

CANADIAN PANDEMIC INFLUENZA PREPAREDNESS:

Planning Guidance for the Health Sector



Pan-Canadian Public Health Network

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Guide de planification pour le secteur de la santé

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PREFACE

Canadian Pandemic Influenza Preparedness: Planning Guidance for the Health Sector (CPIP) is a federal, provincial, and territorial (FPT) guidance document that outlines how jurisdictions will work together to ensure a coordinated and consistent health sector approach to pandemic preparedness and response. CPIP consists of a Main Body, which outlines overarching principles, concepts, and shared objectives, as well as a series of technical annexes that include more detailed operational plans on specific issues.

CPIP was first published in 2004. In 2006, the Pan-Canadian Public Health Network (PHN) Council approved an updated version of CPIP as an evergreen document to be updated as required. In 2009, Canada's pandemic preparedness planning efforts were tested for the first time, with the emergence of the H1N1 influenza pandemic. This latest version of CPIP incorporates evidence from H1N1 lessons learned reviews conducted at the FPT and international levels and by various stakeholder groups, and scientific advances.

The updates to CPIP Main Body were overseen by a task group with a mandate from the PHN Council to provide technical and scientific recommendations and expert opinion as needed to support CPIP renewal. The CPIP Task Group consists of members with expertise in the areas of pandemic and seasonal influenza, pandemic preparedness planning and response, emergency management, epidemiology, public health, virology, bioethics, immunization, surveillance, and laboratory diagnosis.

The updated CPIP allows for a more flexible and adaptable response to future pandemics, providing scope for provinces and territories (PT) to adapt their own plans and responses to local and regional circumstances. The title of the document also has changed, from *Canadian Pandemic Influenza Plan for the Health Sector* to *Canadian Pandemic Influenza Preparedness: Planning Guidance for the Health Sector*, to more accurately reflect its role and intended use as a guidance document.

CPIP now supports a risk management approach and includes new concepts such as pandemic impact assessment, descriptions of pandemic scenarios of varying impact, and identification of triggers for a Canadian response. It also better reflects Canada's geographic, demographic, cultural, and socio-economic diversity and the imperative for planners to take this diversity into account. CPIP has been subject to extensive FPT government review and targeted stakeholder consultations. Stakeholders included national level organizations representing health professionals, emergency preparedness and first responders, community services, the private sector, and Aboriginal persons.

The updated CPIP was approved by the PHN Council and the Conference of FPT Deputy Ministers of Health.



1.0 INTRODUCTION

1.1 Background

Canadian Pandemic Influenza Preparedness: Planning Guidance for the Health Sector (CPIP) provides planning guidance to prepare for and respond to an influenza pandemic. Influenza pandemics (subsequently referred to as pandemics) are unpredictable but recurring events that occur when a novel influenza virus strain emerges, spreads widely and causes a worldwide epidemic. Unfortunately, it is not possible to predict the anticipated impact of the next pandemic or when it will occur.

Planning for a prolonged and widespread health emergency of unpredictable impact is challenging but essential. It requires a “whole of society” response and the coordinated efforts of all levels of government in collaboration with their stakeholders.

Pandemic planning activities within the health sector in Canada began in 1983. The first Canadian pandemic plan was completed in 1988 and was followed by several updates. In 2004, the *Canadian Pandemic Influenza Plan for the Health Sector* was published as the result of extensive collaboration among FPT and other stakeholders. The plan was last updated in 2006, although some annexes have been revised or added since then.

The 2009 influenza A (H1N1) pandemic (subsequently referred to as the 2009 pandemic) provided the first real test of Canada’s pandemic preparedness planning efforts. Collaboration among all levels of government and stakeholders was unprecedented compared with previous events like the Severe Acute Respiratory Syndrome (SARS) outbreak in 2003. The public health and health care systems were stressed but in most instances were able to cope. Antiviral stockpiles were deployed and pandemic vaccine was administered to millions of Canadians. There were, however, many challenges identified in this experience.

Canada’s pandemic planning continues to evolve on the basis of research, emerging evidence and the lessons learned from the 2009 pandemic. The value of building on seasonal influenza surveillance and control measures is well recognized. Making these systems and measures as robust as possible in the interpandemic period will help prepare for a strong pandemic response.

1.2 Purpose

CPIP's overall purpose is to provide planning guidance for the health sector for pan-Canadian preparedness and response, in order to achieve Canada's pandemic goals:

First, to minimize serious illness and overall deaths, and second to minimize societal disruption among Canadians as a result of an influenza pandemic.

The main body of CPIP provides strategic guidance and a framework for pandemic preparedness and response, whereas the CPIP annexes provide operational advice and technical guidance, along with tools and checklists. As an evergreen document, CPIP will be updated as required to reflect new evidence and best practices.

It is important to note that CPIP is not an actual response plan. Rather, it is a disease-specific guidance document that will support an FPT all-hazards health emergency response approach. While CPIP is specific to pandemic influenza, much of its guidance is also applicable to other health emergencies.

1.3 Audience and Scope

CPIP is pan-Canadian pandemic planning guidance for the health sector developed under the guidance of a group of Canadian experts. The primary audiences are the FPT ministries of health together with other ministries that have health responsibilities. While it is anticipated that CPIP's strategic direction and guidance will inform FPT planning in order to support a consistent and coordinated response across jurisdictions, PTs have ultimate responsibility for planning and decision-making within their respective jurisdictions. CPIP also serves as a reference document for other government departments, non-governmental organizations (NGOs) engaged in health issues, and other stakeholders.

