

Ontario Health Plan for an Influenza Pandemic

Chapter 3: Surveillance

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Audience

- individuals who produce and use influenza pandemic surveillance information, including people who work in public health units (PHUs) and other parts of the health system

Chapter objectives

- to provide an understanding of influenza pandemic surveillance data collection and analysis methods, including roles and responsibilities

Immunization data collection methods are discussed in Chapter 7: Immunization.

Surveillance response summary

Response objective: to provide decision-makers with the necessary information to determine when and how to respond to the pandemic by detecting the emergence of a pandemic virus; informing the type and timing of provincial and local interventions needed to respond to the virus; and identifying populations that may need additional or prioritized interventions

SURVEILLANCE ACTIVITIES BEFORE SEVERITY IS KNOWN

The Ministry of Health and Long-Term Care (MOHLTC) and Public Health Ontario (PHO) develop the pandemic surveillance strategy

Health system partners implement the strategy; the initial focus is on identifying the pandemic severity through laboratory testing and follow-up on the first few hundred (FF100) confirmed cases

PHO implements special research studies (e.g., syndromic surveillance, symptom studies)

The MOHLTC monitors pandemic-specific interventions (e.g., number of people visiting flu assessment centres (FACs))

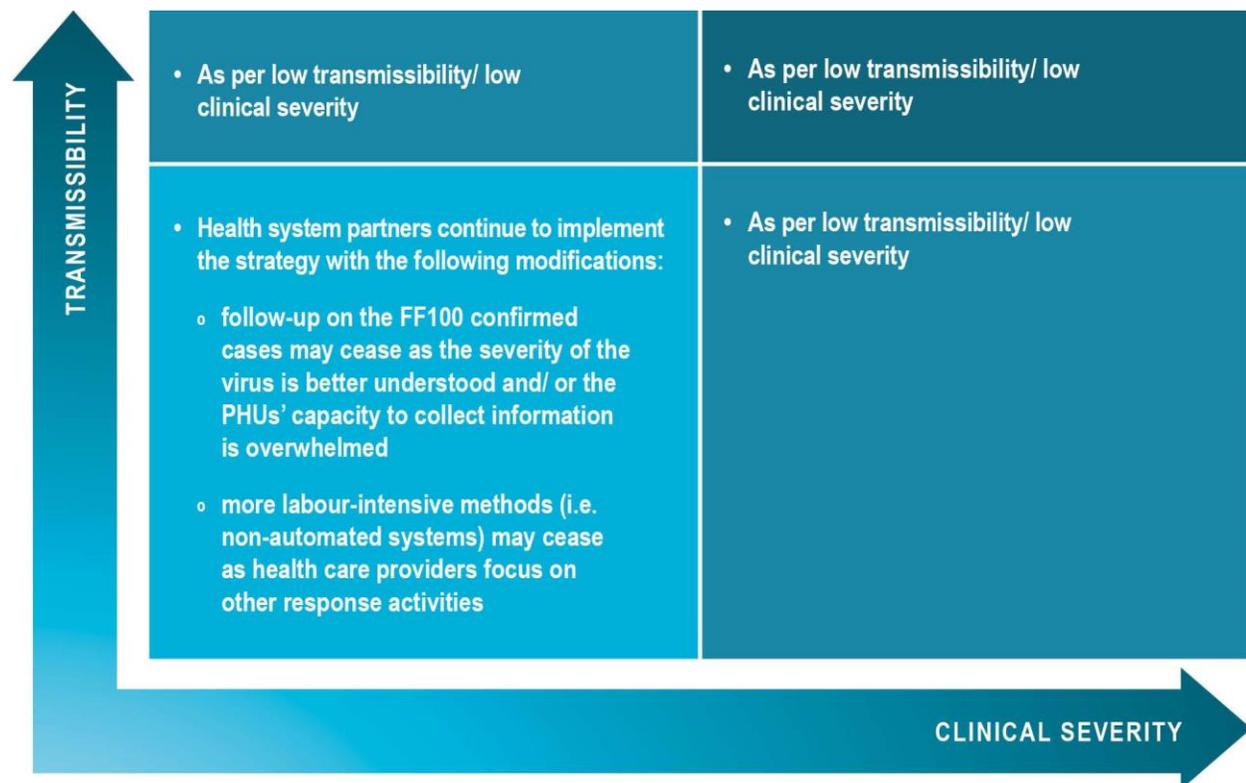


FIGURE 1. SURVEILLANCE ACTIVITIES STRATIFIED BY PANDEMIC SEVERITY

Introduction

Surveillance is the systematic ongoing collection, collation and analysis of data with timely dissemination of information to those who require it in order to take action.¹ Effective surveillance enables appropriate interventions to be implemented in order to reduce morbidity and mortality. Surveillance is essential for any disease but is especially critical when responding to a new threat, such as an influenza pandemic virus.

The response objective of the influenza pandemic surveillance strategy is to provide decision-makers with the necessary information to determine when and how to respond and to evaluate the effectiveness of the response.

Specifically, the influenza pandemic surveillance strategy supports Ontario's evidence-based decision-making process by:

- detecting the emergence of a pandemic virus through:
 - identifying the emergence of a novel influenza virus (with an international, national or Ontario origin) with the potential to start a pandemic
 - confirming the presence of a known influenza pandemic virus in Ontario
 - identifying the beginning of a pandemic wave
- informing the type and timing of interventions needed to respond to the virus through:
 - monitoring ILI activity in Ontario that may be attributable to the pandemic virus
 - assessing the transmissibility of the influenza pandemic virus
 - determining the clinical severity of illness caused by the influenza pandemic virus
 - tracking the geographic spread of the influenza pandemic virus within Ontario
 - anticipating the duration, peak and end of a pandemic wave
 - evaluating the effectiveness of control measures
- identifying populations that may need additional or prioritized interventions (i.e., high risk groups with an increased likelihood of becoming ill and/or of suffering serious health outcomes)

¹ Provincial Infectious Disease Advisory Committee (2012) [Routine practices and additional precautions in all health care settings](#)

Ontario's influenza pandemic surveillance strategy builds on the seasonal influenza strategy, as outlined in [Seasonal Influenza 2012/2013: Ontario's Blueprint for Action](#). Leveraging seasonal influenza capacity enables Ontario to compare historical data, enhancing the ability of the provincial and local level to evaluate the severity of the pandemic in the context of previous influenza seasons and observe changes in the behaviour of the virus. However, the strategy may need to be adjusted at the time of an influenza pandemic due to the demands of the response. For example, the type and level of surveillance activities conducted early on in a pandemic may not be sustainable during peak periods of activity, especially for activities that are not automated. As well, additional components — e.g., information from special studies conducted during an influenza pandemic such as symptom surveys, seroprevalence studies, modelling studies or research to determine virus transmissibility in different settings — may be added to better understand the nature of the virus.

Preparedness tip

Health care providers should participate in influenza surveillance activities every influenza season, such as the [Sentinel Vaccine Effectiveness study](#) and [FluWatch](#). This not only enhances their capacity to support the response to an influenza pandemic, it also contributes to building historical data that can be used to evaluate the severity of future influenza outbreaks. Health care providers can contact their local [PHU](#) for more information on how they can get involved in influenza surveillance activities.

In Ontario, influenza surveillance is typically organized by PHU jurisdiction. There are a number of common surveillance methods that are used across most of the 36 PHUs that allow Ontario to monitor patterns of transmission and disease across the province. While there may be additional methods that individual PHUs use to gather information on disease activity in their jurisdiction, the provincial influenza pandemic strategy focuses on those common activities in place across most PHUs.

