- increased rate of nosocomial infections;
- increased food and environmental contamination;
- establishment zoonotic diseases;
- changes in land use including commercial livestock operations;
- new and emerging diseases; and
- bioterrorism.

The recent pandemics, epidemics, domestic and international bioterrorism threats and public health incidents have increased calls for a strengthened Canadian public health system. These developments have coincided with broader concerns about the state of health care in Canada.

Provincial Public Health Laboratory System¹

Provincial public health laboratories are critically linked to all sectors of the public health infrastructure (e.g., disease control and prevention, environmental health, epidemiology, emergency preparedness and response), public health laboratories provide early detection of health risks associated with infectious agents, compile data in support of outbreak investigations and identify causes of disease to aid in treatment and prevention. As providers of essential services and leadership in the development of programs and policies in the above-mentioned areas, provincial public health laboratories offer the science and resources needed to promote and protect the health of Canadians.

The Provincial Public Health Laboratory System (PPHLS) consists of all the participants in public health testing, including those who initiate testing and those who ultimately use the test results.

¹ This is a Canadian modification of the document developed the Association of Public Health Laboratories - Laboratory Systems & Standards Committee.

The PPHLS is an alliance of laboratories and other partners within a province that supports the 10 Essential Services of Public Health². 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 PPHLS is part of the larger provincial public health system. The System includes individuals, organizations and agencies that are involved in assuring that laboratory data support the 10 Essential Services of Public Health.

Within the PPHLS are primary stakeholders who are directly involved in creating and using laboratory data. Additional stakeholders include those who are concerned with complementary Essential Services, such as Training and Education and Public Health Related Research. A successful National Laboratory System is dependent on the creation of fully integrated and coordinated networks in every province. The goals of the National Laboratory System are to support voluntary, interdependent partnerships of clinical, environmental, agricultural and veterinary laboratories through public private collaboration, for assurance of quality laboratory services and public health surveillance.

The PPHLS should assure that:

1. Public health threats are detected and intervention is timely
2. Stakeholders are appropriately informed of potential threats
3. Reportable conditions are monitored in a comprehensive province-wide system
4. Specimens and isolates for public health testing are sufficient to provide comprehensive public health surveillance and response
5. Public health laboratory data are transmitted to appropriate provincial and federal agencies responsible for disease surveillance and control.

The ability of the public health system to respond to emerging public health challenges, such as the advent or outbreak of new diseases (e.g., pandemic H1N1, drug-resistant communicable disease agents or drug-resistant tuberculosis, shiga toxin producing *E coli* (STEC), and many water and foodborne infectious diseases as yet undefined etiologically), depends largely on the efficacy of Canada's provincial public health laboratories. To ensure the performance of the public health system in meeting these challenges and protecting the well being of Canadian communities, the functions, capabilities and responsibilities of public health laboratories must be identified, evaluated and updated on an ongoing basis.

² *Public Health Functions Steering Committee – Chaired by US Surgeon General and involved a number of US national public health organizations.*

Canadian Public Health Laboratory Network

The Canadian Public Health Laboratory Network (CPHLN) was established in 2001 to unite together provincial and federal stakeholders to address issues of common concern. Comprised of medical or scientific directors of public health laboratories from each province and territory, the Public Health Agency of Canada (including the National Microbiology Laboratory, the Laboratory for Foodborne Zoonosis, and the National HIV/AIDS laboratories, the Centre for Emergency Preparedness and Response, and the Pathogen Regulation Directorate), Health Canada (including the Bureau of Microbial Hazards) and Defence Research and Development Canada, the CPHLN deals with a range of issues affecting the ability of the public health system to protect the health of Canadians (e.g., public health infrastructure, surveillance capabilities, emergency preparedness).

CPHLN has grown over the past ten years, but continues to develop and implement the following strategies:

- Coordinate pathogen detection, infectious disease prevention and control;
- Conduct laboratory-based surveillance, including the development of early warning systems to monitor and detect emerging pathogens, antibiotic resistant organisms and outbreaks;
- Counter bioterrorism threats through epidemiological surveillance and rapid identification of suspect materials; and
- Develop national and provincial pandemic preparedness.

