5. Surveillance: Detecting and Monitoring Influenza

> Investigators and public health officials are not simply sitting back waiting for the next pandemic. In 1948 the World Health Organization established a formal monitoring system for influenza viruses. Currently 110 laboratories in 82 countries participate. … The surveillance has two purposes: first, to track mutations of existing viruses to adjust each year's vaccine, and second, to search for any sign of the emergence of a new strain – a strain that might cause another pandemic.
>
> The Great Influenza, John M. Barry

Under the Health Protection and Promotion Act, the public health system is responsible for: protecting public health, preventing, managing, and controlling the spread of communicable diseases, including influenza.

Surveillance is the continuous and systematic process of collecting, analyzing, interpreting and disseminating descriptive information to monitor public health and ensure timely interventions to reduce morbidity and mortality.

5.1 Objectives of Pandemic Surveillance

1. To detect the pandemic strain early in Ontario.
2. To track the occurrence, severity, and progression of the pandemic, based on the WHO pandemic phases.
3. To monitor influenza-like illness (ILI) activity in order to:
   - detect unusual events (new strains including epizootic strains, antigenic drift/shift, unusual outcomes/syndromes, unusual severity, unusual distribution)
   - compare new strains with vaccine composition and recommendations
   - estimate the impact of ILI in terms of attack rate, outpatient visits, hospitalizations, and case fatality rate
   - describe the affected population/s in order to identify high risk groups, modes of transmission, and risk and protective factors.
4. To share surveillance information with responders to help identify disease; guide prevention, control, and research; and evaluate treatment, prophylaxis and education.

5.2 Elements of a Comprehensive Surveillance Program

Ontario must have the capacity to help the national Centre for Infectious Disease Prevention and Control Surveillance (CIDPC) identify a new strain/s of influenza quickly (prompt identification increases the lead time for vaccine development and management measures) and track virus activity. Surveillance is the means by which Ontario will track the epidemiology, spread and impact of influenza. Ontario's surveillance program attempts to balance the need for information with the capacity of stakeholders to collect and submit information.

Comprehensive surveillance for influenza includes:

- **Laboratory / virology surveillance** (i.e., isolating/ analyzing influenza viruses, diagnosing influenza) to monitor the antigenic drift and shift of circulating influenza viruses. Because the signs and

symptoms of influenza are similar to those of other respiratory pathogens, laboratory testing is required to definitively diagnose influenza in the early stages of a pandemic and in new clusters of ILI. Antiviral susceptibility monitoring should also be conducted, to evaluate sensitivity and resistance in circulating influenza strains.

- **Disease / epidemiologic surveillance** (i.e., monitoring disease activity levels, subpopulations at risk, hospitalization rates, case fatality rates) to determine the extent and severity of influenza pandemics in relation to baseline levels of ILI and to guide prevention and management strategies (e.g., setting priorities for the use of limited antiviral/vaccine supplies).
- **Animal health surveillance** to detect respiratory outbreaks in domestic and wild animals, particularly in swine, poultry and other fowl. These epizootics may pose risks to human health.
- **Vaccine and antiviral uptake surveillance** to monitor, evaluate, and (if necessary) reallocate vaccine or antiviral stocks, and modify guidelines for their use.
- **Adverse event surveillance** to detect unusual adverse events related to vaccine and antiviral use.
- **Data collection systems** that provide an efficient, timely way to collect information. The integrated Public Health Information System (iPHIS) for public health reporting and surveillance in Ontario will play a major role especially in the interpandemic and pandemic alert phases. iPHIS can help identify the unique characteristics of new and emerging infectious diseases and be quickly configured to assist decision-makers and inform control measures while ensuring a consistent approach to data gathering. Its data sharing, near real-time reporting, comprehensive case management and outbreak management capabilities will help health units and the MOHLTC recognize and trace the path of influenza outbreaks more quickly. Use of a common database by every health unit in the province will support consistent standards, practices and processes. During the pandemic, when illness is expected to be widespread, hospital emergency rooms and triage centres will be key data sources. iPHIS can be configured to collect aggregate data so health units can report health care worker surveillance data (e.g., respiratory infection outbreaks in institutions). iPHIS was rolled out to all public health units in 2005. Because of the array of data to be collected (e.g., vaccine and antiviral uptake) and the range of health care sites providing surveillance data to health units during the pandemic phase, a variety of data collection systems may be used.
- **Effective lines of communication** at the local, provincial, federal, and global levels. Lines of communication must be defined in advance, and they must be robust (i.e., viable during power outages). They may include official or unofficial (e.g., internet based) communication methods.

