

# **Clinical Care Guidelines and Tools**

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Summary of significant changes:

- Several sections have been added with advice on clinician preparedness, real-time communication, the need for a business continuity plan and personal preparedness.
- As an appendix to the Annex - the “Pandemic Primer for Front Line Health Care Workers” has been developed to walk the front line clinician through seven key aspects of pandemic preparedness.



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## Section 1: Introduction

For this Annex, “clinicians” are defined as all health care providers who provide primary care. “Health care planners” are those who work on health care system preparedness for an influenza pandemic for the Ministry of Health at the provincial/territorial level.

Clinicians are on the front line in responding to an influenza pandemic. During an influenza pandemic, however, the health response will go well beyond the bedside and will involve a complex health system that includes community-based services, hospitals, public health at all levels of government and laboratories. An effective health system response to an influenza pandemic requires real-time data on the disease and the effectiveness of interventions. This involves clinician reporting and public health professionals working at the local, provincial/territorial, national and international levels. This annex describes what clinicians need to know in the context of this broader health system response.

### 1.1 Purpose and Scope

The purpose of this Annex is to assist local and provincial/territorial health care planners and clinicians in preparing for and responding to a pandemic. It was developed by front-line clinicians, including family physicians and nurse practitioners; experts in infectious diseases, laboratory medicine, respiratory medicine and intensive care; and public health professionals. It is designed to increase awareness of the complementary roles of clinical care providers, the laboratories and public health in responding to a widespread infectious disease outbreak such as an influenza pandemic. With the information, advice and practical tools provided in the Annex, health care planners will be able to enhance clinical preparedness in their jurisdiction, and clinicians will increase their knowledge of the clinical aspects of a pandemic influenza response.

*Section 1: Introduction* provides an overview of the Annex and identifies some key ethical principles that inform a health system response to a pandemic. *Section 2: Clinical Preparedness* outlines the areas of information that provincial/territorial health care planners should provide to clinicians to prepare them for an influenza pandemic. *Section 3: Clinical Response* is directed to both health care planners and clinicians, and touches upon many of the areas covered in the Canadian Pandemic Influenza Plan for the Health Sector (CPIP) and its other annexes. This section responds to the need for clinicians to obtain clinical information on pandemic influenza in a summary format.

**There are “Recommendation” boxes throughout the document. These boxes are intended to highlight key information that health care planners will want to make clinicians aware of.**

## 1.2 Ethics of Clinical Care During Public Health Emergencies

The principles of public health ethics have guided the development of this Annex and the CPIP overall. It is important to note that the responsibilities of health care planners, who focus on the organization of health services, are different from those of clinicians, who focus on the needs of the individual patient. Hence, the implications of the ethical principles may be somewhat different for each group. These ethical principles are provided as guiding values, and it is acknowledged that they may come into tension with each other.

On the basis of the six ethical principles outlined in the CPIP, health care planners and clinicians will want to consider the need for the following:\*

- **Protect and promote the public's health.** This is the organizing principle of public health action. For health care planners, it includes the duty to protect those who are on the front lines helping to fight disease. For clinicians, it implies the “duty of care”,<sup>1</sup> according to which all health care professionals are expected to go beyond the normal call of duty during a health emergency.
- **Ensure equity and distributive justice.** Decisions taken during an influenza pandemic must be fair, especially as they relate to allocation of limited resources during an emergency. This principle applies to policy development by health care planners and policy implementation by clinicians.
- **Respect the inherent dignity of all persons.** As noted, resources will be limited. This principle refers to the importance of how resource allocation is carried out. Although some people may not be eligible for all interventions, they need to be informed and cared for in a way that is respectful and maintains their dignity.
- **Use the least restrictive means.** Health measures needed to minimize the risk of infectious disease in a population should be reasonable and use the least restrictive means possible. This relates to measures that may restrict personal autonomy in the interest of curbing the spread of disease.
- **Optimize the risk-benefit ratio** of public health interventions to favour the common good. This includes not only an assessment of evidence of safety and efficacy but of all possible risks, such as opportunity costs and logistical challenges, as well as all possible benefits.
- **Work with transparency and accountability.** In particular, health care planners have an obligation to educate clinicians and the public in terms of decisions taken and the process used to arrive at these decisions. Clinicians have an obligation to educate their patients about the decisions taken and the process used to arrive at these decisions.

More in-depth explorations of these guiding principles are available. The “Stand on Guard for Thee” document, produced by the Joint Centre for Bioethics of the University of Toronto,<sup>1</sup> identified many of the ethical issues that may arise during an influenza pandemic. In terms of resource allocation, such as who is given access to limited numbers of ventilators, specific guidelines have been proposed, and work continues to inform these guidelines.<sup>2</sup>

### **Recommendation:**

There are common ethical principles that guide decision making during an influenza pandemic, although the implications of these may be different for health care planners and clinicians. Health care planners should inform clinicians about the underlying ethical principles used in developing the CPIP and identify some of the implications for consideration in clinical practice.

\* Canadian Pandemic Influenza Plan for the Health Sector, Section 2: Background, p 14-16.

## Section 2: Clinical Preparedness

This section identifies areas that clinicians in Canada need to be aware of in order to be prepared for an influenza pandemic. In addition, Appendix 1, Pandemic Primer for Front-Line Health Care Professionals, is an educational tool addressing many of the areas in this Section and could be used to meet these clinical preparedness needs in the different provinces and territories.

### 2.1 Understanding the Risk

Although avian influenza outbreaks and human cases of H5N1 avian influenza infection are often described in the media, clinicians need a summary document that identifies the current risk and how the current situation relates to the risk of a pandemic. In addition, pandemic planning assumptions, such as the anticipated attack rate and expected burden of illness, hospitalizations and deaths, should be conveyed to ensure that clinicians have specific information about how a pandemic might affect their community. Clinicians also need a quick reference document that explains the World Health Organization (WHO)'s pandemic phases and the related Canadian pandemic phases.

**Recommendation:**

Health care planners should inform clinicians about the underlying assumptions used in the CPIP, including the clinical attack rates, hospitalizations and mortality rates. Clinicians will also need to understand the Canadian pandemic phases with respect to the WHO phases.

### 2.2 Understanding the Pathogenesis of Influenza

Clinicians have an inherent interest in the pathogenesis of disease. It is important that clinicians understand how influenza viruses are spread and how they infect the human host; the incubation period; the period of infectivity associated with these viruses; and how this leads to the symptoms of the disease, complications and death. This needs to be described in the context of seasonal influenza, of pandemic viruses of the past and of novel viruses that could cause an influenza pandemic in the future. The variation among influenza viruses needs to be identified, necessitating real-time information on the clinical features of the pandemic virus.

**Recommendation:**

Health care planners should provide clinicians with information about how influenza viruses are spread; how they infect the human host; the incubation period; the period of infectivity; and how this leads to the symptoms of the disease, complications and death. They should also indicate that these characteristics may differ for a novel influenza virus and that when a novel virus emerges one of the first tasks will be to assess these parameters and adjust response plans as necessary. (For an example, see Appendix 1.)

## 2.3 Understanding the Health System Response

Clinicians need to understand how their health care system works in response to an infectious disease outbreak. This requires an explanation of the health system response plan for their jurisdiction. The jurisdictional plan typically includes a brief explanation of the enabling legislation in the specific province or territory for both the public health and the emergency management response. The jurisdictional plan should emphasize the need to coordinate efforts locally among clinicians, public health and the public health laboratory system to facilitate the early detection, reporting and response to emerging infectious disease threats. It may also be beneficial to include a brief description of how public health is organized in Canada and its interface with the WHO, especially as the plan relates to the new International Health Regulations (IHR) to which Canada is a signatory.<sup>3</sup> The regulations require a national capacity to detect and report to WHO any infectious disease in Canada that may have international significance. All provinces and territories have agreed to support Canada's commitment to the IHR.

Information designed specifically for clinicians on early detection and response to an emerging infectious disease will soon be available in the form of an online course for which continuing medical education credits will be available. Look for information about this course on the Public Health Agency of Canada (PHAC) Web site in winter 2008/09 (see: <http://www.phac-aspc.gc.ca>).

### **Recommendation:**

Health care planners should provide clinicians with information about the roles and responsibilities of clinicians, public health and laboratory professionals at the local, provincial/territorial, federal and international levels in response to an influenza pandemic.

### 2.3.1 Surveillance and Early Detection

Since influenza-like illness can be caused by multiple agents, early detection of pandemic activity in Canada relies on clinicians being on the alert and working with local public health officials to ensure that rapid viral testing and early reporting to provincial/territorial authorities takes place. The earlier the pandemic virus is detected in Canada, during the pandemic wave, the more likely it is that public health and other measures can be implemented early enough to achieve optimal effectiveness. Front line clinicians are the “eyes” of the health care system, and they need clear guidance on what to look for and when to test.