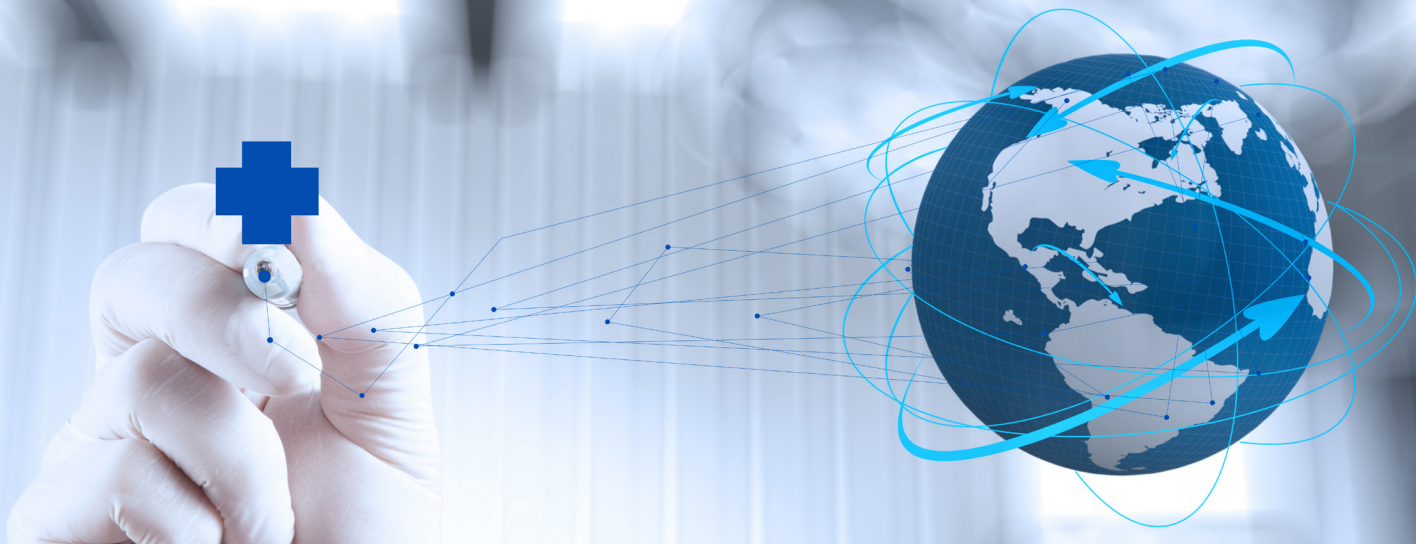
While CPIP provides pandemic planning guidance, it does not address business continuity preparedness or overall management of a health emergency. These activities are critical for an effective pandemic response; however they are more appropriately addressed in the emergency plans of individual jurisdictions and organizations. Neither does CPIP address pandemic preparedness and response in the non-health sectors (e.g., community and social services, public safety), although some of its content may be a useful reference.

1.4 Changes in This Version

This version of CPIP is considerably changed from the 2006 version in both format and content. The strategic nature of the information in the main body of the planning guidance has been strengthened and lessons learned from the 2009 pandemic have been incorporated. While the overall pandemic goals remain the same, new objectives have been added along with a set of principles to support the response. These are accompanied by a discussion of ethical considerations pertaining to pandemic preparedness and response, and consideration of the implications of Canada's diversity and the needs of vulnerable persons. Roles and responsibilities for each level of government have been described more explicitly.

The new CPIP outlines a risk management approach to support a flexible and proportionate response. Risk management involves setting the best course of action in an uncertain environment by identifying, assessing, acting on and communicating risks. Information has been added about what is known and what is uncertain about pandemic influenza. The planning assumptions have been updated, and four hypothetical planning scenarios have been developed to illustrate the importance of developing plans and response strategies that are flexible and can be adapted as circumstances require. CPIP also provides triggers for action that are based on novel virus emergence and pandemic activity in Canada rather than the global World Health Organization (WHO) phases. Finally, content has been updated in each of the specific response areas.

The annexes that accompany the CPIP main body will be renamed according to their subject (e.g., Surveillance, Vaccine) instead of being named alphabetically. As part of the CPIP renewal process, it is intended that each of the annexes will be revised over the next few years.



2.0 CONTEXT FOR PLANNING

2.1 Understanding Pandemic Influenza

2.1.1 INFLUENZA AND THE ORIGIN OF PANDEMICS

While there are three types of influenza virus (A, B and C), only influenza A and B viruses cause seasonal outbreaks in humans, and only influenza A viruses have been known to cause pandemics. Aquatic birds are the natural hosts for influenza A viruses, although a wide range of species can be infected and significant disease outbreaks can occur in poultry, pigs and other species. Most of these zoonotic strains do not cause disease in humans although occasional human infections occur, usually through close contact with infected poultry or animals.

Influenza pandemics or worldwide epidemics occur when an influenza A virus to which most humans have little or no immunity acquires the ability to cause sustained human-to-human transmission leading to community-wide outbreaks. Such a virus has the potential to spread rapidly worldwide, causing a pandemic.¹

These novel viruses may arise through genetic reassortment (a process in which animal and human influenza genes mix together) or genetic mutation (when genes in an animal virus change, allowing the virus to easily infect humans). Pigs can become infected with influenza viruses from different species and act as a “mixing vessel” to facilitate the reassortment of genes from different viruses.