Information generated through this type of integrated surveillance program will be used to: determine when a pandemic begins; track its course locally, provincially, nationally and globally; guide antiviral use, and evaluate management efforts.

Ontario's influenza surveillance system is built on the existing systems for communicable disease control. All the

elements in place now support surveillance during the interpandemic and pandemic alert periods (i.e., preparedness stage). During the pandemic period, the province's surveillance objectives may change, and more work must be done to ensure the existing system can adapt and will be useful during the response stage.

5.3 Surveillance Communications

Effective influenza surveillance is based on close collaboration and communication among local/regional, provincial/territorial, federal and international health authorities. Information must flow into the surveillance system, and from the surveillance system to health care workers and decision makers.

iPHIS will support timely reporting of data from public health units to the MOHLTC, and from the MOHLTC to PHAC. In addition, there are a number of other communication tools that support surveillance (see section 5A. Surveillance Tools).

5.4 Surveillance Activities During the Interpandemic and Pandemic Alert Periods

Figure 5.1 illustrates the routine influenza surveillance activities that Ontario has in place now, and will maintain throughout the Interpandemic and Pandemic Alert Periods (i.e., preparedness stage of emergency management).

5.5 Surveillance During the Pandemic Period

During a pandemic, Ontario's response will be based on local "triggers" which may or may not correspond to the global situation (i.e., Ontario may be in a different phase than other parts of the world or even other parts of Canada). For example, there may be a time in Phase 5 (large clusters but spread still localized) where Canada experiences an outbreak in a few discrete locations as opposed to a nation-wide outbreak. Health and emergency services planners at both the provincial and local levels will have to determine which "phase" their jurisdiction is in order to respond appropriately.

During phase 6, Ontario will likely reduce or curtail some surveillance activities, so resources can be devoted to enhancing or adding activities that will help understand the nature of the virus and its spread, and the impact of antivirals and vaccine.

Figure 5.2 illustrates the surveillance activities that will be undertaken during the pandemic period, including new activities that will be added and current activities that may be reduced or curtailed, depending on resources.

Figure 5.3 is a summary of surveillance activities by pandemic phase, and illustrates the trigger points when surveillance activities will be initiated or changed.

Figure 5.1: Surveillance Activities During the Interpandemic and Pandemic Alert Periods