Provisional guidelines include the federal/provincial/territorial document *Avian Influenza (H5N1) in Humans: Travel/Exposure Screening for Patients Presenting with Severe Respiratory Illness (SRI) and Severe Influenza-Like Illness (severe ILI)*, which is available for adaptation in the provincial/territorial context.<sup>4</sup> As with any outbreak of emerging infectious disease, more specific information will be made available to provincial/territorial governments at the time of the outbreak.

**Guidelines must stress the need for clinical information to be included on laboratory requisitions.** This is to help laboratories correctly triage samples in order to evaluate the most suspicious cases first, and it will also assist in the collection of surveillance data, which will ultimately help determine the epidemiology of the pandemic and inform the response. Information that is necessary includes age, sex, symptoms, pertinent contact and travel history, and any other epidemiological information that puts the patient at risk. Some jurisdictions have developed specific requisition forms to support this process. The most up-to-date version of the CPIP annexes on surveillance and laboratory services should be reviewed as well as documentation located on the PHAC Emerging Respiratory Infections Web site<sup>5</sup> in order to



establish an effective, consistent and sustainable approach to early detection and reporting of suspected cases of pandemic influenza.

**Recommendation:**

Health care planners should ensure that mechanisms are in place to enable real-time communications with clinicians during a pandemic as new information that may affect their practice becomes available. Clinicians need to know ahead of time how real-time communications with their local public health authority and the Ministry of Health will occur.

### 2.3.2 Real-Time Communications

Provincial/territorial and federal governments have made a commitment to providing transparent and timely communications regarding the threat or arrival of pandemic activity in Canada and have mechanisms in place to facilitate communication within the health care system and with the public.

In light of the fact that the management of pandemic patients may change over the course of the pandemic as new information becomes available, it is of utmost importance that there are strategies in place to establish real-time communications with clinicians during a pandemic. While every effort will be made to ensure that communications at the national, provincial/territorial and local levels are consistent, it must be acknowledged that the country will be responding to an evolving situation, and messaging may be inconsistent from time to time.

**Recommendation:**

Health care planners should ensure that mechanisms are in place to enable real-time communications with clinicians during a pandemic as new information that may affect their practice becomes available. Clinicians need to know ahead of time how real-time communications with their local public health authority and the Ministry of Health will occur.

### 2.3.3 Antiviral Medications

Clinicians may not be aware that a National Antiviral Stockpile (NAS) has been established to ensure that there are antiviral medications for the early treatment of all who are anticipated to need it during a moderately severe pandemic. The size and composition of the stockpile will be re-assessed on an ongoing basis. By April 2008, there were 53 million doses (i.e. 5.3 million treatment courses) of neuraminidase inhibitors, approximately 90% in stock being oseltamivir (Tamiflu®) and 10% zanamivir (Relenza®). Additional pediatric capsules are expected to be added in the near future. These stocks are distributed to provinces and territories on a per capita basis. In addition, some jurisdictions have augmented their stockpiles on their own.

The issue of the use of antivirals for prophylaxis is under review, but at this time no policy decision has been made by federal/provincial/territorial governments to use or enhance the existing NAS for prophylaxis purposes. (See Section 3.4: Therapeutic options, including the use of antiviral drugs.)

**Recommendation:**

Health care planners should provide clinicians with information about the National Antiviral Stockpile (NAS) and its intended use for **early treatment (within 48 hours of onset of symptoms)**. Clinicians need prescribing information on the two major antiviral medications, oseltamivir<sup>6</sup> and zanamivir.<sup>6</sup> When it has been formally approved, clinicians will need information on Canada's prophylaxis policy.

### 2.3.4 Emergency Health Services

Every province and territory is planning how they will organize emergency health services to meet the increased demands for health care during an influenza pandemic. Many provinces and territories are planning for assessment centres (in part to facilitate the distribution of antiviral medications), yet many clinicians are not clear on what their role will be in such centres.

**Recommendation:**

Health care planners should provide information to clinicians about how health services will be organized during a pandemic and what role clinicians will be expected to play.

### 2.3.5 Public Health Measures

At this time, individual-focused public health measures, such as individual case investigation (including contact tracing and quarantine of contacts), will only be considered for the Pandemic Alert phases (i.e. before a pandemic), when containment of a novel influenza virus may be possible and demand on resources would be manageable. During Phase 6 (when there is sustained transmission in the general population), contact tracing and quarantine will no longer be feasible or effective for several reasons: the short incubation period of the influenza virus; the fact that people can be infectious before symptoms begin; and the time and resources required for this type of intervention given the number of cases expected at that time. Clinicians need to know that community-based public health measures will be used during a pandemic, for example, advice to the public on voluntary self-isolation when ill, travel advisories and, possibly, school closures and cancellation of public gatherings.

**Recommendation:**

Health care planners should provide clinicians with information regarding who will make decisions on public health measures in their community during a pandemic, how these decisions will be communicated to them and how they may affect clinicians in their practice.

### 2.3.6 Pandemic Vaccine

The Government of Canada has a contract with a domestic manufacturer of influenza vaccine to ensure that enough pandemic vaccine is produced for all Canadians. Clinicians will need to know what their role is (if any) in the dispensing of pandemic vaccine when it does become available.

**Recommendation:**

Health care planners should provide clinicians with information on the national pandemic vaccine strategy; identify the local/provincial/territorial implementation plans for providing it to the entire population; and describe the role that clinicians will be expected to play.

## 2.4 Best Practices in Infection Prevention and Control

Clinicians are interested in improving their infection prevention and control practices, and a number of guidelines have been developed to address this in the primary care setting. Annex F (*Infection Prevention & Control and Occupational Health & Hygiene Guidelines during Pandemic*

*Influenza in Existing and Temporary Health Care Settings*) of the CPIP is expected to be released in winter 2008/09.

**Recommendation:**

Clinicians need to be given clear infection prevention and control guidelines for the primary care and office practice setting that are consistent with the updated Annex F of the CPIP as it relates to the primary care and office practice setting.

## 2.5 Business Continuity Planning

Clinicians need guidance in the area of business continuity planning. The basic tasks of business continuity planning can be found on the Public Safety Canada Web site<sup>7</sup> and include the following:

- conducting a business impact analysis (identify critical services, impacts of disruption and critical dependencies);
- developing a business continuity plan that would mitigate the risks identified by disruptions;
- completing response preparation and readiness procedures (such as stockpiling critical supplies and staff training);
- conducting quality assurance procedures, such as exercises, maintenance and auditing;
- for large health care organizations, determining the governance structure (i.e. who approves the business continuity plan).

Unique aspects for clinicians preparing for a pandemic, such as infection prevention and control, supplies and procedures, need to be considered. In addition, creating alternative options for patients with less urgent medical needs, for example, instituting telephone-based prescription renewals, should be considered in clinicians' business continuity plans.<sup>8-11</sup>

**Recommendation:**

Health care planners should provide clinicians with information about business continuity strategies, including infection control guidelines and human resource policies and procedures.

## 2.6 Personal and Family Preparedness

Clinicians' sense of preparedness will likely directly relate to their sense that their family is also prepared and is as safe as possible. Clearly, there are conflicting moral imperatives that all front-line responders will face as they reconcile their family and work duties. However, this dynamic of balancing work and home life is continually at play, and although the tensions are higher during a pandemic the ability to address both is still possible and feasible.

To optimize preparedness, clinicians will need to have family preparedness plans. This largely relates to developing agreements with family and friends regarding mutual aid and having a basic stockpile of necessary items to get through a period of illness at home. Preparedness usually involves the development of a contingency plan for the care of family members (e.g. young children, aging parents) if a clinician becomes unwell or is required to be at work for extended periods of time.

Look for a personal and family preparedness planning guide on the Public Health Agency of Canada Web site to be available in the fall of 2008 (see: [www.phac-aspc.gc.ca](http://www.phac-aspc.gc.ca)).

**Recommendation:**

Health care planners should provide clinicians with information and guidance about self and family preparedness in a health emergency.

## 2.7 Instituting Best Practices with Seasonal Influenza

Clinicians can actively prepare for a pandemic now by instituting best practices in influenza control during seasonal influenza. Influenza occurs every year, and applying knowledge regarding infection prevention and control, along with the detection and management of influenza, will be beneficial when the pandemic occurs.

Best practices have been established for dealing with febrile respiratory illness in the ambulatory setting. These include basic infection prevention and control procedures, routine screening, promotion of influenza vaccine and consideration of the use of antiviral medications, especially in seasons when the match between circulating influenza viruses and the vaccine virus strains is less than optimal.<sup>12,13</sup>

### 2.7.1 Screening

Clinicians should be encouraged to screen for cough and fever all patients who present in their offices for any reason. This should ideally be done by the first person who is expected to have contact with the patient (for example, a receptionist). If cough and fever are present, the patient should be instructed to clean his or her hands with 60%-90% alcohol-based hand gel sanitizer or soap and water, don a surgical mask and be seated at least 1 metre away from others. If maintaining this distance is not possible in the waiting room setting, he/she should be placed immediately in an examining room. (For additional details, see Annex F.)