Further accomplishments of the CPHLN are highlighted in the recently published *Statement of Accomplishments Report*.

The Vision and Mission of the CPHLN are as follows:

Vision

Be an action-oriented national public health laboratory network that provides valuable advice and services which form the foundation for the broader public health system.

Mission

To provide strong leadership and in-depth consultation in all aspects of the public health system through the continual development of the proactive network of public health laboratories to protect and improve the health Canadians.

To achieve its mission and vision, the CPHLN has established the following Strategic Priorities:

- I. Expanding the Scope of Core Functions
- II. Strengthening Accountability and Preparedness
- III. Enhancing Value, Visibility, and Partnerships

A key goal established for all Strategic Priorities, is to *support and communicate the core mandate of public health laboratories*. The Core Functions of Public Health document was first developed in support of this goal, and continually updated to reflect the ever-changing landscape of the Canadian Public Health System. The aim of the document remains to define and provide a basis for further discussion regarding the development of the core functions of Canada’s provincial public health laboratories, with a view to strengthening the capacity of the public health system to protect the well being of Canadian communities.

The CPHLN Core Functions of Public Health document was based on the white paper, “Core Functions and Capabilities of State Public Health Laboratories”, published by the Association of Public Health Laboratories (APHL), as well as core functions material produced by the British Columbia Centre for Disease Control, Cadham Provincial Laboratory in Manitoba and the Provincial Laboratory in Saskatchewan. This revised Core Functions document reflects the growth and development of the CPHLN and its member laboratories over the course of the last 10 years.

Defining Core Functions and Capabilities

In defining the core functions of provincial public health laboratories, it is important to understand the scope of responsibilities of today's public health laboratory. Far beyond their traditional role of laboratory testing, provincial public health laboratories are now engaged in the broader challenge of disease recognition, prevention and control as a part of the public health system. The CPHLN forges critical connections that form a partnership that includes provincial, territorial and federal public health laboratories into a national program-based approach to disease control. These are integral components of the public health system.

A core function is a role fundamental to a laboratory's mandate. The term *capability* refers to a specific activity that ensures the laboratory's success in implementing the core function. Each organization also has capacity or, in the case of public health laboratories, output of testing or services provided over a defined period. The *Core Functions of Canadian Public Health Laboratories* document identifies the minimum core functions of provincial public health laboratories, which must be supported by adequate capabilities and resources to ensure sufficient capacity or output of services.

The CPHLN continues to recognize that the core functions and capabilities of provincial public health laboratories reflect the needs, priorities and resources of their respective constituencies, and thus may differ somewhat from province to province. As such, the core functions and capabilities outlined in this document are intended to serve as a framework for future evaluation activities as well as investment and policy decisions involving Canada's provincial public health laboratories.

Core Functions and Capabilities

The following are ten equally fundamental core functions and capabilities basic to the Canadian public health laboratory system. The CPHLN considers these to be a minimum requirement for the provision of optimal service on behalf of communities throughout each province.

- Communicable disease surveillance, prevention and control
- Outbreak and emergency response to communicable diseases
- Environmental health and food safety
- Reference testing, specialized screening and diagnostic testing
- Biosafety, containment and biohazard spill response programs
- Integrated communicable disease data management
- Public health policy development and evaluation
- Laboratory improvement and regulation (Quality Assurance)
- Training and education of health care and public health workers
- Public health related research and development

A description of the capabilities required to fulfill these core functions is provided on the subsequent pages.

Communicable Disease Surveillance, Prevention and Control



- A provincial public health laboratory should have the ability to serve as a first line of defence against existing and emerging infectious diseases, including the provision of information and expert advice to the public health system.

To fulfill this role, a provincial public health laboratory must maintain the capacity to:

- serve as a centre of expertise for relevant communicable disease detection and identification, while ensuring access to reference and diagnostic laboratory expertise and capabilities;
- isolate and identify the source, causative agents or contaminants, and infectious carriers of communicable and environmental diseases;
- provide (or at a minimum have access to) specialized investigations for low-incidence infections or high-risk diseases (e.g. tuberculosis, botulism, influenza, etc.);
- be actively engaged with provincial communicable disease control and epidemiology units;
- provide population surveillance for infections of importance to the public health community (e.g. community immune status; antibiotic resistance); and
- work in a consulting and advisory capacity with key government officials and their staff.