Roles and responsibilities

[Table 1](#) outlines surveillance 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. SURVEILLANCE ROLES AND RESPONSIBILITIES

Party	Roles and responsibilities
PHAC	<p>Collaborate with provinces and territories to determine core data elements</p> <p>Disseminate Canada-wide ILI activity information</p> <p>Identify circulating virus strains and antiviral resistance through the National Microbiology Laboratory (NML)</p> <p>Through the FluWatch program, collect sentinel health care provider ILI data and share with respective province/territory, as well as publish in the FluWatch report</p> <p>Issue national Public Health Alerts to share information with public health professionals across the country</p>
MOHLTC ² (through the Ministry Emergency Operations Centre (MEOC))	<p>Collaborate with PHO to develop the provincial surveillance strategy</p> <p>Receive surveillance information from PHO</p> <p>Communicate surveillance information to health system partners through situation reports, Important Health Notices (IHNs) and other methods</p> <p>Communicate surveillance information to the public through media briefings, the MOHLTC website and other methods</p> <p>Collaborate with PHO to use surveillance information to determine severity</p>

²Throughout the OHPIP, the MOHLTC includes the [Minister](#), the [Chief Medical Officer of Health](#) 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
<p>PHO (through the MEOC)</p>	<p>Collaborate with the MOHLTC to develop the provincial surveillance strategy</p> <p>Lead and communicate the provincial surveillance strategy</p> <p>Perform provincial surveillance data analysis and interpretation</p> <p>Support the MOHLTC to use surveillance information to determine severity</p> <p>Receive and consider analytic and interpretive input from PHUs</p> <p>Engage and collaborate with infectious disease modellers</p> <p>Collect, analyze, report and communicate surveillance information through the Ontario Respiratory Virus Bulletin and the Monthly Infectious Diseases Surveillance Report</p> <p>Communicate PHOL testing recommendations and response strategies through Labstracts</p> <p>Identify type, subtype and antiviral resistance of circulating influenza viruses in collaboration with the NML</p> <p>Organize and implement special research studies in consultation with the MOHLTC</p> <p>Monitor for virus mutations</p> <p>Report Integrated Public Health Information System (iPHIS) data to PHAC</p>
<p>PHUs³</p>	<p>Collect local data as per the provincial surveillance strategy</p> <p>Lead and implement local surveillance initiatives</p> <p>Report local data to PHO and contribute any analytic or interpretive insights to the MOHLTC and PHO</p> <p>Analyze, report and communicate local surveillance information to local health system partners</p> <p>Interpret provincial, national and international data for relevance to the local context and communicate this information to local health system partners</p> <p>Facilitate the collection of samples during institutional outbreaks</p>

³Throughout the OHPIP, PHU includes boards of health, medical officers of health (MOH) and other PHU health workers (e.g., public health inspectors, epidemiologists,

Party	Roles and responsibilities
Long-term care homes and other institutions	<p>Report respiratory infection outbreaks and laboratory-confirmed cases of influenza to the MOH as required by the HPPA</p> <p>Report respiratory infection outbreaks to the Director of the MOHLTC's Performance Improvement and Compliance Branch as required by the Long-Term Care Homes Act</p>
Hospitals	<p>Report respiratory infection outbreaks and laboratory-confirmed cases of influenza to the MOH as required by the HPPA</p> <p>Report data on critical care clients/ patients/ residents (C/P/Rs) through the Critical Care Information System (CCIS)</p> <p>If participating in an emergency department syndromic surveillance strategy, report data</p>
Primary health care providers	<p>Report laboratory-confirmed cases of influenza to the MOH as required by the HPPA</p> <p>If a sentinel health care provider, report ILI rates to the national FluWatch program and/or collect respiratory samples from clients/ patients with ILI symptoms as part of the Sentinel Vaccine Effectiveness study</p>
Schools with the support of Boards of Education	Report student absenteeism to the PHU based on local arrangements

Methods

During an influenza pandemic, the provincial surveillance strategy is based on established provincial seasonal influenza laboratory and epidemiologic surveillance methods, including syndromic sources.