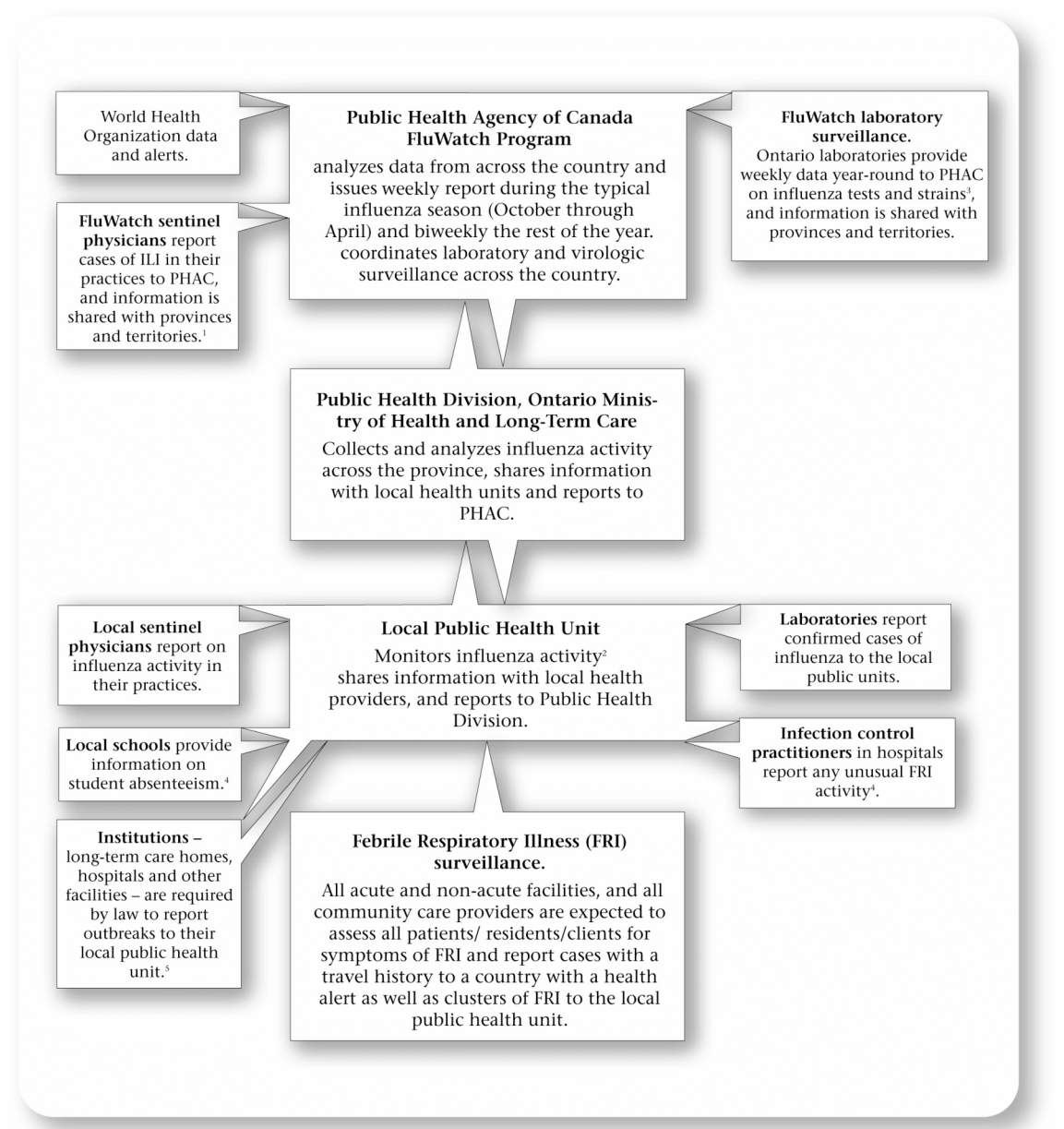