### 2.7.2 Vaccines and Antivirals

Influenza is a vaccine preventable disease that causes approximately 4,000 deaths a year in Canada. Clinicians should be encouraged to receive the influenza vaccine themselves every year and promote vaccine uptake among their peers and patients. Anyone from 6 months of age could benefit from the influenza vaccine. Those considered at highest risk of a poor outcome of influenza are identified in the annual influenza statement by the National Advisory Committee on Immunization (NACI) (available through the Public Health Agency of Canada Web site: [www.phac-aspc.gc.ca](http://www.phac-aspc.gc.ca)).

Clinicians should consider antivirals for early treatment (within 48 hours after symptoms begin) or post-exposure prophylaxis of **seasonal** influenza, especially in seasons when there is not a good match between vaccine and circulating influenza strains. Amantadine was used previously in controlling long-term care outbreaks but is no longer recommended because of high levels of resistance in the H3N2 virus. Oseltamivir (Tamiflu®) is now the most commonly prescribed antiviral medication, although levels of resistance are starting to be seen with the H1N1 virus. Zanamivir (Relenza®) is another antiviral medication in the form of an inhaler. More information on all these drugs is available from the product monographs. Currently, physicians seldom prescribe these medications, since few patients present early enough and the diagnosis is often uncertain.

**Recommendation:**

Health care planners should provide clinicians with information to encourage the adoption of routine best practices for seasonal influenza, including the implementation of screening for febrile respiratory illness, infection control, promotion of influenza vaccine and appropriate use of antiviral medications.

## Section 3: Clinical Response

During an influenza pandemic there will be a large number of people seeking assessment for influenza-like illness. Assessment guidelines have been developed to evaluate the needs of each individual and to assist in the efficient triage of influenza patients in a crisis (see Appendix 1).

### 3.1 Self-Assessment and Initial Triage

Public education may help people to do their own personal assessment and thus reduce unnecessary strain on the health care system. Many provinces and territories are planning to set up telephone lines to conduct initial telephone assessments. These assessments will serve to determine whether a patient is unlikely to have influenza and can stay at home, whether he/she is at low risk and fits the criteria for antiviral treatment, or whether she/he needs to be seen by a clinician for further assessment. Algorithms for this purpose will need to be developed, and personnel will need to learn to use them.

Even with these mechanisms in place, there will be people who will need to be clinically assessed. Most provinces and territories plan to have centralized influenza assessment centres for the assessment and treatment of influenza patients. Triage personnel in these centres will also need to be educated regarding how to use jurisdiction-specific algorithms to decide when patients can be sent home with instruction and follow-up, managed in an ambulatory site or admitted to an acute care hospital.

The overall clinical approach to patients with influenza-like illness can be captured in the algorithm noted in Appendix 1.

Until an influenza pandemic hits and data are gathered to characterize it, we do not know how it will present or who will be “hit” the hardest. For now, it is advisable to use seasonal influenza as the benchmark, with the clear understanding that this will need to be updated at the time of a pandemic when epidemiological information on the pandemic virus becomes available.

#### ***Clinical Presentation:***

When influenza is circulating in the community, the presence of fever and cough of acute onset is a good predictor of influenza. The positive predictive value increases when fever is higher than 38°C and when the onset of the clinical illness is acute. Other symptoms, such as sore throat, rhinorrhea, malaise, rigors or chills, myalgia and headache, although non-specific, may also be present.

This clinical definition is a general guide and is not intended to capture every clinical presentation. In the elderly, fever may not be present, and in children gastrointestinal symptoms may predominate. Other atypical presentations may also occur.

## 3.2 Assessment of Patients with Influenza-Like Illness

Primary and secondary assessment protocols for patients presenting to a clinician with influenza-like illness offer a systematic approach to triage of large numbers of patients. The primary assessment includes history taking, physical examination and an oxygen saturation measurement, if available. For detailed assessment guidelines, refer to Appendix 1.

### 3.2.1 Primary Assessment

Identification of risk factors for influenza complications during the history taking is an important part of the primary assessment. The risk factors identified by NACI as being associated with an increased risk of morbidity and mortality from seasonal influenza include age (less than 2 or over 65 years), pregnancy and chronic conditions such as diabetes, and cardiovascular and respiratory diseases.<sup>14</sup> This list of risk factors is provisional for the pandemic context and may need to be revised as information about the novel influenza virus becomes available.

The primary assessment includes a check of basic vital signs and physical examination with a focus on mental status, the cardiorespiratory system and functional status. The primary assessment should also include monitoring of oxygen saturation (e.g. pulse oximetry, arterial blood gases)<sup>15</sup> whenever possible both at presentation and routinely during subsequent care (see Table A2: Features of the primary assessment with abnormal values for adults and children, in Appendix 1). If abnormalities are found (clinical parameters outside the normal range) either with or without the presence of risk factors, then a secondary assessment is indicated.

### 3.2.2 Secondary Assessment

The secondary assessment, if required, involves complementary laboratory studies to further the assessment and evaluation of patients. Not all the tests identified for the secondary assessment will be needed for all patients. Clinical assessment should determine which procedures are to be done, particularly when resources are scarce. Generally, blood tests and chest radiography should be performed for all patients who need a secondary assessment (see Table A3: Investigations for the secondary assessment and abnormal values for adults and children, in Appendix 1).

If no abnormalities are found, the patient can be considered for discharge home with antiviral medications and instructions for self-care. If mild abnormalities are detected and risk factors are present, clinical judgement regarding management is indicated. In some cases, abnormalities may be stabilized with a few hours of care, after which time the patient could be sent home with care instructions, provided that appropriate home support has been assessed and arranged if required. The patient should be reassessed after 24 to 48 hours. For example, in the case of fever with dehydration, the first dose of antiviral medication and rehydration would be started, and if the patient responds to a few hours of intravenous therapy he or she could return home for the remainder of the antiviral treatment. In other situations, different management options, such as admission to an alternative care site (See Annex J: *Guidelines for Non-Traditional Sites and Workers*) or hospital may be needed.

Clinical discretion is always advised.

### 3.3 Indications for Laboratory Testing During a Pandemic

Laboratory testing for the pandemic virus will likely be most intense just prior to pandemic activity being detected in the community. Once the presence of pandemic influenza has been established, laboratory testing in the ambulatory care setting will largely cease in order to conserve laboratory resources for surveillance purposes, and monitoring of antiviral resistance and effectiveness. This is partially based on the assumption that when such a virus is circulating in the community it will “crowd out” other viruses and predominate. However, this will need to be assessed at the time through surveillance methods. We know that during seasonal influenza, many respiratory viruses can co-circulate in a community.

Under specific circumstances, laboratory testing will still be indicated to inform clinical care, but it may be restricted. In the hospital setting, virology testing may need prior approval by an authority such as the Director of Laboratory Medicine (or designate). Testing in the community setting will likely be even more limited and may require the approval of the local Medical Officer of Health (or designate). Hospitals and communities should develop policies governing laboratory utilization based on the current guidance provided in Annex C: *Pandemic Influenza Laboratory Guidelines*.

Provisional indications for laboratory testing to inform clinical care during a pandemic include the following:

- confirmation of an atypical presentation of pandemic influenza when it will affect a treatment decision;
- confirmation of the etiology of an institutional outbreak;
- non-response to treatment in the hospital setting (for early detection of a resistant strain in a hospital); and
- admission to the intensive care unit, to enable cohorting of patients.

Laboratory testing for surveillance purposes will continue. Local information may be available through the local/regional public health office, provincial/territorial information will be available through the Ministry of Health, and national information will be supplied by PHAC.

### 3.4 Therapeutic Options, Including the Use of Antiviral Drugs

All patients who meet the criteria for antivirals should begin treatment as soon as possible.<sup>16</sup> At this time, that would include any patient who presents with cough and fever of less than 48 hours' duration, *when the pandemic virus is known to be circulating in the community*, or who tests positive for influenza. If the patient has few or no risk factors for influenza complications and all the clinical parameters, including oxygen saturation, are within the normal range, the patient can generally be sent home with antiviral medication and instructions for self-care, provided that appropriate home support has been assessed and arranged if required. Ideally, patients should be reassessed after 48 hours (possibly by telephone).

For treatment, oseltamivir is approved for persons 1 year of age and older. The recommended adult oral dosage for oseltamivir is 75 mg twice daily for 5 days. The dosage is reduced to 75 mg daily in persons with a creatinine clearance of 10-30 mL/min. For persons undergoing renal dialysis, the following recommendations apply:

- low flux hemodialysis: oseltamivir 30 mg orally every second hemodialysis session
- continuous ambulatory peritoneal dialysis: oseltamivir 30 mg orally once per week.<sup>17</sup>

Pediatric doses are provided in Section 3.7.1.

Zanamivir is recommended for the treatment of influenza in adults and children 7 years of age and older.<sup>6</sup> The recommended dose of zanamivir is 10 mg inhaled twice daily for 5 days.