Additional data collection components may be added to enable a better understanding of the influenza pandemic virus, such as special research studies to gain an understanding of virus transmissibility (symptom surveys) and evaluate population susceptibility to the virus (seroprevalence studies) and data collection methods related to pandemic interventions (e.g., number of clients/ patients visiting FACs). As well, existing seasonal influenza surveillance methods may be modified in order to balance

public health nurses, etc.). See the [Health Protection and Promotion Act \(HPPA\)](#) and [Ontario Public Health Standards](#) for more information on the roles and responsibilities of various PHU parties.

data collection needs with the demands placed on health care providers during the response.

The burden of illness pyramid in [Figure 2](#) demonstrates how influenza surveillance methods provide data on specific components of the spectrum of disease, with each level of the pyramid assumed to be a subset of the level beneath. As with the seasonal influenza surveillance strategy, the provincial surveillance strategy attempts to ensure that information is collected across the spectrum of disease — from subclinical to clinical disease, including death — to provide decision-makers with a full picture of the epidemiology of the virus.

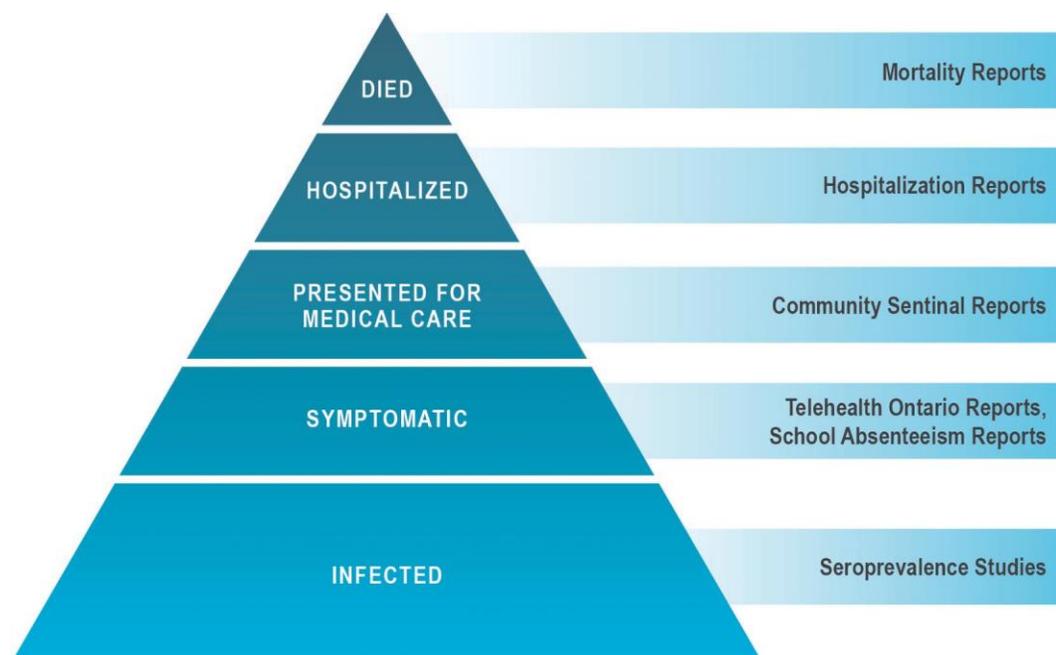


FIGURE 2. BURDEN OF ILLNESS PYRAMID

The provincial surveillance strategy will be confirmed and communicated at the time of a pandemic by PHO. [Appendix A](#) provides a summary of the surveillance methods and indicators that may be part of the provincial surveillance strategy.

Preparedness tip

To ensure they have access to the latest information during an influenza pandemic, health care providers should subscribe to receive [IHNs](#), [Labstracts](#), [Ontario Respiratory Virus Bulletins](#) and [Monthly Infectious Diseases Surveillance Reports](#).