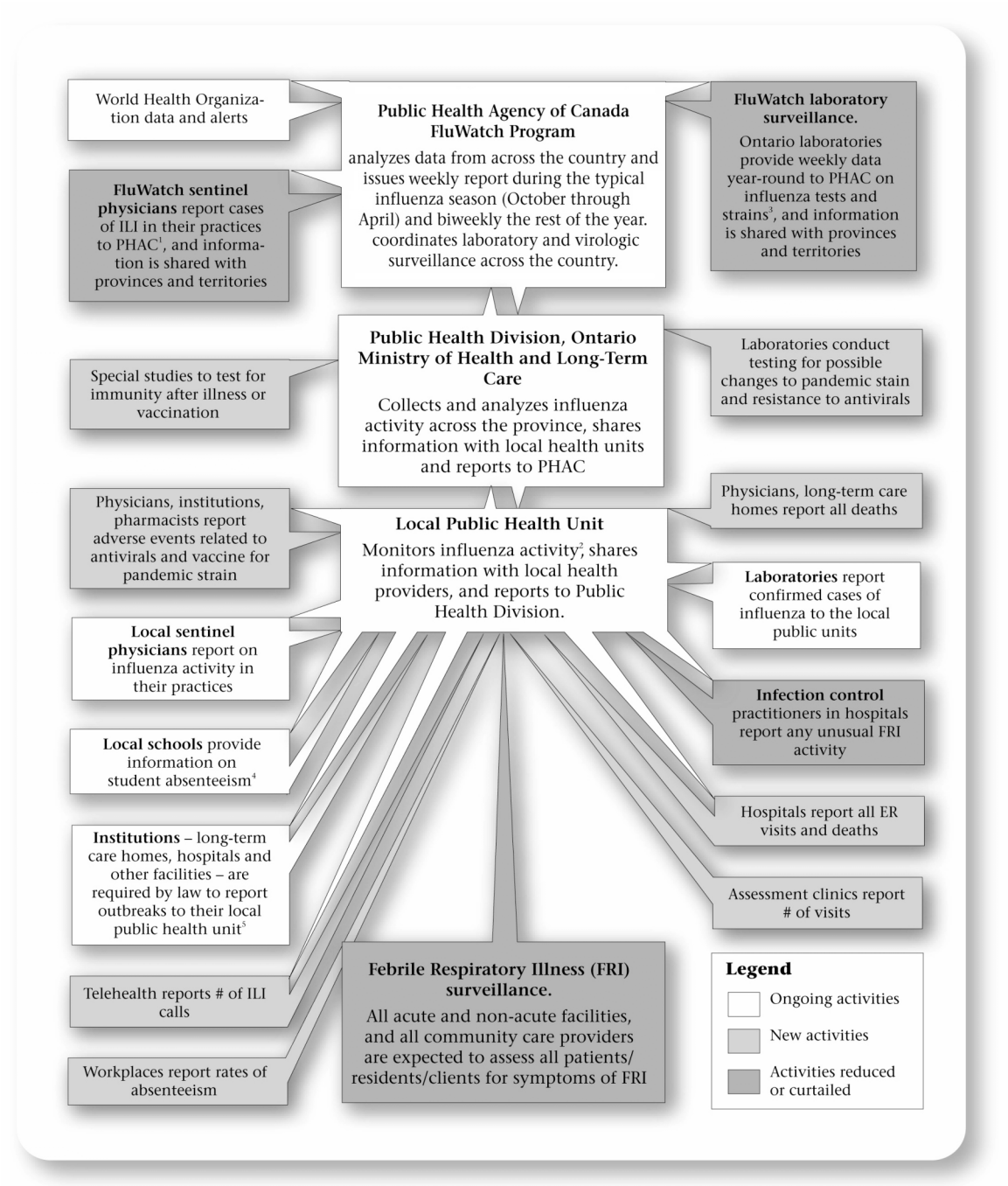