Not all novel influenza viruses evolve into pandemic viruses. Some novel subtypes, like the avian A (H5N1) virus, have caused sporadic human cases on an ongoing basis since 1997 but have not gained the ability to spread easily in humans. As the overall human case fatality rate for A (H5N1) infections has been over 50%,² there are concerns about the potential of a high impact human pandemic if this virus gains the capacity to spread easily in people.

2.1.2 TYPICAL PANDEMIC CHARACTERISTICS

Historical evidence suggests that influenza pandemics occur three to four times per century. In the last 100 years there were four pandemics separated by intervals of 11 to 41 years. They varied greatly in their impact, as measured by illness and deaths. The 1918-1919 pandemic had a high impact, killing an

¹ World Health Organization. Pandemic influenza risk management – WHO interim guidance. 2013. Available from: http://www.who.int/influenza/preparedness/pandemic/influenza_risk_management/en/index.html.

² World Health Organization. Influenza at the human-animal interface. 4 July 2013. Available from: http://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_03July13.pdf.

estimated 30,000 to 50,000 people in Canada and 20 to 50 million people worldwide. The impact of the 1957 and 1968 pandemics was considered moderate, whereas the 2009 pandemic had a lower impact.

Pandemics of the last 100 years:
1918-1919: H1N1 "Spanish flu"
1957-1958: H2N2 "Asian flu"
1968-1969: H3N2 "Hong Kong flu"
2009: H1N1 Influenza A (H1N1) 2009 pandemic

While every pandemic is different, some common characteristics can be recognized:

- The pattern of disease is different in pandemics than in seasonal influenza.
- Pandemics may arrive outside of the usual influenza season and typically have more than one wave of illness.
- The total duration of a pandemic is likely to be 12 to 18 months.
- During a pandemic, the new pandemic virus replaces other circulating influenza strains. Afterwards, the pandemic strain becomes part of (and may dominate) the mix of seasonal influenza A viruses.
- During seasonal influenza, most hospitalizations and deaths occur in the elderly and persons with underlying health conditions, whereas, in a pandemic, disproportionately more severe disease and death is seen in young people and in persons without underlying health conditions.³
- There is a gradual reversion back to the typical seasonal morbidity and mortality pattern over the decade following the pandemic.

During the 1918-1919 pandemic, 99% of influenza-associated deaths in the United States (US) were in persons under 65 years of age and nearly half among previously healthy adults 20-40 years of age. In subsequent pandemics, the proportion of influenza-associated deaths in the US in persons under 65 years of age was 36% (1957-58), and 48% (1968-69).⁴ In the 2009 pandemic 70% of reported deaths in Canada were in persons under 65 years of age.⁵

2.1.3 PANDEMIC IMPACT

For planning and response purposes, describing the impact of a pandemic on the population is a more meaningful approach than talking about its "severity". The term "severity" is used to describe both severity of disease in individuals (clinical severity) and the overall "severity" of a pandemic in a population. In CPIP, the term *severity* will be used to describe clinical severity of disease in individuals and *impact* will be used to describe the effects of a pandemic on the population. It is acknowledged that this usage may vary from the approach of some other authorities. For example, the World Health Organization (WHO) uses the term "pandemic severity" for what the CPIP terms "impact" but the concepts are the same.⁶

3 Simonsen L, Clarke MJ, Schonberger LB, et al. Pandemic versus epidemic mortality: a pattern of changing age distribution. *J Infect Dis* 1998;178:53-60.

4 Ibid.

5 Helferty M, Vachon J, Tarasuk J et al. Incidence of hospital admissions and severe outcomes during the first and second waves of pandemic (H1N1) 2009. *Can Med Assoc J* 2010;182:1981-7.

6 World Health Organization. Pandemic influenza risk management – WHO interim guidance. 2013. Available from: http://www.who.int/influenza/preparedness/pandemic/influenza_risk_management/en/index.html

Severity refers to clinical severity of disease in an individual (e.g., mild, moderate or severe disease)

Impact refers to the effects of a pandemic on a population (e.g., low, moderate, or high impact)

Pandemics vary in their impact, as do seasonal influenza outbreaks, although usually on a higher scale of magnitude. A low impact pandemic might resemble moderate to severe seasonal influenza outbreaks, although its epidemiological profile would be different in important ways as previously described. In contrast, pandemics of moderate to high impact could result in high rates of illness and death across the country and would severely challenge the health care sector. They could also disrupt the normal functioning of society and put people with limited resources and support systems into a more vulnerable state.

Numerous factors can affect pandemic impact. These are outlined below and described in more detail in Appendix A:

- *Viral factors* are perhaps the most important. These characteristics of the virus itself are usually described as transmissibility (ability to spread) and virulence or clinical severity (the ability to cause severe disease). Transmissibility can be defined in terms of both the extent and the speed of spread and it can vary by season and setting.
- *Factors affecting population vulnerability* include pre-existing population immunity, the presence of underlying health conditions, or unexpected new risk factors for severe disease. Impact may be increased in vulnerable populations, including among Aboriginal Peoples (First Nations, Inuit and Métis), or settings such as remote communities, homeless shelters and overcrowded housing.
- *Response factors* include the effectiveness of interventions (e.g., public health measures, vaccine, and antiviral medications), the health care system response (e.g., access, surge capacity), and risk communications, along with the extent of public adoption of desired behaviours and social mobilization.