Treatment with either medication should begin within 48 hours of the onset of influenza symptoms.

Product monographs should be consulted for more information on the indications and clinical use of oseltamivir<sup>6</sup> and zanamivir.<sup>6</sup>

### 3.5 Complications of influenza

Table 1<sup>18</sup> identifies the complications of influenza infections. At times these complications, such as an exacerbation of chronic airways disease, may be the presenting symptom. Respiratory complications are the most common ones (especially secondary infections). Cardiac events following influenza are not uncommon.<sup>19</sup>

| Complications of influenza | Major clinical category   |
|----------------------------|---|
| Respiratory                | Pneumonia: primary viral, secondary bacterial, combined<br>Upper respiratory: otitis media, sinusitis, conjunctivitis<br>Acute laryngotracheo-bronchitis (croup)<br>Bronchiolitis<br>Complication of pre-existing disease |
| Cardiovascular             | Pericarditis<br>Myocarditis<br>Complication of pre-existing disease   |
| Muscular                   | Rhabdomyositis<br>Rhabdomyolysis with myoglobinuria and renal failure   |
| Neurological               | Encephalitis<br>Reye's syndrome<br>Guillain-Barré syndrome<br>Transverse myelitis   |
| Systemic                   | Toxic shock syndrome<br>Sudden death  |

It is often difficult to differentiate influenza from a secondary bacterial pneumonia. Typically, with secondary bacterial infection there is a history of improvement and then worsening. On x-ray, viral pneumonias often have diffuse infiltrates; bacterial pneumonias have consolidation. It may take blood and sputum cultures to ensure that a bacterial pneumonia has not been missed.

### 3.6 Treating Secondary Infections

Secondary bacterial pneumonias can cause major morbidity and mortality during a pandemic; indeed, it has been estimated that up to one-third of deaths during the 1918 pandemic were due to pneumococcal pneumonia.<sup>20</sup> The most common organisms in secondary bacterial pneumonias are *Streptococcus pneumoniae*, *Staphylococcus aureus* and *Haemophilus influenzae*.



Health planners need to consider stockpiling medications and supplies to address treatment. This includes both antibiotics and supplies for sputum and blood cultures, as well as Gram stains. Stockpiling of antibiotics should be based on the most recent consensus guidelines for the management of community-acquired pneumonia in adults (see Table 2, which summarizes recent consensus recommendations).

| <b>Table 2 Recommended empirical antibiotics for community-acquired pneumonia<sup>21</sup></b>   |
|--|
| <b>Patients well enough for outpatient treatment</b>   |
| <ol style="list-style-type: none"> <li>1. Previously healthy and no use of antimicrobials within the previous 3 months:<br/>A macrolide (strong recommendation; level I evidence) OR<br/>Doxycycline (weak recommendation; level III evidence)</li> <li>2. Presence of comorbidities such as chronic heart, lung, liver or renal disease; diabetes mellitus; alcoholism; malignancies; asplenia; immunosuppressing conditions or use of immunosuppressing drugs; or use of antimicrobials within the previous 3 months (in which case an alternative from a different class should be selected): <ul style="list-style-type: none"> <li>▪ A respiratory fluoroquinolone, such as moxifloxacin, gemifloxacin or levofloxacin 750 mg (strong recommendation; level I evidence) OR</li> <li>▪ A <math>\beta</math>-lactam <b>plus</b> a macrolide (strong recommendation; level I evidence)</li> </ul> </li> <li>3. In regions with a high rate (&gt; 25%) of infection with high-level (MIC <math>\geq</math> 16 <math>\mu</math>g/mL) macrolide-resistant <i>Streptococcus pneumoniae</i>, consider use of alternative agents listed above in (2) for patients without comorbidities (moderate recommendation; level III evidence)</li> </ol> |
| <b>Inpatients, non-ICU treatment</b>   |
| <ul style="list-style-type: none"> <li>▪ A respiratory fluoroquinolone (strong recommendation; level I evidence) OR</li> <li>▪ A <math>\beta</math>-lactam <b>plus</b> a macrolide (strong recommendation; level I evidence)</li> </ul>  |
| <b>Inpatients, ICU treatment</b>   |
| <ul style="list-style-type: none"> <li>▪ A <math>\beta</math>-lactam (cefotaxime, ceftriaxone or ampicillin-sulbactam)</li> </ul>  |
| <b>Plus</b>  |
| <ul style="list-style-type: none"> <li>▪ either azithromycin (level II evidence) or a respiratory fluoroquinolone (strong recommendation; level I evidence). (For penicillin-allergic patients, a respiratory fluoroquinolone and aztreonam are recommended.)</li> </ul>   |
| <b>Special concerns</b>  |
| If <i>Pseudomonas</i> is a consideration   |
| <ul style="list-style-type: none"> <li>▪ An antipneumococcal, antipseudomonal <math>\beta</math>-lactam (piperacillin-tazobactam, cefepime, imipenem or meropenem) plus either ciprofloxacin or levofloxacin (750 mg) OR</li> <li>▪ The above <math>\beta</math>-lactam plus an aminoglycoside and azithromycin OR</li> <li>▪ The above <math>\beta</math>-lactam plus an aminoglycoside and an antipneumococcal fluoroquinolone (for penicillin-allergic patients, substitute aztreonam for above <math>\beta</math>-lactam) (moderate recommendation; level III evidence)</li> </ul>   |
| If CA-MRSA is a consideration, add vancomycin or linezolid (moderate recommendation; level III evidence)   |
| MIC, minimum inhibitory concentration; ICU, intensive care unit; CA-MRSA, community-acquired methicillin-resistant <i>Staphylococcus aureus</i>  |

## 3.7 Special Populations

### 3.7.1 Children

Influenza virus infections represent the most important cause of acute respiratory illness requiring medical attention beyond infancy. In an eight-year study, it was shown that half of school children under 17 years of age were infected each year with influenza virus. In preschool children the infection rate was about 30% each year.<sup>22</sup>

Uncomplicated influenza in children may be similar to that experienced by adults, but there are a number of clinical differences. Young children usually have higher temperatures (often over 39.5°C) and may have febrile seizures. In young infants (less than 2 months old) the condition can progress to severe illness rapidly. Unexplained fever may be the only manifestation of the disease in neonates and infants. Gastrointestinal manifestations, such as nausea, vomiting, diarrhea and abdominal pain, are found in 40%-50% of patients, with an inverse relation to age (mainly 3 years or younger). Otitis media and non-purulent conjunctivitis are more frequent in younger children. A variety of central nervous system findings, including apnea and seizures, may appear in as many as 20% of infants. Children may also present with symptoms suggestive of meningitis or encephalitis, e.g. headache, vomiting, irritability and photophobia.

In infants and young children (2 months to 5 years of age) danger signs include chest indrawing, nasal flaring, tachypnea, grunting or stridor, cyanosis, inability to drink, continuous vomiting, lethargy, seizures or a full or sunken fontanelle.

All children under the age of 7 years with complications or risk conditions should be assessed by a health care worker.<sup>23</sup>

In children over 5 years of age, including adolescents, the most frequent symptoms are fever, cough, non-localizing throbbing headache, chills, myalgia and sneezing. The temperature range is usually 38-40°C, and a second peak of fever, without bacterial super-infection, may occur around the fourth day of illness. Backache, sore throat, conjunctival burning with watery eyes and epistaxis may be present, but gastrointestinal symptoms are infrequent. Chest auscultation is usually normal, but occasionally coarse breath sounds and crackles may be heard.

For treatment, oseltamivir is approved for those aged 1 year and older; dosage varies by weight as follows:

- 15 kg or less            30 mg twice a day
- > 15-23 kg            45 mg twice a day
- > 23-40 kg            60 mg twice a day
- > 40 kg                75 mg twice a day (the adult dose)

Zanamivir is approved for children aged 7 and older, and the dosage is the same as in adults: 2 inhalations twice daily.

Product monographs should be consulted for more information on the indications and clinical use of oseltamivir<sup>6</sup> and zanamivir<sup>6</sup>.

### 3.7.2 Pregnant Women

NACI recommends that all pregnant women with chronic conditions (such as cardiopulmonary conditions, diabetes, cancer or anemia) and healthy pregnant woman in their second or third trimester receive the influenza vaccine.<sup>14</sup> Reports from the pandemics of 1918-19 and 1957-58 show that excess deaths were documented in pregnant women. Pneumonia was reported in 50% of cases involving pregnant women and was associated with a 50% mortality rate and a high rate of pregnancy loss.<sup>24,25</sup> Furthermore, recent data have indicated that healthy pregnant women have higher rates of influenza-associated respiratory hospitalization and medical visits than their non-pregnant peers,<sup>26</sup> and that pregnant women are at increased risk of influenza infection and complications.<sup>25,27</sup>

Retrospective studies have found that no serious risk of adverse events or congenital anomalies has been reported in infants of women who received influenza vaccine during their pregnancy.<sup>28</sup> In these studies a cohort of healthy pregnant women who received influenza vaccine were compared in rate of hospital admissions and physician office visits with a control group of unvaccinated women who were matched by age, month of delivery, gestational week and medical insurance. The results showed that there was no difference between the groups in the outcome of pregnancy, risk of common disease, hospitalization rates among mothers, or infants' medical condition from birth to six months.