Challenges

Influenza pandemic surveillance poses many challenges. As with seasonal influenza surveillance, the first indications of the arrival or beginning of an influenza pandemic may not be a definitive physician diagnosis or laboratory confirmation because only a portion of those with influenza seek medical attention and many who do seek care are not tested. Since many of the cases cannot be identified by traditional surveillance methods, alternative data methods — such as seroprevalence studies — are important for augmenting clinically-generated data sources.

There are also pressures on the health system's data collection abilities as an influenza pandemic unfolds. The types of surveillance methods used and their levels of intensity may not be sustainable prior to or during peak periods of activity — this would be especially true in a severe pandemic when the capacity of the health system may be overwhelmed. This would be the case for those data collection methods that are not automated.

During an influenza pandemic, the provincial surveillance strategy must address these challenges in order to ensure that decision-makers have access to timely surveillance information to inform response activities, while considering the workload and needs of those health care providers that are contributing to data collection processes.

Next steps

In the development of the Ontario Influenza Response Plan, the MOHLTC will work with its partners to:

- identify methods to collect and analyze data on health system capacity and public perception
- identify methods to collect and analyze data on the impacts of influenza on vulnerable populations
- continue to evaluate the effectiveness of influenza surveillance methods and further refine the seasonal and pandemic surveillance strategies

Appendix A – Surveillance methods

[Table 2](#) outlines the surveillance methods that may be used in Ontario during an influenza pandemic.

TABLE 2. OVERVIEW OF SURVEILLANCE METHODS

Method	Indicator(s)	Description
Community sentinel ILI reports	Proportion of ILI visits out of all visits to sentinel community health care providers Change in ILI visit rates ILI visit rate by age group	Through PHAC’s national Flu Watch Program, community sentinel health care providers provide weekly reports to PHAC on the number of clients/ patients seeking care with symptoms of ILI as a proportion of all clients/ patients seeking medical care from that practitioner for a given day of the week. (Note that sentinel health care providers are only active in some PHUs). PHAC publishes national data in FluWatch Reports. PHO receives the data provided by sentinel health care providers in Ontario directly from PHAC on a weekly basis and monitors trends in ILI rates and age groups most affected by ILI. Provincial rates are reported and mapped in the Ontario Respiratory Virus Bulletin. PHUs have access to data reported by sentinel health care providers in their jurisdiction.
Critical Care reports	per cent critical care bed utilized per cent of critical care C/P/Rs with respiratory syndromes per cent of critical care C/P/Rs with confirmed influenza and/ or ILI	The CCIS is a real-time performance measurement system that supports resource utilization management for intensive care units across the province. The goal of the CCIS is to support decision-making around critical care resource utilization and capacity planning and management. During an influenza pandemic, the MOHLTC may request that the critical care subsector report cases of confirmed influenza or ILI – rather than just cases with respiratory syndromes – to allow for greater understanding of the types of C/P/Rs in intensive care units.

Method	Indicator(s)	Description
Follow-up on the FF100 laboratory-confirmed cases	Known exposure Hospitalization Death rate Pre-existing health conditions Location Immunization status	Detailed information is collected by PHUs and reported to PHO through the iPHIS from the FF100 laboratory-confirmed cases in Ontario. Information collected may include pre-existing health conditions (e.g., chronic diseases), pregnancy, health outcomes, demographic data, and immunization status.
Emergency department reports	# all-cause and respiratory chief complaint visits Change in # all-cause and respiratory chief complaint visits Age of clients/ patients	The Emergency Department Syndromic Surveillance (EDSS) system (run by the Kingston, Frontenac and Lennox & Addington Public Health Informatics program and supported by the MOHLTC) monitors visits to emergency departments at many hospitals across Ontario. The EDSS generates alerts to notify PHUs of these increases. Real time activity data from nine of these hospitals are available at the Infection Watch Live website. (Note that the EDSS system is only available in some PHUs across Ontario).
FAC reports	# visits	Information collected by FACs (should they be established) and reported to the MOHLTC. Data may include the age of the client/ patient and if the client/ patient was referred elsewhere for additional medical assessment.
Google Flu Trends	# searches Trend in # searches	Google Flu Trends uses aggregated search information related to ILI to estimate the level of influenza activity in a region. PHO monitors this data.