2.2 Uncertainties and Unpredictability

Influenza is unpredictable and remains a disease of surprises. Every influenza season and every pandemic is different. These uncertainties make pandemic planning challenging and highlight the need for flexibility and adaptability. Some of the major unknown areas about the next pandemic are the following:

- *When the next pandemic will occur* – although historically pandemics have occurred three to four times per century, there is no predictable interval. It should not be assumed that the 2009 pandemic has provided a respite during which preparedness efforts can be relaxed.
- *Where it will emerge* – while most seasonal influenza strains emerge in East/Southeast Asia,⁷ the same is not true for pandemic influenza; the 2009 pandemic emerged in Mexico. An influenza pandemic could emerge anywhere in the world, and there may be very little lead time before Canada is extensively involved.
- *The nature of spread* – pandemics often first arrive outside the usual influenza season (e.g., in late spring or summer) and typically have more than one wave of infection. However, this is not true in all circumstances or in all areas. A small first wave is often followed by a larger second wave, but the relative size of pandemic waves may vary. The speed of spread may also vary – pandemic waves can be intense or more spread-out over time. An intense wave would put more stress on the health care system.

7 Russell CA, Jones TC, Barr IG et al. The global circulation of seasonal influenza A (H3N2) viruses. *Science* 2008;3210:340-6.

- *What its characteristics will be* – the basic characteristics of the next pandemic virus are unknown, including its antigenic type (e.g., H2, H5, H7), its transmissibility and virulence, and the age groups and clinical groups most affected.
- *What its impact will be* – the last four pandemics demonstrated that population impact can vary from low to high and is not the same in all populations or settings. It is important to consider all possibilities and make plans adaptable for different circumstances. This will help ensure that the response is proportional to the evolution of the pandemic in any specific community.
- *The effect of interventions* – typical seasonal influenza interventions are expected to be effective during the pandemic. However, the novel virus could be resistant to antiviral medications and/or pandemic vaccine production could be delayed or unsuccessful. The extent of vaccine uptake and adoption of public health measures is also unknown. Furthermore, interventions could have unintended consequences that are very difficult to predict.

2.3 Lessons Learned from the 2009 Pandemic

There were many important *epidemiological observations* from the 2009 pandemic to take into account in future planning and response. These include the speed with which cases and sporadic outbreaks appeared in Canada after the novel virus was first detected and the early involvement of some remote and isolated communities, with severe disease in some First Nations communities. There was considerable variation in the timing and intensity of pandemic waves, especially the first wave, across the country. Although the symptoms were similar, age groups affected and risk conditions varied from seasonal influenza. Greater impact was seen in pregnant women and Aboriginal Peoples, and persons with morbid obesity were newly recognized as being at high risk for complications. For the duration of the pandemic, seasonal influenza strains were replaced by the pandemic strain but it was not certain whether this single strain dominance would continue as in previous pandemics. However, in the 2010/2011 influenza season A (H3N2) and B strains began to re-circulate and the pandemic virus became the seasonal A (H1N1) strain.

A number of *challenges* were identified in the national response. Surveillance demands were very heavy from the very start, and were accentuated by lack of linked information systems in some jurisdictions, unclear protocols for sharing information, and limited capacity for epidemiological analysis. The process for release of the National Antiviral Stockpile (NAS) was uncertain. There was high demand for critical care and ventilators for affected children and adults. Preparation and timely approval of concise national guidelines was difficult. The pandemic immunization program faced challenges with uncertain timelines for vaccine delivery, prioritization, logistics of local campaigns and communication of changing recommendations.

On the positive side, previous planning processes and relationship-building led to unprecedented FPT collaboration and many successful stakeholder engagement efforts. Existing surveillance systems, like FluWatch, and ready-to-use hand hygiene and respiratory etiquette campaigns were valuable. Mathematical modeling was successfully used to support decision-making in some areas (e.g., recommendations for vaccine prioritization) and it was recognized that a number of other areas would benefit from modeling.

Following the pandemic, the Government of Canada (GC)⁸ and most provincial and territorial (PT) governments conducted lessons learned reviews. In addition, the Standing Senate Committee on Social Affairs, Science and Technology held extensive hearings on the response.⁹ Some common themes emerged from these reports and recommendations were identified to improve preparedness, such as:

- streamlined FPT governance structure and clarification of roles and responsibilities;
- improved scalability and adaptability of response, with triggers to activate and deactivate specific responses while taking into account the variable impact and timing of the pandemic in different geographic regions;
- development of integrated electronic information management systems;
- strengthened surveillance systems and epidemiological capacity;
- collaborative processes to develop and strengthen guidance documents for health care workers (HCW) and other stakeholders to establish timely availability, accessibility, consistency and cultural sensitivity of messages;
- strategies to communicate risk, uncertainty and changing information;
- active participation of all stakeholders in pandemic preparedness and response;
- strengthened linkages with primary care and other front-line service providers;
- development of mechanisms for rapid funding and research priority-setting, multi-jurisdictional studies and centralized ethics approval for multi-centre studies;
- mechanisms to integrate new research findings into evidence-informed practice; and
- regular and rigorous testing of plans at all levels.