Not only is there little risk to the fetus from maternal influenza vaccination but also prospective studies have demonstrated protective effects. The evidence includes higher cord antibody level to influenza in babies born to mothers immunized during pregnancy, and a delay in the onset and a decrease in the severity of influenza infection in babies born with higher antibody levels.<sup>29</sup> Increased influenza vaccine use during pregnancy has the potential to benefit both the woman and her infant through maternal transplacental antibodies and breast milk-acquired immunity.<sup>26,28</sup>

### 3.7.3 The Elderly

Excess hospitalization and death, and functional decline occur in elderly individuals after epidemics of influenza. Community-dwelling adults 65 years of age or older, and particularly frail elderly persons in long-term care institutions, are at increased risk of influenza complications.<sup>30</sup>

Although influenza viral pneumonia and bacterial pneumonia following influenza are considered the main causes of influenza-related hospitalization in the elderly, many such hospitalizations are attributed to the exacerbation of chronic obstructive pulmonary disease or congestive heart failure following the viral infection. The symptoms and signs seen in older adults are similar to those in younger individuals, but most cases are characterized by the presence of dyspnea, wheezing, sputum production and fever. In some, especially the older and frailer, there may be no or minimal febrile response, and they may simply develop confusion or loss of functional capability. Thus, any unexplained acute deterioration in health status associated with or without fever may be a manifestation of influenza infection in elderly individuals. Influenza-like illness in older adults can also be caused by other viruses, such as respiratory syncytial virus (RSV), human metapneumovirus or parainfluenza virus. RSV infections are an important cause of hospitalization and death in elderly individuals. It is impossible to distinguish between RSV and influenza on the basis of clinical manifestations alone.

### 3.7.4 Immunocompromised Patients

People with immune system impairment resulting from chronic illness or medications are more likely to show influenza complications and are more likely to shed influenza virus for longer periods than those who are not immunocompromised.<sup>30-33</sup>

**Persons infected with HIV:** Influenza in AIDS patients is prolonged and more frequently associated with complications.<sup>32-34</sup> In a cohort of young and middle-aged HIV infected women, the risk of cardiopulmonary hospitalization was higher during influenza seasons than during the peri-influenza periods. This risk was even higher than among women with other high-risk conditions, like chronic heart and lung diseases.

Influenza-associated excess mortality was found for the adult and adolescent US population with AIDS during three influenza seasons. Among persons aged 25-54 years, the risk of influenza-related death was estimated at 9.4-14.6/10,000 persons with AIDS, compared with 0.09-0.10/10,000 in the general population and 6.4-7.0/10,000 among persons older than 65 years.<sup>33</sup> In this study, deaths of AIDS patients due to pneumonia and influenza followed a seasonal pattern (and also a virus isolation pattern) with peaks in December-January, as in the general adult population. More than 90% of AIDS deaths occurred in the 25-54 years age group. The excess death rate in this age group was 81-155 times higher among AIDS patients than in the general US population in this age range, as compared with the summer. These death rates are comparable and even higher than those seen in the general population aged 65 years or older. Other studies have reported that AIDS patients experience more severe respiratory symptoms and prolonged duration of illness, with an increased risk of complications.<sup>32,34,35</sup>

No prospective studies of influenza in immunosuppressed children or in children with AIDS have been published. It is known, however, that children with HIV commonly have severe and persistent viral respiratory infections, including influenza. A large proportion of respiratory viral infections in children with cancer or HIV are hospital acquired, illustrating the importance of protective measures.<sup>36</sup> Children with cancer who were receiving immunosuppressive therapy had similar clinical manifestations to those of control populations, but the duration of the disease was longer.<sup>37,38,39</sup>

**Other chronic illnesses, diabetes, neoplastic diseases, renal diseases:** In any patient suffering from a chronic disease that compromises the immune system and/or metabolic homeostasis, complications of influenza may develop. These include neoplastic diseases, renal dysfunction, hemoglobinopathies, some congenital diseases and illnesses due to autoimmunity.

In the event of a pandemic, at least in the early phases, a vaccine against the pandemic virus will not likely be available, and even when it does become available some severely immunosuppressed patients, either by virtue of their disease itself or their drug therapy, are less likely to have a protective immune response to the vaccine.

## 3.8 Medical Directives and Other Legal Issues

The use of clinical algorithms and medical directives are recommended as strategies to decrease the strain on clinicians during a pandemic. A medical directive typically indicates a specific treatment to be given in a specific set of clinical circumstances, with clear contraindications, documentation and informed consent. It must be clear who has authorized the directive and is taking legal responsibility for it, and who is authorized to carry out the directive.

The use of medical directives is governed by provincial and territorial legislation and professional practice, and therefore planners and clinicians should be guided by their provincial or territorial legislation when considering and/or using them

Manufacturers are responsible for monitoring their marketed health products and for continuous assessment of the benefits and risks. Additionally, Health Canada has a voluntary reporting program, MedEffect, to monitor adverse drug reactions. Clinicians are advised to report any adverse drug reactions to Health Canada for both approved or “off-label” use. (See [http://www.hc-sc.gc.ca/dhp-mps/medeff/index\\_e.html](http://www.hc-sc.gc.ca/dhp-mps/medeff/index_e.html) for more information.)

### 3.9 Education of Patients and Families

Clinicians have a lot of influence in “setting the tone” of a pandemic response, as they are dealing with people at the front line all the time. If clinicians remain positive and impart confidence that the pandemic plans will work at the local, provincial and national levels, this will go a long way to reassuring patients and stemming public fears.

Clinicians can also give the message that each person has a role to play in being part of a successful pandemic response. They need to be aware of and distribute resources and tools, such as a personal and family preparedness tool kit, so that people can be prepared to deal effectively with an influenza pandemic in the home and community settings ([www.phac-aspc.gc.ca](http://www.phac-aspc.gc.ca)). Clinicians should advise their patients as to what changes, expectations and practices will be in place in their office during a pandemic.

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## Pandemic Primer for Front-Line Health Care Professionals

***“All you wanted to know about how to prepare for a pandemic, but never had time to ask”***

The dedicated and well-informed health care practitioner is at the heart of the response to pandemic influenza. This is because the key challenge during a pandemic is to provide care to the many people who fall ill. Yet, many health care practitioners in Canada feel unprepared.\*

This appendix is designed to assist you, the clinician, to deal with influenza pandemic situations by guiding you through the seven key aspects of pandemic influenza preparedness:

- *One organizing principle* of infection control practices for any influenza infection.
- *Two interim clinical guidelines* for the assessment and management of influenza patients.
- *Three main resources* that will help you stay abreast of new developments in pandemic preparedness at local, provincial/territorial and national levels.
- *Four major assumptions* regarding a pandemic scenario in Canada.
- *Five best practices for health care practitioners* during a pandemic.
- *Six key national strategies* we have in place for the health system in Canada to address pandemic influenza.
- *Seven steps* to ensure that you have best practices in place for seasonal influenza.

### 1. The One Principle of Infection Control Practices for Any Influenza Infection

#### ***The influenza virus is transmitted primarily by droplets***

In order to feel confident in caring for influenza patients during a pandemic, clinicians need to know how to protect themselves and protect others. As you know, be it seasonal influenza or pandemic, all influenza viruses are transmitted in the same way. The organizing principle that underlies all infection control practices is this: **transmission of influenza virus happens primarily by droplets.**

Respiratory viruses are spread by either droplet or airborne transmission. The main difference between the two types of transmission is this: droplets drop and airborne particles float. Droplets

\* Canadian Public Health Association, unpublished survey (available upon request).

are larger and generally easier to control than the smaller airborne particles. Most cold viruses are spread by droplets.