Outbreak and Emergency Response for Communicable Diseases



- A provincial public health laboratory should have the ability to provide immediate support and guidance during emergency and outbreak situations, to ensure expedited and accurate public health system response.

To fulfill this role, a provincial public health laboratory must maintain the capacity to:

- provide infection control and laboratory support for the investigation of outbreaks of public health relevance, including laboratory support as part of provincial and national disaster preparedness plans;
- determine the source of infection through analysis of outbreak organisms using molecular epidemiological tools;
- support investigative analysis of biological agents regardless of the source of exposure (i.e. accidental, bioterrorist or natural disaster);
- assist in the co-ordination and development of provincial capacity to quickly and accurately handle a large volume of tests in a public health emergency situation; and
- participate at a minimum as a sentinel laboratory to Canada's Laboratory Response Network.

Environmental Health and Food Safety



- A provincial public health laboratory should have the ability to assist government organizations in ensuring compliance with food and environmental safety regulations, while providing precise analysis of biological and environmental contaminants that put the health of Canada and its people at risk.

To fulfill this role, a provincial public health laboratory must maintain the capacity to:

- test specimens implicated in food borne illness to identify causes and sources, including the detection of organisms such as those included in national enteric surveillance programs;
- actively participate in national enteric surveillance programs (e.g. PulseNet Canada, National Enteric Surveillance Program (NESP));
- conduct analysis or scientific studies of environmental specimens (i.e. food and water) and human samples to identify, relate, and monitor potential microbiological threats to human health;
- conduct analysis of environmental specimens to ensure compliance with environmental regulations;
- analyze agents of food borne or water borne illness using reference-level molecular and serological epidemiological (i.e. DNA fingerprinting) tools; and
- provide services that link with national partners (e.g., the National Microbiology Laboratory).

Reference, Specialized and Diagnostic Screening and Testing



- A provincial public health laboratory should have the ability to serve as a centre of excellence through reference, specialized and diagnostic screening and testing, through which the Canadian public health laboratory system can ensure timely identification of diseases of public health concern.

To fulfill this role, a provincial public health laboratory must maintain the capacity to:

- conduct analysis and surveillance for unusual or rare pathogens (i.e. emerging and re-emerging pathogens);
- confirm atypical laboratory test results and verify test results from sentinel sites;
- provide reference diagnostic services to laboratories that may not have the capability to fully identify disease agents of clinical public health importance; and
- provide services with national and inter-provincial links.

Biosafety, Containment and Biohazard Spill Response Programs



- A provincial public health laboratory should have the ability to serve as a leader in the development, implementation and application of laboratory biosafety, to safeguard the health of Canadians, while ensuring the protection of those actively engaging in public health laboratory response.

To fulfill this role, a provincial public health laboratory must:

- maintain high quality biosafety programming for laboratory staff (e.g., Transportation of Dangerous Goods, WHMIS, HPTA) that meets or exceeds national regulations;
- provide leadership and training opportunities in biosafety at a regional, provincial, national and international level;
- actively engage other national and international biosafety programs; and
- collaborate with other jurisdictions to ensure an integrated response to RG4 organisms (e.g., Medical Microbiologist 24/7 On Call Service, ERAP for Health Canada).

Integrated Data Management



- A provincial public health laboratory should have the ability to serve as a central repository for the analysis and dissemination of information in support of public health programs.

To fulfill this role, a provincial public health laboratory must maintain the capacity to:

- ensure the maintenance and communication of laboratory data using standardized data formats;
- assure rapid dissemination of laboratory information to assist in the identification, understanding and control of disease outbreaks;
- participate in a province-wide disease reporting network with centralized facilities for the receipt, storage, retrieval and analysis of data;
- serve as a primary data link with the Public Health Agency of Canada and the National Microbiology Laboratory for surveillance of diseases of national and global concern;
- participate as a key link in Canadian and, where appropriate, international database systems to collect, monitor and analyze laboratory data;
- collect and report laboratory data essential to decision making processes in the public health system;
- provide primary data to support the development and implementation of policies and plans; and
- develop and strengthen laboratory data systems.