Method	Indicator(s)	Description
Hospitalization reports	# hospitalizations	<p>PHUs follow up on laboratory confirmed cases that are hospitalized in order to collect additional information on the individuals' underlying health status, influenza immunization status, as well as to document if they presented with any unusual systems or had any severe complications, including death. This information is entered into iPHIS.</p> <p>Immunization Monitoring Program ACTIVE (IMPACT) monitors paediatric hospitalizations as a consequence of influenza infection (by type and subtype) from 12 children's hospitals across Canada. IMPACT is administered by PHAC and aggregate data from the two participating Ontario hospitals (Hospital for Sick Children in Toronto and the Children's Hospital of Eastern Ontario in Ottawa) are shared with PHO on a weekly basis during influenza season.</p>
Institutional respiratory infection outbreak reports	# outbreaks Trend in # outbreaks	<p>Under the HPPA, institutions such as long-term care homes and hospitals are required to report outbreaks of respiratory infections to their local MOH or designate. PHUs share this information with PHO through iPHIS. Aggregate data on C/P/Rs and workers are reported.</p>
Laboratory testing	Novel virus Per cent positivity Change in antiviral resistance patterns Match between vaccine strain and circulating influenza strains	<p>Under the HPPA, laboratories are required to report laboratory-confirmed cases of influenza (sporadic and outbreak related) to their local MOH. PHUs then report these cases to PHO through iPHIS. PHO tracks the percentage of respiratory samples that test positive for influenza (as well as other respiratory viruses), an important indicator of influenza and ILI activity.</p> <p>The NML in Winnipeg performs strain characterization and monitors circulating influenza strains for resistance to influenza antivirals. PHOL also test for resistance, but only to a specific mutation for oseltamivir (Tamiflu).</p>

Method	Indicator(s)	Description
Local influenza activity reports	Influenza activity level	PHUs submit weekly reports to PHO on the influenza activity levels in their jurisdiction based on their assessment of a variety of data sources, such as reports on ILI consultations from community-based sentinel health care providers, institutional respiratory infection outbreaks, reports on school/ work absenteeism levels and the results from syndromic surveillance systems in emergency departments. PHUs may not have access to all these data sources; therefore, they base their assessment on the available sources in their jurisdiction.
Mortality reports	# hospitalized C/P/Rs with laboratory confirmed influenza who died Proportion of lab-confirmed hospitalized C/P/Rs who died as a consequence of influenza infection	PHUs follow up on laboratory confirmed cases that are hospitalized in order to collect additional information on underlying health status, influenza immunization status, as well as to document if they presented with any unusual symptoms or had any severe complications, including death. This information is entered into iPHIS. PHUs report on hospitalized individuals with laboratory-confirmed influenza who died.
National/ international reports, research, symposia and the media	Numerous	The MOHLTC, PHO and PHUs monitor international and national surveillance reports, (e.g., PHAC's Public Health Alerts, surveillance reports from the Centers for Disease Control and Prevention , World Health Organization and the European Center for Disease Prevention and Control), the latest scientific findings and media reports.
School absenteeism reports	Absenteeism rate Change in rate	School absenteeism rates are reported to PHO by those PHUs that receive information from schools and/or boards of education in their jurisdiction. Absenteeism rates are either reported as all cause or due to illness.