Here is what we know about the droplet transmission of influenza virus:

- Droplets generally travel about 1 metre before they drop.
- Virus can survive on hard surfaces for up to 48 hours; on hands for 5-10 minutes.
- People can be inoculated with the influenza virus either
  - **By direct contact** (i.e. someone coughs and virus-filled droplets land on someone else's eye, nose or mouth)
  - **From hands** (or anything else) that have touched a surface contaminated by virus-filled droplets or has a droplet from a cough land on them, which then comes into contact with someone's eyes, nose or throat.
- Thorough hand washing with soap and water for 20 seconds is an effective way to decontaminate hands; 60%-90% of alcohol-based hand rub applied thoroughly on the hands until it dries is equally effective and is now the preferred method of hand hygiene in the health care setting.\*

The principle states that transmission occurs “primarily” by droplets. This reflects the fact that in certain circumstances droplets can turn into aerosol particles, typically during aerosolizing procedures, such as intubation. A lot of basic scientific research is being done right now to try to quantify how much influenza virus gets aerosolized and under what circumstances. Even the 1 metre estimate for droplet spread is under review. The current lack of data in this area is what is driving the debate about the use of surgical masks (which protect against virus-filled droplets) and N95 masks (which protect against airborne particles). The current recommendations in Canada and by the WHO<sup>1</sup> are for **thorough hand hygiene, surgical masks and eye protection to be used as routine protective measures, and during aerosolizing procedures, such as endotracheal intubation or bronchoscopy, an N95 (or equivalent) respirator, eye protection, a gown and gloves.**

## 2. The Two Interim Clinical Care Guidelines

The organization of health care services during an influenza pandemic will vary across Canada, depending on the provincial/territorial or even regional health system that is in place. It is estimated that less than 1% of people who are clinically ill (that is, ill enough to miss at least half a day of work) will need to be hospitalized. Thus, the basic challenge will be to set up an assessment process that determines who is well enough to return home and who needs to be hospitalized. The two interim clinical care guidelines reflect the best knowledge that is currently available and are based on clinical experience with seasonal influenza. They will be updated during the influenza pandemic as information about the virus is received.

The first assessment is a history, physical examination and an oxygen saturation test to determine whether the person can return home or needs further evaluation. The second assessment identifies the investigations that may need to be done to fully determine who can go home and who needs to be admitted to hospital.

### Primary assessment

The primary assessment includes the history, physical examination and oxygen saturation measurement. During history taking, the types of symptoms and their date of onset will be

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\* These are no efficacy data for hand sanitizers with other agents or tubs with < 60 % alcohol.

important, as well as possible factors that may lead to complications. Table A1 identifies who is at increased risk of complications from seasonal influenza.

| <b>Table A1. Primary assessment: identifying groups at increased risk of complications from seasonal influenza</b> |  |
|--|--|
| 1.   | Age ≤ 2 or ≥ 65 years of age   |
| 2.   | Pregnancy (second or third trimester)  |
| 3.   | Cardiovascular disease: congenital, rheumatic, ischemic heart disease, heart failure   |
| 4.   | Bronchopulmonary disease: asthma, chronic bronchitis, bronchiectasis, emphysema, cystic fibrosis                                       |
| 5.   | Diabetes   |
| 6.   | Renal diseases   |
| 7.   | Malignancies   |
| 8.   | Immunodeficiency: AIDS, immunosuppression, transplant recipients   |
| 9.   | Hematologic disorders: anemia, hemoglobinopathies  |
| 10.  | Hepatic diseases, cirrhosis  |
| 11.  | Long-term acetylsalicylic acid therapy in those < 18 years of age; Kawasaki disease, rheumatoid arthritis, acute rheumatic fever, etc. |

Table A2 identifies the key areas to cover in the physical examination of influenza patients.

| <b>Table A2 Features of the primary assessment with abnormal values for adults and children</b> |  |  |
|---|--|--|
| Clinical Feature  | Adults ≥ 18 Years or Older                                   | Children < 18 years  |
| Oral temperature  | < 35°C or > 38°C   | < 35°C or > 38°C   |
| Heart rate  | New arrhythmia or pulse > 100 beats/min                      | Heart rate outside normal range<br>Newborn-3 mos: 85-205<br>3 mos-2 yrs: 60-140<br>2 yr - 18 yrs: 60-100 |
| Blood pressure  | < 100 systolic or dizziness when standing                    | < 70 systolic + 2x age in years  |
| Respiratory rate  | > 24/min   | < 2 mos: ≥ 60/min<br>2 mos-12 yrs ≥ 50/min<br>>12 mos-5 yrs ≥ 40/min<br>>5 yrs-18 yrs ≥ 30/min           |
| Skin colour (lips, hands)   | Cyanosis   | Cyanosis or sudden pallor, or cold legs up to the knee   |
| Chest pain/chest signs  | Chest pain or any abnormality on auscultation                | Chest pain, indrawing or any abnormality on exam   |
| Mental status   | New onset of confusion                                       | Lethargy, decreased consciousness or confusion   |
| Function  | Vomiting > 2/day or new onset of loss of functional capacity | Vomiting > 2/day, loss of appetite, dehydration or inability to breastfeed                               |
| Neurological signs/symptoms   | Seizure or reduced level of consciousness                    | Stiff neck, photophobia, convulsion, full fontanelle   |
| Oxygen saturation   | < 90% room air   | < 90% room air   |

Systematic recording of each patient encounter is required; standardized checklists will likely make this easier.

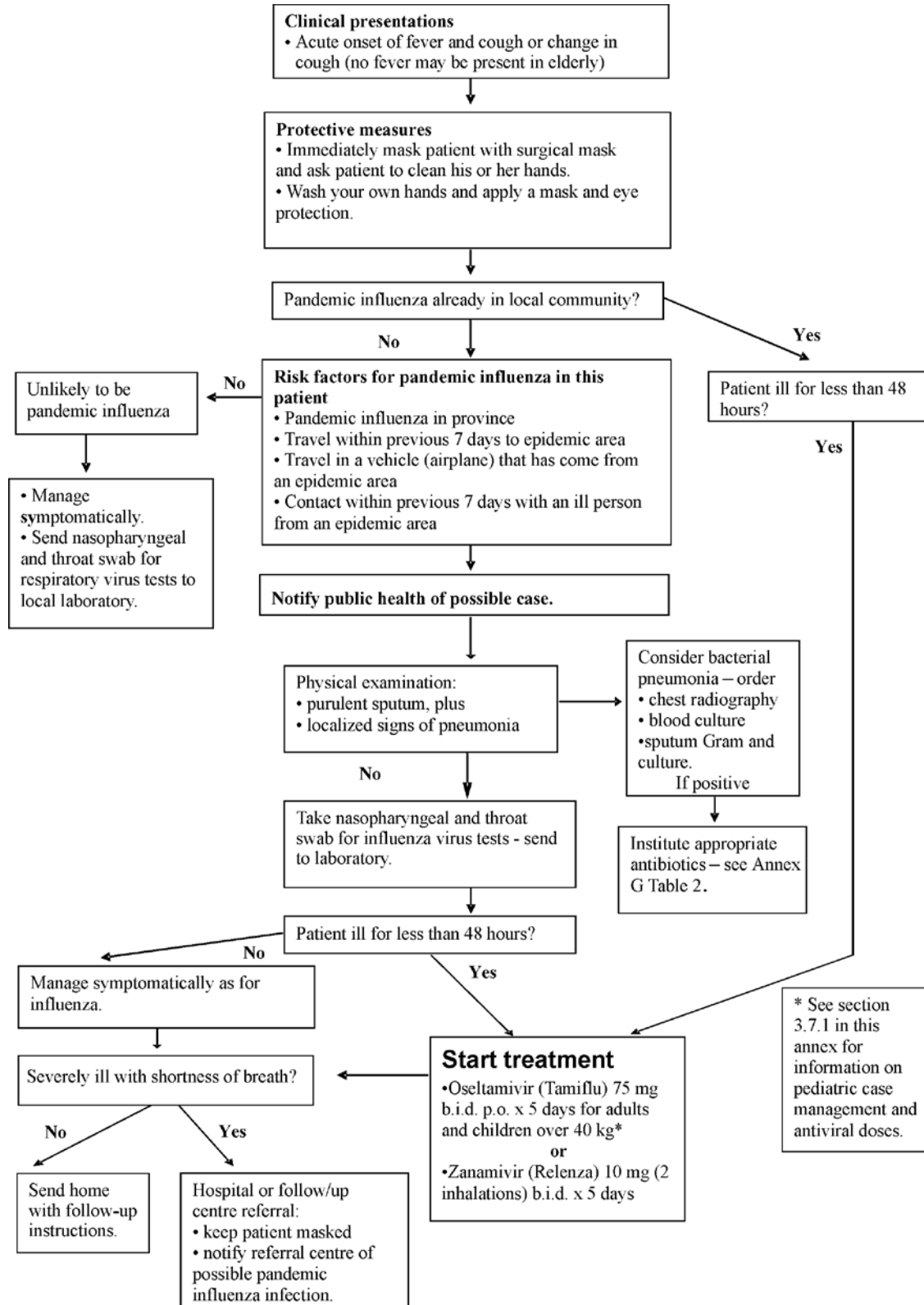
## Secondary assessment

Abnormal clinical features and indicators, and significant co-morbidity would generally be the indicators to conduct a secondary assessment. These are identified in Table A3. Note that viral diagnostic testing will be important at the onset of the influenza pandemic in any given community to document its arrival. After this, however, diagnosis will be presumptive, based on the history and the clinical presentation. Viral testing will not be readily available during the height of the pandemic because of the need to maintain essential laboratory services. Once the pandemic is established in a community, it is likely that viral tests will be restricted to specific indications (e.g. to rule out the emergence of a resistant strain). It will be important to look for laboratory guidelines at the time for indications of when to test.