2.4 Understanding Canada's Diversity

Canada's geographic features and population diversity can create challenges in mounting an effective response to a public health emergency. Canada is a huge country geographically with communities that range in size from large cities to small rural and remote settlements. The proportion of people living in rural areas in Canada (18.9%) is low in comparison to other developed countries and is steadily declining. The proportion of the rural population, however, varies greatly (from 14% to 53%) from one province or territory to another. It is lowest in British Columbia and Ontario and is highest in the Atlantic provinces and the territories.¹⁰

Canada is diverse in terms of language, religious beliefs, ethnicity, culture and lifestyle. Canada's Aboriginal Peoples make up almost 4% of the population, the second highest percentage in the world after New Zealand.¹¹ While many Aboriginal people live in remote and isolated communities in the North, about half now live in urban areas. The median age of Aboriginal Peoples is considerably younger than that of the non-Aboriginal population (27 years compared with 40 years respectively).¹²

8 Public Health Agency of Canada. Lessons Learned Review: Public Health Agency of Canada and Health Canada Response to the 2009 H1N1 Pandemic. November 2010. Available from: http://www.phac-aspc.gc.ca/about_apropos/evaluation/reports-rapports/2010-2011/h1n1/index-eng.php

9 Standing Senate Committee on Social Affairs, Science and Technology. Canada's Response to the 2009 H1N1 Pandemic. December 2010. Available from: <http://www.parl.gc.ca/40/3/parlbus/commbus/senate/com-e/soci-e/rep-e/rep15dec10-e.pdf>

10 Statistics Canada. Canada's rural population since 1851. 2012-02-09. Available from: <http://www12.statcan.gc.ca/census-recensement/2011/as-sa/98-310-x/98>

11 Statistics Canada. 2006 Census: Aboriginal Persons in Canada in 2006: Inuit, Metis and First Nations, 2006 Census. Available from: <http://www12.statcan.ca/census-recensement/2006/as-sa/97-558/p2-eng.cfm>

12 Statistics Canada. Canada Year Book 2011. Available from: <http://www.statcan.gc.ca/pub/11-402-x/2011000/pdf-eng.htm>

The proportion of foreign-born people in Canada is one of the highest in the world at 20%,¹³ most of whom settle in large cities. Toronto and Vancouver now have over 40% visible minority populations and Montreal has 16%. In addition there are many temporary residents, such as foreign workers and foreign students.¹⁴

The needs of *remote and isolated communities* may be greater than other communities because of geographic isolation and health, social, environmental, economic and cultural considerations. These may affect the baseline health status and thus increase the vulnerability of their residents. In addition, some remote and isolated communities lack basic amenities, such as household access to running water, that are assumed to be present when public guidance like hand hygiene is issued. It is important to consider these factors, along with limited access to health care and transportation challenges, when planning for all aspects of the pandemic response in remote and isolated communities. Similar concerns may affect urban marginalized or vulnerable populations.

There are individuals within all jurisdictions whose needs are not fully addressed by traditional services or who cannot comfortably or safely access and use standard resources. Examples of these *vulnerable persons* include, but are not limited to, individuals who are:

- physically or mentally disabled (e.g., visually or hearing impaired, mobility limitations, cognitive disorders);
- limited or non-English or French speaking;
- low literacy;
- geographically, culturally or socially isolated;
- low income;
- medically or chemically dependent;
- homeless or street-involved;
- housebound or frail seniors; and
- new immigrants and refugees.¹⁵

Studies indicate that there is a social gradient of risk during influenza pandemics, based on social vulnerabilities that are likely to lead to increased exposure to infection, risk of basic human needs not being met, insufficient support and/or inadequate treatment.¹⁶ Vulnerable populations might become more marginalized if pandemic health services are streamlined into standard approaches to reach the general population.

13 OECD. *Society at a Glance 2011: OECD Social Indicators*. 4.5 Migration. Available from: http://dx.doi.org/10.1787/soc_glance-2011-en

14 Statistics Canada. *Canada Year Book 2011*. Available from: <http://www.statcan.gc.ca/pub/11-402-x/2011000/pdf-eng.htm>

15 International Centre for Infectious Diseases. *Flu season and the most vulnerable people. Preparing your organization, staff, volunteers and clients for seasonal and pandemic flu*. Available from: http://www.icid.com/files/Marg_Pop_Influenza/Influenza_Preparedness_Guidebook_English_FINAL.pdf

16 O'Sullivan T, Bourgoin M. *Vulnerability in an influenza pandemic: looking beyond medical risk*. Oct 2010. Available from: http://www.icid.com/files/Marg_Pop_Influenza/Lit_Review_-_Vulnerability_in_Pandemic_EN.pdf

Within the nationally coordinated pandemic response it is important to allow sufficient local flexibility to address the unique needs of vulnerable populations. Detailed influenza-specific planning guidance has been developed for vulnerable populations in Canada.^{17,18} These referenced documents should be useful for FPT and regional/local planners.

Responsibility for planning for vulnerable populations is often unclear and although public health is typically involved, inclusion of all relevant stakeholders is important for comprehensive planning and buy-in. It is important for planners to address the unique needs of their jurisdiction. This begins with identifying populations and settings associated with increased risk of illness or severe outcomes from pandemic influenza along with persons who might need tailored prevention and care services during a pandemic. Specific planning considerations include information needs (e.g., language, cultural style and methods); access to assessment, treatment (including antiviral medications) and convalescence support; access to vaccine; and need for support for activities of daily living.