Policy Development and Evaluation



- A provincial public health laboratory should have the ability to serve as an active, engaging resource to government officials, to support and enhance the public health system.

To fulfill this role, a provincial public health laboratory must maintain the capacity to:

- provide medical and scientific leadership in the development of provincial public health policy and integration of public health laboratory science into practice; and
- participate in the development of standards for health related laboratories, including food, environmental, clinical and research standards.

Laboratory Improvement and Regulation (Quality Assurance)



- A provincial public health laboratory should have the ability to serve as a central resource for laboratory quality assurance and set the standard for local laboratory performance, in order to sustain the calibre of the Canadian public health laboratory system.

To fulfill this role, a provincial public health laboratory must maintain the capacity to:

- maintain College of American Pathologists' (CAP) or International Standardization Organization (ISO) accreditation with distinction;
- support the development of quality assurance programming for clinical and environmental laboratories by way of provision of training, leadership, consultation, and proficiency testing; and
- develop and oversee the delivery of programs to ensure the reliability of laboratory data used for communicable disease and environmental monitoring.

Training and Education of Health Care and Public Health Workers



- A provincial public health laboratory should have the ability to serve as a provincial academic centre in areas related to public health to ensure continual improvement and enhancement of the public health system.

To fulfill this role, a provincial public health laboratory must maintain the capacity to:

- provide training to improve the scientific and technical skills of public health laboratory staff, including cross-training to meet surge response requirements;
- participate in the training of technologists and under-graduate and post-graduate medical and non-medical trainees; and
- assist in the instruction and education of provincial infection control personnel.

Public Health Related Research and Development



- A provincial public health laboratory should have the ability to evaluate and implement new technologies and analytical methodologies to secure the provision of state-of-the-art, cost-effective and timely analytical services in support of the province's public health and health care communities.

To fulfill this role, a provincial public health laboratory must maintain the capacity to:

- identify the need for new laboratory methodologies for communicable and, where appropriate, chronic disease detection and prevention;
- conduct research to improve laboratory tests for communicable and, where appropriate, chronic disease surveillance;
- collaborate with academic and private sector researchers and other government agencies to adapt, test and evaluate emerging technologies for public health laboratories;
- administer applied studies into new analytical methods and services necessary to meet changing public health surveillance and regulatory requirements; and
- lead public health research.

Core Functions Fulfillment

To support the development of the ten core functions and capabilities identified by the CPHLN, provincial public health laboratories are encouraged to:

- build and strengthen partnerships with provincial, regional and national public health leaders and private industry;
- maintain communication with medical health officers, provincial epidemiologists and infectious disease experts, as well as provincial environment departments, public health nurses, provincial agriculture departments, and policy makers;
- address legislative and regulatory responsibilities with laboratory stakeholders;
- participate in provincial strategic planning and policy development processes;
- explore ways to optimize resources in a fiscally challenging environment; and
- develop accountabilities within a framework of evaluation for the optimal delivery of public health and reference services.

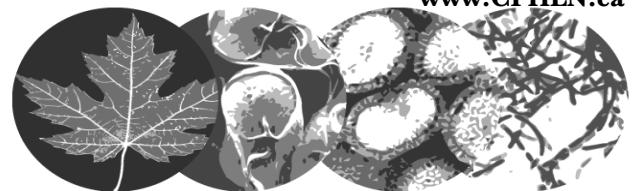
Finally, the dialogue surrounding core functions and capabilities should not be limited to provincial public health laboratories. Comprising an integral component of the broader network of Canadian public health laboratories, provincial public health laboratories have an opportunity and a responsibility to contribute to a national framework for the development and delivery of public health laboratory services. Collaboration among all participants of the public health system is necessary to ensure a cohesive response in cross-provincial outbreak and emergency situations.

The **Canadian Public Health Laboratory Network** is
a nationally minded, proactive forum of public health
laboratories.

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