Method	Indicator(s)	Description
Sentinel Vaccine Effectiveness study	Vaccine status of confirmed cases per cent positivity Change in antiviral resistance patterns Match between vaccine strain and circulating influenza strains	A number of health care providers participate as sentinel health care providers in the national Sentinel Vaccine Effectiveness study, which is designed to monitor circulating influenza virus strains and resistance to a specific antiviral resistance mutation, estimate influenza vaccine effectiveness against laboratory-confirmed cases, assist the World Health Organization in selection of vaccine components for the next influenza season and monitor the contribution of other circulating respiratory viruses to ILI.
Special research studies	Various	Research studies may be needed during an influenza pandemic to provide more information about the pandemic virus. Studies may include symptom studies to describe how well the virus spreads from person-to-person, seroprevalance studies, modelling and studies to determine virus transmissibility in different settings.
Telehealth Ontario reports	Change in call volumes for fever/ ILI or respiratory syndrome Change in all cause call volume Change in call volume by age/ sex	Telehealth Ontario calls that meet specific symptom-based criteria are categorized as either calls for fever/ ILI syndrome or a respiratory syndrome. PHO analyzes call volumes for these syndromes, which are reported as a proportion of all calls to Telehealth Ontario. Significant increases in call volumes or geographic clustering of syndrome-specific calls (by postal code) may indicate increases in influenza activity in the community.

[Table 3](#) outlines which surveillance objective(s) each method helps to achieve (see the legend below for a description of the objectives).

Legend

Response objective #1 - detecting the emergence of a pandemic virus

- Novel virus = identifying the emergence of a novel influenza virus (with an international, national, or Ontario origin) with the potential to start a pandemic
- Ontario pandemic = confirming the presence of an influenza pandemic virus in Ontario
- Pandemic wave = identifying the beginning of a pandemic wave

Response objective #2 - informing the type and timing of interventions needed to respond to the virus

- ILI in Ontario = monitoring ILI activity in Ontario that may be attributable to the pandemic virus
- Transmissibility = assessing the transmissibility of the influenza pandemic virus
- Severity = determining the clinical severity of illness caused by the influenza pandemic virus
- Geography = tracking the geographic spread of the influenza pandemic virus within Ontario
- Timing = anticipating the start, duration, peak and end of a pandemic wave
- Evaluation = evaluating the effectiveness of control measures

Response objective #3 - identifying populations that may need additional or prioritized interventions

- High-risk groups = identifying populations that may need additional or prioritized interventions (i.e., populations with an increased likelihood of becoming ill and/or suffering serious health outcomes)

TABLE 3. LINKAGE BETWEEN SURVEILLANCE METHODS AND OBJECTIVES

Method	Objective #1			Objective #2						Objective #3
	Novel virus	Ontario pandemic	Pandemic wave	ILI in Ontario	Transmissibility	Severity	Geography	Timing	Evaluation	High-risk groups
Community sentinel ILI reports			X	X			X	X		X
Critical Care reports		X		X		X	X			X
Follow-up on the FF100 laboratory-confirmed cases						X	X	X	X	X
Emergency department reports			X	X		X	X	X		X
FAC reports				X		X	X	X		X
Google Flu Trends				X			X			
Hospitalization reports	X	X				X			X	X
Institutional respiratory infection outbreak reports	X	X	X	X	X	X	X	X		X

Method	Objective #1			Objective #2						Objective #3
	Novel virus	Ontario pandemic	Pandemic wave	ILI in Ontario	Transmissibility	Severity	Geography	Timing	Evaluation	High-risk groups
Laboratory testing	X	X		X			X	X	X	X
Local influenza activity reports			X	X			X			
Mortality reports						X	X		X	X
National/international reports, research, symposia	X				X	X			X	X
School absenteeism reports				X			X	X		X
Sentinel Vaccine Effectiveness study	X	X	X				X		X	X
Special research studies					X	X		X	X	X
Telehealth Ontario reports				X	X		X			X