2.5 Ethical Considerations

This section summarizes the more important ethical considerations in pandemic planning but is not intended to be an actual ethical framework. Ethical considerations are also addressed more specifically in various CPIP annexes with supporting tools and frameworks where available.

In Canada, ethical considerations are increasingly taken into account in the development of health policy. Ethical analysis helps to identify the ethical issues and determine how to do the right thing in a fair, just and transparent way. Many of the issues encountered in pandemic preparedness and response involve balancing rights, interests and values. Examples include decisions over resource allocation; prioritization guidelines for pandemic vaccine and antiviral medications; adoption of public health measures that may restrict personal freedom; roles and obligations of HCWs and persons providing medical first response, as well as their employers; the potential need for triage in the provision of critical care; and responsibilities to the global community.¹⁹

The application of ethical reasoning to pandemic preparedness and response begins with identifying and prioritizing the ethical questions in the issue under consideration. Analysis should include reflection on the ethical considerations associated with the options, taking into account the societal versus individual interests and values that are at stake. Ethical tensions are inevitable. When weighing the options, it is important to be guided by the Canadian pandemic goals.

As pandemic planning initiatives fall within the domain of public health, they are guided by a code of ethics that is distinct from traditional clinical ethics.²⁰ Whereas clinical ethics focuses on the health and interests of individuals, public health ethics focuses on the health and interests of a population. When a health risk like a pandemic affects a population, public health ethics predominates, and a higher value is placed on collective interests.

17 International Centre for Infectious Diseases. *Op cit*.

18 International Centre for Infectious Diseases. Issues in pandemic influenza responses for marginalized urban populations; key findings and recommendations from consultation meetings and key informant interviews. March 2010. Available from: http://www.icid.com/files/Marg_Pop_Influenza/Issues_in_Pandemic_Influenza_Responses_for_Marginalized_Ubran_Populations_English_FINAL.pdf

19 World Health Organization. Ethical considerations in developing a public health response to pandemic influenza. WHO/CDS/EPR/GIP/2007.2. 2007. Available from: http://www.who.int/csr/resources/publications/WHO_CDS_EPR_GIP_2007_2c.pdf

20 Kenny NP, Sherwin SB, Baylis FE. Re-visioning public health ethics: a relational perspective. *Can J Public Health*. 2010;101:9-11.

In practical terms, this means there should be an emphasis placed on *trust* and *solidarity*. Successful public health activities require relationship-building and can contribute to creating and maintaining trust between individuals, populations and health authorities. Solidarity is the notion that we are all part of a greater whole, whether an organization, a community, nation or the globe. Another important consideration is *reciprocity*, meaning that those who face disproportionate burdens in their duty to protect the public (e.g., HCWs and other workers who are functioning in a health care capacity, for example police or fire personnel who are providing medical first response) are supported by society, and that to the extent possible those burdens are minimized.

The concept of *stewardship* is also closely related to trust. Stewardship refers to the responsible planning and management of something entrusted to one's care, along with making decisions responsibly and acting with integrity and accountability. Trust, stewardship and the proper building of relationships also mean that the power conferred to government and health authorities will not be abused. For example, if restrictions are deemed essential for proper risk management, they must be effective and proportional to the threat, meaning that they should be imposed *only* to the extent necessary to prevent foreseeable harm. These restrictions should also be counterbalanced with supports to minimize the burden on those individuals affected.

The concepts of *equity* and *fairness* are very important to Canadians. In a pandemic context, they lead to a number of considerations. As much as possible, benefits and risks should be fairly distributed through the population. This may be difficult, however, in some circumstances, such as a pandemic that differentially affects certain populations or a very severe pandemic if resources are in short supply. Decisions should take health inequities into account and try to minimize them, rather than make them worse. Access to necessary health care may be restricted in a health crisis; however, available resources (e.g., vaccine and antiviral medications) should be distributed in a fair and equitable way. What will constitute fair and equitable distribution will be context dependent. Therefore the transparency and reasonableness of decision-making processes are important.

Good decision-making processes are also essential for ethical decision-making. They involve the following:^{21,22}

- openness and transparency – the process is open for scrutiny, and information about the basis for decisions and when and by whom they were made is publicly accessible;
- accountability – being answerable for decisions;
- inclusiveness – stakeholders are consulted, views are taken into account, and any disproportionate impact on particular groups is considered; and
- reasonableness – decisions should not be arbitrary but rather be rational, proportional to the threat, evidence-informed and practical.

21 University of Toronto Joint Centre for Bioethics Pandemic Influenza Working Group. Stand on Guard for Thee: Ethical considerations in preparedness planning for pandemic influenza. 2005. Available from: http://www.jointcentreforbioethics.ca/publications/documents/stand_on_guard.pdf

22 UK Cabinet Office and Department of Health. Responding to pandemic influenza. The ethical framework for policy and planning. 2007. Available from: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_080751

2.6 Legal Considerations

The legal considerations that arise in the context of pandemic preparedness and response are varied and complex. International laws as well as FPT legislation will be relied upon during both the preparedness and responses phases of a pandemic.

