Ontario Health Plan for an Influenza Pandemic

Chapter 8: Laboratory Services

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Ontario

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Chapter 8: Laboratory Services

Audience

- community, hospital and public health laboratory workers and management and those who use laboratory services

Information on the use of laboratory data for surveillance is discussed in Chapter 3: Surveillance.

Chapter objectives

- to provide guidance and tools for laboratories responding to an influenza pandemic
- to define roles and responsibilities with respect to laboratory services
- to identify the laboratory services required during an influenza pandemic and provide guidelines to rationalize other laboratory services
- to outline the role of laboratory-based influenza surveillance and research priorities during a pandemic
- to provide guidance on where to access key resources providing further information on laboratory services

Laboratories response summary

Response objective: to provide laboratory services throughout an influenza pandemic, including influenza testing to support clinical decision-making and as well as surveillance activities

LABORATORY ACTIVITIES BEFORE SEVERITY IS KNOWN

Public Health Ontario Laboratories (PHOL) distribute updated recommendations and guidelines on specimen management, diagnostic testing (including indications for testing), and biosafety and biocontainment measures to health care providers and laboratories through Labstracts

Laboratories implement these recommendations and appropriate continuity of operations protocols

Health care providers submit laboratory samples according to these recommendations

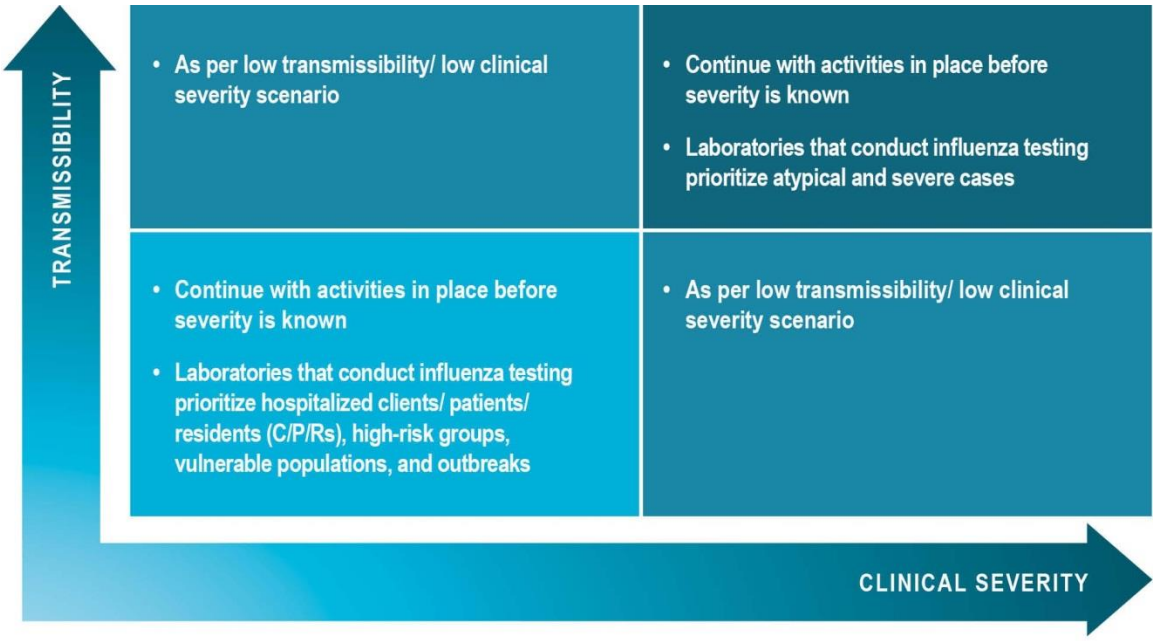

FIGURE 1. LABORATORY ACTIVITIES STRATIFIED BY SEVERITY

Roles and responsibilities

Table 1 outlines Laboratory roles and responsibilities during an influenza pandemic. For a broad overview of roles and responsibilities during an influenza pandemic, see Chapter 1: Introduction.