|                        | Adults ≥ 18 Years or Older                           | Children < 18 years  |
|------------------------|--|--|
| Oxygen saturation      | < 90% room air                                       | < 90% room air   |
| Chest radiography      | Abnormal, consistent with pneumonia or heart failure | Abnormal, consistent with pneumonia or heart failure   |
| Hemoglobin             | Hb ≤ 8.0 g/dL  | Newborn: < 14.5 or > 22.5<br>Toddlers: < 9.0 or > 14<br>6-12 yrs: < 11.5 or > 15.5<br>12-18 male: < 13 or > 16<br>12-18 female: < 12 or > 16   |
| White blood cell count | < 2,000 or > 12,000                                  | Newborn: < 9,000 or > 34,000<br>Infant: < 5,000 or > 19,500<br>Toddler: < 6,000 or > 17,500<br>4-7 yrs: < 5,500 or > 15,500<br>8-13 yrs: < 4,500 or > 13,500<br>13 to < 18yrs: < 4,500 or > 11,000 |
| Sodium                 | Na ≤ 125 or ≥ 145 mmol/L                             | Infants: < 139 or > 146<br>Child: < 138 or > 145<br>Teen: < 136 or > 146   |
| Potassium              | K ≤ 3 or ≥ 5.5 mmol/L                                | < 2 mos: < 3.0 or > 7.0<br>2-12 mos: < 3.5 or > 6.0<br>> 12 mos: < 3.5 or > 5.0  |
| Blood urea nitrogen    | BUN ≥ 10.7 mmol/L                                    | < 13 yrs: < 1.8 or > 6.4<br>Teen: < 2.5 or > 6.4   |
| Creatinine             | ≥ 150 µmol/L   | Infant: < 18 or > 35<br>Child: < 27 or > 62<br>Teen: < 44 or > 88  |
| Glucose                | ≤ 3 or ≥ 13.9 mmol/L                                 | Child: < 3 or > 5.5  |
| Viral diagnostics      | According to laboratory guidelines                   | According to laboratory guidelines   |
| Electrocardiogram      | Evidence of ischemia or new arrhythmia               | Evidence of ischemia or new arrhythmia   |

To give an overall sense of how the assessments of patients would proceed, a clinical algorithm has been developed.

## Algorithm for Clinical Management of Pandemic Influenza



### **3. The Three Main Resources to Keep You Abreast of New Pandemic Developments**

You now have the essential infection control and clinical guidance you need for the assessment of patients with influenza or influenza-like illness. However, you also know that research is currently under way to better understand influenza transmission and that the clinical guidelines may change as we know more. So the next logical question is: What is the best way to stay informed of new developments? Here are your three most reliable sources:

#### **Resource #1 – Your health care institution**

Hospital-based nurses and physicians will receive information through the senior staff at the hospital. They, in turn, are linked with their local health unit as well as their provincial or territorial Ministry of Health.

#### **Resource #2 – Regional and provincial public health authorities**

Every health care practitioner in Canada should know how to contact his or her local Medical Officer of Health. Why? There are two very good reasons:

1. Ultimately, a pandemic happens at the local level. Each jurisdiction should have its own pandemic plan, and the local Medical Officer of Health has been identified as the person who will help facilitate planning in his/her local area. Plans for how health care services will be organized should either be “under construction” by now or posted on the local public health Web site.
2. The first person in Canada who has a novel or pandemic virus will likely be seen by a front-line health care practitioner. This heralds the start of a complex national health emergency. What if that person is you? If you suspect that a person may have a severe respiratory illness (for example, has cough, fever and a history of travel to an area where the pandemic virus is circulating), the first thing you are going to want to do is discuss this with your local Medical Officer of Health. He or she can help you get the nasopharyngeal kit for virology testing and ensure that it gets to the nearest public health laboratory, and will arrange for public health nurses to do contact tracing (identifying all those who may have been in close contact with this patient).

Provincial and territorial Ministries of Health have the primary responsibility for health care in their jurisdiction. Although efforts have and will be made to promote a consistent response across the country, the primary focus for decisions affecting health care during a pandemic will be made at the provincial/territorial level. Each province and territory is working out how they will have ongoing real-time communication with health care practitioners during a pandemic, and some are working with the medical licensing bodies to assist with this. To be prepared, you may want to know your provincial/territorial Ministry of Health Web site, fax or telephone number. (The best way to contact the provincial or territorial Ministry of Health varies across the country.)

#### **Resource # 3 – The Public Health Agency of Canada**

Many things have happened in the wake of SARS (severe acute respiratory syndrome) in Canada, and one has been the establishment of the PHAC. The Agency is the Canadian equivalent of the US Centers for Disease Control and Prevention (CDC), and like the CDC it has a Branch dedicated to infectious diseases and emergency preparedness. This Branch provides support to the national Pandemic Influenza Committee, which is responsible for maintaining and updating the Canadian Pandemic Influenza Plan for the Health Sector. The Agency also provides support to the Public

Health Network Council, which brings together the Chief Public Health Officer and the Assistant Deputy Ministers of Health from all the provinces and territories. The Agency is also the focal point for reporting any emerging infectious disease activity to the WHO.

The PHAC Web site contains extensive information about pandemic influenza (which can be accessed at [www.influenza.gc.ca](http://www.influenza.gc.ca)). Another area of relevance to health care practitioners is the section on emerging respiratory infections. This section on the PHAC Web site ([www.phac-aspc.gc.ca](http://www.phac-aspc.gc.ca)) contains clinically relevant information on what to do if you have a possible case of serious respiratory infection of unknown origin, H5N1 or an emerging pandemic influenza virus.

#### **4 The Four Major Assumptions Regarding a Pandemic Scenario in Canada**

Now that you have a picture of the clinical approach to pandemic influenza, it is important to take a moment to appreciate the larger picture, in order to place these guidelines into context. Just what exactly will we be up against? No one is certain what the next pandemic will look like or even when it will occur, but modellers have reviewed the pandemics of the past and come up with their best guesses as to what might be a best, moderate or worst case scenario. In national planning exercises, Canada has adopted the moderate case scenario, with the understanding that the actual pandemic could be either milder or more severe. These assumptions give us an idea of what we might be facing.

##### **Assumption #1 – We are currently at increased risk of a pandemic**

The WHO has concluded that we are at increased risk of an influenza pandemic because of numerous sporadic human cases of H5N1 associated with H5N1 outbreaks in birds. It is possible that another avian influenza virus will be the source of the next pandemic; however, at this point, we do not know how or when the next pandemic will occur.

##### **Assumption #2 – Over 70% of the population may become infected during a pandemic, but only 15%-35% of the population will become clinically ill (i.e. there will be a high rate of asymptomatic infection)**

These numbers are based on previous experience with influenza pandemics. Note that people who become infected but are asymptomatic would be expected to develop immunity to the virus. The impact of the pandemic in terms of severity, age distribution and extent of spread will not be known until the pandemic virus has begun spreading efficiently in the human population.

##### **Assumption #3 – Of those who are clinically ill, about 50% will seek outpatient care, 1% will be ill enough to require hospitalization, and 0.4% will die**

These estimates are based on a moderate pandemic scenario in which the impact of antivirals and vaccine has not been included. A mild pandemic would be similar to the one of 1968. A severe pandemic would be similar to the one of 1918 and could have up to a 2% mortality rate without intervention. Therefore, during an unmitigated moderate influenza pandemic a family physician with a practice of 2,000 patients could expect about 700 patients to become clinically ill (over the course of one to two waves, each lasting 6-8 weeks), 350 would seek health care and 2-3 patients may die. The use of antivirals and pandemic vaccine (when available) are expected to decrease these numbers.

**Assumption #4 – It is expected that the pandemic influenza virus will circulate in any given community for 6-8 weeks, and will likely come back for a second wave**

Influenza generally follows the typical bell curve, in which cases are few at first, become much more frequent, peak and then subside. It can then return weeks or months later.

## **5. The Five Best Practices for Health Care Professionals to Consider When Preparing for Pandemic Influenza**

### **Best Practice #1 – Psychological preparedness**

It is important that front-line health care professionals feel prepared for a pandemic and cultivate the resiliency needed to get through what will inevitably be a trying time. Studies of Vietnam War veterans have found that the chance of experiencing post-traumatic stress disorder after the war was not related to the level of stress or trauma experienced. The most important predictor was a feeling of helplessness during the experience. Those who felt some level of control, including self-control, were much more likely to recover completely from their experience.