Figure 5.2: Proposed Surveillance Activities During the Pandemic Period



Notes to Figure 3 and 4.

1. The goal of the FluWatch program is to have 1 sentinel physician per 250,000 population recruited from across the country's census divisions. Based on the 2001 census, Ontario has 1 physician per 165,000 people.

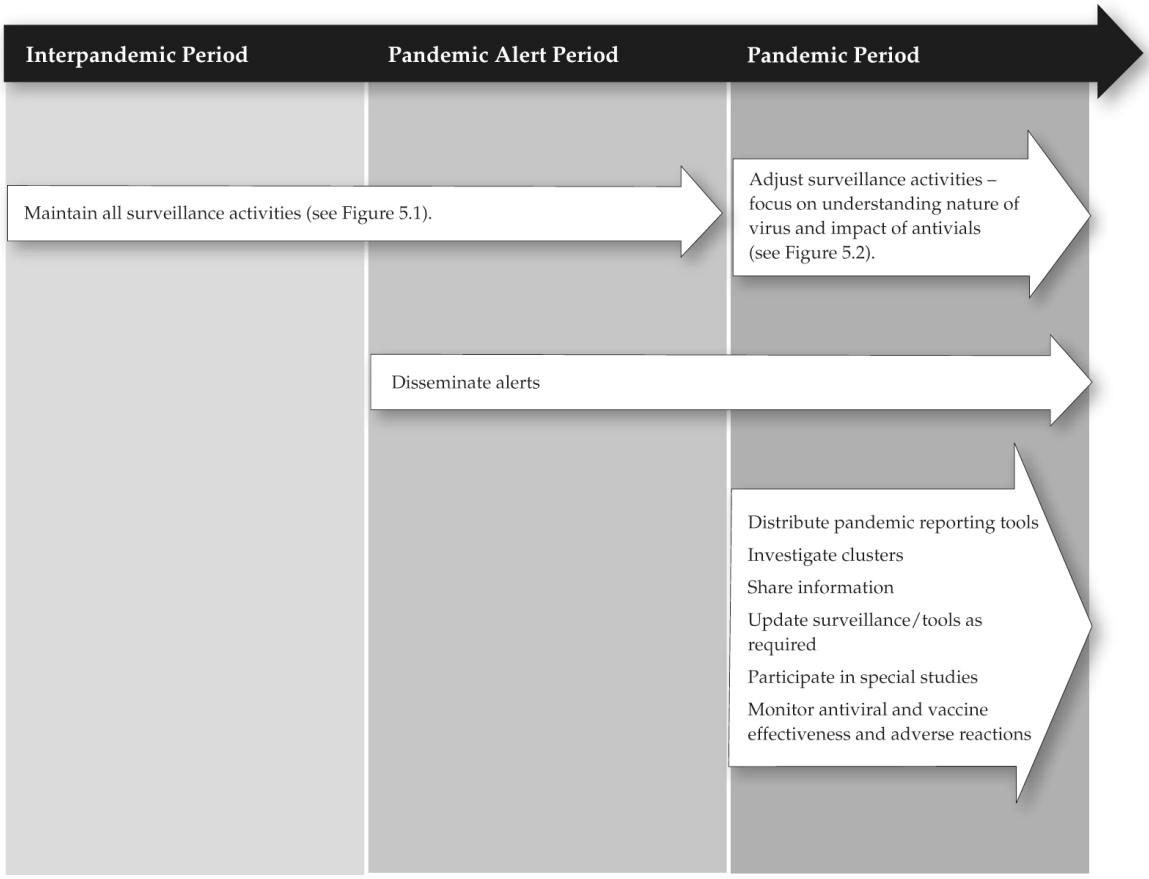
2. Influenza activity is reported in one of four categories: no activity, sporadic activity (i.e., sporadically occurring ILI or laboratory-confirmed influenza with no outbreaks detected), localized outbreaks (i.e., outbreaks affecting a single geographic area within the health unit jurisdiction, such as an outbreak in one nursing home), or widespread outbreaks.

3. Ontario has designated a number of laboratories to conduct influenza surveillance including the following public health laboratories -- Central (Etobicoke), Kingston, Timmins, Windsor, Thunder Bay, Sault Ste. Marie, Orillia and Sudbury -- and the following hospital-based laboratories -- the Children's Hospital of Eastern Ontario (Ottawa), the Hospital for Sick Children (Toronto), Toronto Medical Laboratories, Hamilton Health Science Centre, St Joseph's Hospital (London) and Sunnybrook and Woman's Health Sciences Centre (Toronto). Other Ontario public health laboratories participate in influenza surveillance activities, but they do not take part in the FluWatch Program.

4. Collecting this type of data is optional, and could be replaced or supplemented with other strategies to measure influenza activity, such as workplace absenteeism and reports from sentinel physicians, infection control practitioners. Etc.

5. Schools and day-care centres are not required to report respiratory infection outbreaks – although some do.

Figure 5.3: Surveillance Activities by Pandemic Phase



5.6 Next Steps

MOHLTC will continue to develop surveillance tools and structures, including:

- data collection form for community health services
- a list of sentinel sites in facilities and in the community
- protocols for special studies
- vaccine adverse events reporting form
- vaccine uptake reporting form
- antiviral uptake reporting form.