TABLE 1. LABORATORY ROLES AND RESPONSIBILITIES DURING AN INFLUENZA PANDEMIC

Party	Roles and responsibilities
Public Health Agency of Canada (PHAC) (including the NML and Pathogen Regulation Directorate)	Confirm the presence of the influenza pandemic virus in Ontario Function as an interchange of laboratory surveillance and scientific information to and from all levels of government across Canada, the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) Provide technical support to PHOL to confirm the initial cases of a novel influenza virus, disseminate protocols and proficiency panels to aid such detection, and assist with the development of laboratory testing recommendations appropriate for different stages of a pandemic Provide resources and scientific and technical advice to PHOL on influenza subtyping, antiviral resistance testing, and the development of laboratory protocols Conduct and support research during the pandemic response Identify the level of biosafety required for handling and processing laboratory specimens
MOHLTC[1] (through the Ministry Emergency Operations Centre (MEOC))	Communicate laboratory recommendations[2] through Important Health Notices (IHNs), the Health Care Provider Hotline, teleconferences and other mechanisms (note that MOHLTC communiqués link to Labstracts)

[1] Throughout the OHPIP, the MOHLTC includes the Minister, the Chief Medical Officer of Health (CMOH) and the rest of the MOHLTC. For information on how decisions are made in the MOHLTC during an emergency, see the Ministry Emergency Response Plan.

Party	Roles and responsibilities
PHO (through the MEOC)	Collect, analyze, report and communicate laboratory surveillance information through the Ontario Respiratory Virus Bulletin and the Monthly Infectious Diseases Surveillance Report Develop laboratory recommendations Communicate laboratory recommendations through Labstracts Provide influenza molecular testing (detection, sub-typing and antiviral susceptibility), prioritizing access to these services for high risk groups and vulnerable populations Assist hospital laboratories with implementation of influenza molecular testing, including training, verification and validation Undertake research (see Laboratory-based pandemic research for more information)
Hospital laboratories	Follow MOHLTC/PHO laboratory recommendations, as issued in IHNs and Labstracts Provide influenza molecular testing, or transfer samples to a PHOL or other laboratory that provides influenza testing Provide laboratory testing data to PHO as possible Continue to provide the routine tests required for provision of hospital care
Community laboratories	Continue to provide the routine tests required for the provision of community health care services Continue to collect, sort and transport influenza and other necessary specimens (e.g., bacterial coinfections) from community-based health care providers to laboratories that provide such testing

[2] This term refers to best practices and guidance on the risk posed by the pandemic. Recommendations related to occupational health and safety (OHS) may be considered reasonable precautions in the application of the Occupational Health and Safety Act (OHSA).

Party	Roles and responsibilities
Laboratory employers	Recognize hazards, assess risks associated with hazards, control risks and evaluate controls (see Chapter 5: Occupational Health & Safety and Infection Prevention & Control for more information on the roles and responsibilities of laboratory employers with respect to biosafety and biocontainment measures)
Health care providers	Follow MOHLTC/ PHO recommendations for specimen collection and indications for testing, as issued in IHNs and Labstracts

Pandemic response measures

Community laboratories, hospital laboratories, and PHOL deliver an escalating response to an influenza pandemic based on the severity of the virus (see Table 2).

TABLE 2. PANDEMIC RESPONSE MEASURES IN COMMUNITY, HOSPITAL, AND PROVINCIAL LABORATORIES

Severity	All community and hospital laboratories	Hospital laboratories that perform influenza testing	PHOL
Initial pandemic (severity unknown)	Implement continuity of operations protocols. Implement guidelines for specimen type, collection, and transportation, as described in the national and provincial pandemic guidelines (as found in Labstracts and IHNs).	Ensure that appropriate bio-safety guidelines to manage respiratory specimens are in place. Refocus resources towards increasing capacity for influenza testing. Where possible, redeploy cross-trained laboratory personnel to influenza testing. Submit specimens with suspected novel influenza sub-types to PHOL for confirmation. Institute active surveillance for influenza-like illnesses among laboratory personnel.	Implement appropriate bio-safety guidelines to manage respiratory specimens. Implement continuity of operations protocols to manage the increased number of requests for influenza testing and implementing new research initiatives; this may include increasing capacity for molecular testing. Distribute updated guidelines on specimen management and diagnostic testing (including indications for testing) to health care providers and laboratories through Labstracts. Disseminate precise and accurate communications to clients, stakeholders, employees and other laboratories. Adopt testing, reporting and surveillance protocols from the NML for influenza diagnosis and other functions as they become available. Send initial specimens of suspected novel influenza virus to NML for confirmation as done for seasonal influenza.