First-hand accounts from health care workers after Hurricane Katrina spoke of the importance of having small comfort items (such as different shoes to change into every 8 hours) to help give both a sense of control and relief during long hours of work.<sup>2</sup>

### **Best Practice #2 – Family preparedness**

Nothing helps people withstand emergencies better than well-laid plans that result in families feeling that they can “weather the storm”. Now is the time to review and reinforce basic hand hygiene and cough etiquette practices with your family. Take the time to discuss with your spouse, parents, children and others close to you how you might be able to deal with a widespread infectious disease outbreak. What often works is setting up mutual aid agreements. If your spouse falls ill, you may want to take a couple of days to be with him/her and take care of your family. Once he/she is on the road to recovery, perhaps a friend or neighbour could help. If schools close, some people have tentatively planned home schooling arrangements for their children and a few of their friends.

### **Best Practice #3 – Practice-based preparedness**

The basic overall strategy to be prepared in your practice will be something like this: ensure that infection control procedures are in place, know how you will be updated during a pandemic, predetermine how you will triage your patient load to lighten routine care, and discuss with colleagues how you will cover for each other. Infection control and real-time communications during a pandemic have already been discussed, so we will focus on the other two aspects of the strategy.

The basic exercise in triage is to work out which patients may not need routine care during a pandemic. For office-based practices this may mean that routine blood pressure or blood sugar checks can be postponed and renewal of prescriptions can be done by telephone. Elective surgeries will likely be postponed or cancelled.

As with the discussions you will have with family and friends, it is wise to form a small group of colleagues and co-workers, and develop a plan of mutual aid and cross-coverage to get through a 6-8 week period of intense demand for health care services at a time when you or your colleagues may fall ill.



#### **Best Practice #4 – Ethics-based decision making**

There are a number of ethical considerations that come into play during a pandemic; here are a few key principles:

First, there is the **duty of care**. All health care professionals will be asked to work hard during a pandemic. It is understandable that among the first reactions clinicians may experience is some personal trepidation when hearing the news that the pandemic has hit Canada. It is hoped that, nonetheless, you will respond to the call of duty. Of course, it will be much easier to respond to this call of duty if the previous best practices have already been put in place.

Second, there is the **duty to protect**. The people responsible for organizing health care services know that there is a moral and legal duty to protect those who are on the front lines helping to fight this disease. In turn, those who are on the front lines need to protect the patients whom they are looking after, especially the vulnerable.

Third, studies of Canadian values explored in the context of pandemic planning have identified the **importance of being practical, fair and equitable**. The public realizes that it won't be "business as usual" during a pandemic, and there will be a scarcity of resources. Work has already begun on rationing the use of respirators in intensive care units according to principles such as, "those who are most likely to recover will have priority". Doctors will be expected to do their best in making these difficult choices during a pandemic and will need to work hard to ensure that the choices they make are fair, humane and for the larger good.

#### **Best Practice #5 – Patient preparedness**

Most people today are aware that there is a threat of a pandemic and may ask you for advice. Use the patient educational guide to promote the idea of preparedness and resiliency. Emphasize that there will be organized health care services and treatments available, but people will also have to be self-reliant as much as they can. **Promote the idea of a "flu buddy"** or an arrangement of mutual aid, and identify the importance of volunteerism for those who remain well. Point them to reliable information sources, such as the provincial Ministry of Health Web site, its telehealth services or telephone number for general inquiries, and the PHAC.

## **6. The Six Key National Strategies**

Now that you have a good sense of the clinical challenges that a pandemic poses, and how you can deal with them, we will end with the good news: Canada has one of the best national pandemic plans in the world. A lot has been done at the federal, provincial and territorial levels to support the clinical care response. However, as a health care practitioner you have a critical role to play when interacting with the larger health system to ensure that there is a well coordinated and seamless response.

#### **National strategy #1 – Surveillance and early detection**

Early detection of a pandemic in Canada relies on early reporting of suspicious cases to public health and positive laboratory identification. The first step is routine influenza surveillance or our current national FluWatch program, and our Severe Respiratory Illness (SRI) Reporting protocol. FluWatch contains several data sources, including influenza-like illness reporting from sentinel health care practitioners across Canada, laboratory testing to identify influenza and other respiratory viruses, subtyping of influenza samples and assessment of antiviral resistance, as well as provincial/territorial assessments of their "flu activity levels. Should the risk of a pandemic increase, alerts and SRI reporting would be actively encouraged. During a pandemic, a surveillance strategy

will track the entry, extent and exit of the pandemic virus in communities across Canada. Once the first pandemic wave is over, surveillance would return to routine FluWatch activities with evaluation activity geared to fine-tuning the overall strategy for a second wave.

The laboratory strategy is currently being worked out. Once the pandemic has been declared, it will be critical that health care practitioners do not overwhelm their local laboratory with samples. Laboratories have finite staff and resources, and are currently working out how best to limit the number of laboratory tests that are done during a pandemic while maintaining both clinical and a population-based monitoring capacity.

### **National strategy #2 – Transparent and timely communications**

Provincial/territorial and federal governments are committed to transparent and timely communications regarding the threat or arrival of a pandemic, and are planning mechanisms to facilitate communication with the broader health care system and the public. There will also be regular media briefings when timely updates on pandemic activity and response will be given at local/regional, provincial and federal levels.

### **National strategy #3 – Emergency health services**

The organization of health services during a pandemic will differ according to province and territory, and may differ among regions. A recent national survey identified that most provinces currently have plans for hospitals, long-term care facilities and for telephone-based advice. Some provinces have decided to organize special assessment centres to assess those with ‘flu-like symptoms; others are in the process of doing so. Checklists are available in the Canadian Pandemic Influenza Plan regarding the setting up of alternative care sites and dealing with mass fatalities. Your local public health unit will communicate with doctors to inform you of the plans and how you and your patients can fit into them.

### **National strategy #4 – Antiviral medications**

As of April 2008, Canada has a stockpile of 53 million doses of antiviral medications consisting of approximately 90% oseltamivir (Tamiflu) and 10% zanamivir (Relenza). These medications have been distributed to provinces and territories on a per capita basis. The National Antiviral Stockpile’s size, composition and uses are being reviewed on an ongoing basis. Currently, the stockpile is reserved for an early treatment strategy. The question of whether the national stockpile should be increased for purposes of prophylaxis is under review. There are an additional 12 million doses of antiviral medications in a national emergency stockpile for surge capacity.

### **National strategy #5 – Public health measures**

Classic public health measures, such as isolation of cases and quarantine of contacts, may be used prior to a pandemic, before efficient human-to-human transmission is established and when containment may still be possible. Once the pandemic is under way these measures will no longer be effective because of the short incubation period of the influenza virus, its propensity for community spread and the presence of asymptomatic infection. During a pandemic, community-based public health measures will be used, such as public advice on voluntary self-isolation when ill, travel advisories and, if necessary, school closures and cancellation of public gatherings.

## **National strategy #6 – Pandemic vaccine**

Ultimately, the best strategy against a pandemic virus is a vaccine. Canada is fortunate to have a domestic manufacturer of influenza vaccine, with a contract to produce enough pandemic vaccine for all Canadians. However, it will take about six months after a pandemic has been announced before vaccine will be available. Clinical trials to enhance manufacturer and regulatory preparedness are currently being planned in Canada, and these may shorten this lag time. Thus, it is anticipated that antivirals will be the main treatment modality for the first wave, and vaccine will be available to prevent the second or subsequent waves of a pandemic.

## **7. The Seven Steps to Prepare Now for Seasonal Influenza**

Seasonal influenza hits Canada every year, and this creates an opportunity to practise our pandemic readiness. Please review these seven steps for optimal management of seasonal influenza.

1. Optimize your management of patients with fever and cough
  - Screen your patients for cough and fever by 'phone for emergency appointments and upon arrival. If patients do have these symptoms ask them to don a mask and to clean their hands with alcohol-based hand gel, and direct them to a separate area (at least 1 metre away from other patients or directly into an examining room).
  - Have provisions of masks, tissues and alcohol-based hand gel readily available.
  - Consider the use of antivirals when influenza is suspected and the patient either has not had the 'flu vaccine or it is a season of relative mismatch between the circulating viruses and the vaccine.<sup>3</sup>
  - Arrange for surfaces to be disinfected after patient visits.
2. Ensure that you and your personnel receive the influenza vaccine every year.
3. Immunize your patients with seasonal 'flu vaccine and pneumococcal vaccine, especially those at risk.
4. Consider requesting viral sampling kits from your local health unit.
5. Given the opportunity, support your local FluWatch program and visit the PHAC FluWatch Web site to learn about influenza activity in your region.
6. Inform your patients before the season about the following topics:
  - What the 'flu symptoms are.
  - How the 'flu is transmitted.
  - How it can be prevented.
  - That antibiotics won't help.
7. Inform your patients about self-care:
  - Risk factors and complications.

## Conclusion

Today, we are better prepared for a pandemic than ever before, with surveillance systems and sophisticated laboratory capacity for early identification, antiviral drugs stockpiled and vaccine manufacturing plants at the ready. Nonetheless, challenges remain. Links between clinical care, public health and laboratories need to be strengthened. Health care plans for pandemic influenza need to be made ready for operation, and clinicians need to ensure that they have the information and supplies they need to feel protected and prepared.

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