2.6.1 INTERNATIONAL REQUIREMENTS

International Health Regulations (2005)

The current International Health Regulations (2005) [IHR (2005)] came into force in 2007. They provide a framework for monitoring and enhancing global public health capacity and international communication regarding potential public health emergencies of international concern (PHEIC). The aim of the IHR (2005) is to prevent the international spread of disease while limiting interference with international traffic and trade. The IHR (2005) also establish a more effective and transparent process for WHO and its Member States (including Canada) who are States Parties to the Regulations, to follow when determining and responding to a PHEIC. Most importantly, they broaden the scope of international collaboration to include any existing, re-emerging or new disease that could represent an international threat. The IHR (2005) are available at: <http://www.who.int/ihr/en/>.

The IHR (2005) include obligations for States Parties to:

- develop core capacity for surveillance and response;
- establish a national focal point (NFP) as the contact point for WHO on all IHR matters; and
- notify WHO of all potential PHEIC within specified time frames.

In order for Canada to meet the IHR (2005) requirements, all levels of government must collaborate. In Canada, PTs use established protocols to report influenza infections of international concern to the Public Health Agency of Canada (PHAC), which is Canada's NFP. After an initial assessment if notification is required, PHAC communicates with the WHO. Reportable influenza-related events include cases of human influenza caused by a new subtype as well as cases having potential international public health implications that meet the notification criteria established under Annex 2 of the IHR (2005). WHO then re-assesses the event to determine whether the event constitutes an actual PHEIC. The first PHEIC declared by the WHO under the IHR (2005) was the influenza A (H1N1) pandemic in 2009.

Pandemic Influenza Preparedness Framework

The Pandemic Influenza Preparedness Framework (PIP Framework) for the sharing of influenza viruses and access to vaccines and other benefits was adopted by the World Health Assembly in 2011. The PIP Framework aims to improve the sharing of influenza viruses with pandemic potential and to achieve more predictable, efficient and equitable access for countries in need of life-saving vaccines and medicines during future pandemics. The PIP Framework is available at: <http://www.who.int/influenza/pip/en/>.

Under the Framework, Member States, including Canada, are responsible for:

- ensuring the timely sharing of influenza viruses with human pandemic potential with the Global Influenza Surveillance and Response System (GISRS);
- contributing to the pandemic influenza benefit-sharing system; and
- continuing to support the GISRS.

2.6.2 FEDERAL LEGISLATION

The *Emergency Management Act* (2007), section 6(1), makes each minister accountable to Parliament for a government institution responsible to identify the risks that are within or related to his or her area of responsibility and prepare emergency management and response plans with respect to those risks; to maintain, test and implement those plans; and to conduct exercises and training in relation to them.

In accordance with responsibilities under the Act, the federal Minister of Health is primarily responsible for developing, testing and maintaining mandate-specific emergency plans for the federal Health Portfolio, which includes Health Canada (HC) and PHAC. These emergency plans outline the federal response to national public health threats or events such as major disease outbreaks (including an influenza pandemic), and to the health effects of natural disasters or major chemical, biological, radiological, nuclear and explosive (CBRNE) events.

Furthermore, the *Quarantine Act* (2005) strives to prevent the introduction and spread of communicable diseases into and out of Canada by providing the Minister of Health with the authority, including enforcement mechanisms, to take public health measures as required. Pandemic Influenza Type A is listed in the Act's Schedule of Diseases.

2.6.3 PROVINCIAL/TERRITORIAL LEGISLATION

Health emergency management in the PTs in Canada is governed by legislation specific to each jurisdiction. This legislation requires the PT governments to have comprehensive emergency plans respecting preparation for, response to and recovery from emergencies and disasters, including those with potential impact on critical infrastructure. Important health emergency management powers are also found in public health legislation.

The 2009 pandemic provided an opportunity to identify problems or gaps in existing legislation (including public health legislation) that should be addressed in order to respond more effectively to a future pandemic. An effective response requires an authority to establish appropriate leadership for a coordinated response, along with authority for PT and local public health officials to implement appropriate control measures. Planners should ensure that they will have authority to mount an effective response whether or not an emergency is officially declared.



3.0 CANADA'S APPROACH TO PANDEMIC INFLUENZA

3.1 Goals and Objectives

Goals serve an important purpose in guiding preparedness and response, and in prioritizing the use of resources if necessary. Canada's goals for pandemic preparedness and response are:

First, to minimize serious illness and overall deaths, and second to minimize societal disruption among Canadians as a result of an influenza pandemic.

These national goals were originally presented in the Canadian Pandemic Influenza Plan for the Health Sector, which was endorsed by FPT Ministers of Health in 2004. The goals, and their sequence, had undergone extensive deliberation by FPT pandemic planners and other stakeholders. A survey carried out as part of the Canadian Program of Research on Ethics in a Pandemic (CanPREP) found that over 90% of participants agreed that the most important goal of pandemic influenza preparations was saving lives.²³ During the 2009 pandemic, the pandemic goals were invaluable in guiding aspects of the response.

The supporting objectives for the health sector are as follows:

A. MINIMIZE SERIOUS ILLNESS AND OVERALL DEATHS BY

- reducing the spread of infection through promotion of individual and community actions;
- protecting the population through provision of pandemic vaccine and implementation of other public health measures; and
- providing treatment and support for large numbers of persons while maintaining other essential health care.