Severity	All community and hospital laboratories	Hospital laboratories that perform influenza testing	PHOL
		Submit respiratory pathogen testing data to PHO.	Increase monitoring for antiviral resistance above levels done for seasonal influenza. Increase molecular surveillance for influenza variations, novel subtypes, and antiviral resistance to a higher level than done for seasonal influenza with representation across the province. Work with national partners to monitor the pandemic virus and to conduct special studies as required or to address other aspects of the response. Continue community sentinel respiratory viral surveillance system as done for seasonal influenza. Continue to produce the Ontario Respiratory Virus Bulletin as done for seasonal influenza.

Severity	All community and hospital laboratories	Hospital laboratories that perform influenza testing	PHOL
Low transmission, low severity	Initiate suspension of testing for non-critical laboratory services, if required. Monitor surveillance data from PHOL for information on community circulation of influenza and other respiratory viruses.	Review and adjust influenza testing algorithms, following national and provincial guidelines (as found in Labstracts and IHNs). Submit a proportion of samples from C/P/Rs with influenza (including ambulatory clients/ patients (C/Ps)) to PHOL for further analysis including molecular surveillance, strain typing, resistance testing. Prioritize influenza testing of more severe cases (hospitalized C/P/Rs), high-risk groups, vulnerable populations, cases with unusual presentations and outbreaks.	Distribute updated guidelines on specimen management and diagnostic testing (including indications for testing) to health care providers through Labstracts. The strategy regarding curtailing of laboratory tests is based on available surveillance and laboratory system capacity. Continue respiratory viral surveillance and dissemination of Ontario Respiratory Virus Bulletins. Continue monitoring for antiviral resistance. Continue molecular surveillance. Continue community sentinel respiratory viral surveillance system. Submit a portion of samples from C/P/Rs with influenza to NML for further study (molecular surveillance, strain typing, antiviral resistance testing). Work with national partners to monitor the pandemic virus and conduct special studies as required or to address other aspects of the response.

Severity	All community and hospital laboratories	Hospital laboratories that perform influenza testing	PHOL
High transmission, low severity	As per the low transmission, low severity scenario.	As per the low transmission, low severity scenario.	As per the low transmission, low severity scenario. Prioritize influenza testing of more severe cases (hospitalized C/P/Rs), high risk groups, vulnerable populations, cases with unusual presentations, and outbreaks.
Low transmission, high severity	As per the low transmission, low severity scenario.	Prioritize influenza testing of more severe cases (hospitalized C/P/Rs), high-risk groups, vulnerable populations, cases with unusual presentations, and outbreaks.	As per the low transmission, low severity scenario. Prioritize influenza testing of more severe cases (hospitalized C/P/Rs), high-risk groups, vulnerable populations, cases with unusual presentations, and outbreaks.
High transmission, high severity	As per the low transmission, high severity scenario.	Prioritize influenza testing to atypical and severe cases.	As per the low transmission, high severity scenario. Prioritize influenza testing for atypical and severe cases.

Influenza testing recommendations

During an influenza pandemic, NML and PHOL base their influenza testing recommendations on the most current seasonal influenza guidelines.[3]

Health care providers can order nasopharyngeal (NP) swab kits by contacting their local PHOL. Instructions on the use of Virus Respiratory Kits, including NP swab kits, are available from PHOL.

Additional guidelines for laboratories serving hospitalized populations

Laboratories serving hospitalized C/P/Rs should focus on providing critical services and reducing the scope and volume of non-critical testing during an influenza pandemic. Priority testing is necessary because kit inventory could become limited and restocking could be challenging. Assessing critical services should be done in consultation with the chief of staff, other medical leadership, and the senior administration of the hospital. Factors affecting such decisions include:

- the unique needs of the facility
- the scope of clinical services offered (including referral mandate and specialized care)
- the proximity to nearest less affected supportive hospital
- the need to provide support to more severely affected partner facilities

Those facilities that lack specialized influenza testing capabilities may need to rely initially on rapid influenza diagnostic testing (RIDT). Due to variable sensitivity, which may be very poor with a novel influenza strain, specimens with negative RIDT results should be followed up with alternative testing as soon as possible. If used, the facility will need to develop algorithms to support decision-making on the use of RIDTs and other testing choices.

Preparedness tip

As part of continuity of operations planning, all laboratories should identify the critical services that must continue, and those that can be temporarily suspended, during an influenza pandemic.

[3] See the Canadian Public Health Laboratory Network for the most current testing recommendations.

Bacterial co-infection testing

Bacterial co-infection occurs in approximately 30 per cent of cases of severe influenza, and is detected in approximately 25 per cent of all influenza-related deaths; *Streptococcus pneumoniae* and *Staphylococcus aureus* are most commonly identified. Methicillin-resistant *S. aureus* (MRSA) is the most commonly reported bacteria in fatal influenza infection in children in the United States. Bacterial pneumonia may occur concomitantly with influenza or up to two weeks following influenza illness. Sputum, blood cultures, endotracheal tube (ETT) and/or lower respiratory tract specimens obtained by bronchoalveolar lavage (BAL) should be submitted for bacterial culture, ideally prior to initiating antibiotic treatment, in the following cases:

- severe influenza
- history of influenza followed by persistence or worsening of respiratory symptoms and fever, or development of new respiratory symptoms and fever
- chest radiography demonstrating lobar pneumonia, cavitation or effusion

At this point there is insufficient data to recommend the use of serum C-reactive protein or procalcitonin levels for the diagnosis of bacterial pneumonia in the setting of influenza.

Prior to and during a pandemic it is important to conduct surveillance of bacterial pathogens co-infecting persons with influenza as possible.

Biocontainment and biosafety recommendations

Laboratories should implement relevant occupational health & safety (OHS) and infection prevention & control (IPAC) measures as outlined in Chapter 5: Occupational Health & Safety and Infection Prevention & Control, such as promoting immunization and hand hygiene and encouraging health workers to stay home when sick. This section outlines laboratory-specific biocontainment and biosafety recommendations.

In addition to regular measures for seasonal influenza, laboratories may need to make additional efforts to maintain a healthy environment during an influenza pandemic. Additional biocontainment and biosafety measures may be recommended by PHAC.[4] These measures are communicated by PHAC and PHO.

Employers may need to implement additional precautions prior to the release of recommendations from PHAC and PHO due to local conditions or circumstances within the laboratory. In the absence of such directions, laboratory employers should apply the

[4] The Canadian Pandemic Influenza Plan for the Health Sector (CPIP) includes recommendations for handling clinical specimens from C/P/Rs with influenza-like illness (ILI) during an influenza pandemic. The CPIP is currently under review.

RACE approach.[5] Factors that should be considered as part of the risk assessment include:

- infectious dose, virulence, and pathogenicity of the agent
- potential outcome of exposure
- natural route of infection
- other routes of exposure possibly resulting from laboratory manipulations (aerosol, ingestion)
- stability of the agent in the environment
- concentration of the agent
- presence of a suitable host
- laboratory activity (e.g., molecular testing, virus culture)
- existing control measures and availability of effective therapeutic interventions

Laboratory-based pandemic research

The most effective way to ensure research opportunities are available is to prepare well in advance of a pandemic. Having the necessary, scaleable laboratory infrastructure in place, as well as ongoing and active collaborations underway before an influenza pandemic will enable the implementation of new research projects or the expansion of existing projects to include pandemic research.

PHO participates in the Sentinel Vaccine Effectiveness Study, which is designed to estimate influenza vaccine effectiveness against laboratory-confirmed infection, monitor circulating influenza virus strains, assist the WHO in selection of vaccine components for the upcoming influenza season, and monitor the contribution of other circulating respiratory viruses to ILI.

[5] RACE stands for recognize, assessment, control and evaluate. The RACE approach involves recognizing a hazard; assessing the risk associated with a hazard; controlling the risk associated with a hazard; and evaluating the controls. See Chapter 5: Occupational Health & Safety and Infection Prevention & Control for more information on the RACE approach.

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