B. MINIMIZE SOCIETAL DISRUPTION BY

- supporting the continuity of health care and other essential services;
- supporting the continuation of day-to-day activities as much as possible and promoting a return to normal community functioning as soon as possible;
- maintaining trust and confidence through
 - support of evidence-informed decision-making by collection, analysis and sharing of surveillance and other scientific information; and

23 Ritvo P, Wilson K, Gibson JL, et al. Canadian survey on pandemic flu preparations. BMC Public Health 2010;10:125.

- communication of appropriate and timely advice to decision-makers, health professionals and the public; and
- supporting a coordinated response by working collaboratively with all levels of government and stakeholders.

3.2 Guiding Principles and Approaches

The following principles underpin Canadian pandemic preparedness and response activities and decision-making:

- *Collaboration* – all levels of government and health care stakeholders need to work in partnership to produce an effective and coordinated response. This implies adopting consistent and collaborative approaches to planning, response and recovery, and having an effective FPT decision-making process. It also implies involvement of stakeholders in these steps.
- *Evidence-informed decision-making* – decisions should be based on the best available evidence to the extent possible. It is recognized that other factors also enter into decision-making, such as legal and institutional constraints, values, costs and availability of resources.²⁴
- *Proportionality* – the response to a pandemic should be appropriate to the level of the threat.
- *Flexibility* – actions taken should be tailored to the situation and subject to change as new information becomes available. The pan-Canadian approach should be consistent, although patterns of spread may mean that regional and local jurisdictions will require flexibility in terms of the scale and timing of their response.

In addition to these main guiding principles, Canadian pandemic planning and response activities are also guided by:

- *A precautionary/protective approach* – this approach is particularly applicable in the early stages of a pandemic when evidence-informed decision-making is not possible due to lack of data and the uncertainty of an evolving event. This means taking timely and reasonable preventive action, proportional to the threat and evidence-informed to the extent possible. This does not mean that in the absence of evidence, all actions must be taken; rather, it means that as emerging evidence reduces uncertainty, evidence-informed actions may supersede those precautionary measures taken at the outset.
- *Use of established practices and systems to the extent possible* – it is extremely difficult to implement new ways to do things during an emergency. Effective seasonal influenza responses support a strong pandemic response, as well-practised strategies and processes can be rapidly ramped up to manage the pandemic.
- *Ethical decision-making* – ethical principles and societal values should be explicit and embedded in all decision-making, including the processes used to reach decisions. It is especially important to ensure that all actions respect ethical guidelines tailored to the concerns of public health, while respecting the rights of individuals as much as possible.

²⁴ Oxman AD, Lavis JN, Lewin S et al. SUPPORT Tools for evidence-informed health Policymaking (STP) 1: What is evidence-informed policymaking? *Health Res Policy Syst* 2009;7(Suppl 1):S1

3.3 Coordination of National Preparedness and Response

The global nature of a pandemic requires a response that differs from many other types of emergency. Traditionally, the responsibility to deal with an emergency is placed first on the individual/household to manage the effects of the emergency as it affects them, and then on successive levels of government as the resources and expertise of each are needed. Public Safety Canada is responsible for coordinating the whole of government response when the federal government is involved in the response to an emergency. Within the PTs a similar function is performed by the appropriate ministry or emergency measures organization.

In a pandemic situation, a pan-Canadian whole-of-government response is required so that all potential resources can be applied to minimizing the pandemic's negative health, social and economic impacts. Pandemic plans should be aligned across jurisdictions to facilitate successful FPT collaboration during a pandemic.

The following sections provide a high-level overview of FPT health emergency planning and response relevant to pandemics.

3.3.1 EMERGENCY MANAGEMENT FRAMEWORKS AND PLANS

The GC has in place a coordinated system of federal emergency management frameworks, systems and emergency response plans, many of which can be accessed at Public Safety Canada's website, available at: <http://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/index-eng.aspx>. These plans are based on the four components of the emergency management continuum (prevention and mitigation, preparedness, response and recovery) and they use an all-hazards approach. Emergency response plans for the federal Health Portfolio are part of this GC system.

The FPT health sector also has a system of frameworks and emergency response plans parallel to those of the federal health sector, that are comprehensive and flexible enough to address any type of national health emergency. The development and maintenance of some of these documents, including CPIP, is overseen by the Public Health Infrastructure Steering Committee of the PHN.

The federal and FPT emergency management plans are supported by various operational annexes and guidance documents. These are nested under the generic all-hazards emergency response plans and deal with more specific threats.

3.3.2 PAN-CANADIAN COORDINATION OF THE PANDEMIC HEALTH SECTOR RESPONSE

Because a pandemic is a significant health event, the FPT ministries of health have the primary mandate for the health sector response in their respective jurisdiction and act as advisor for other sectors on health issues.

At the federal level, the Centre for Emergency Preparedness and Response (CEPR) at PHAC is the Health Portfolio's focal point for coordinating and providing a wide range of emergency management services with other federal departments, PT governments, NGOs and the private sector. CEPR is responsible for the Health Portfolio Operations Centre (HPOC) in Ottawa and its linkages to other operational centres at the FPT level.

Coordination of the FPT *health sector response* to a pandemic is expected to be based on an FPT all-hazards health emergency response approach, designed to be complementary in nature and used in conjunction with existing jurisdictional planning and response systems. At the strategic level, it is anticipated that the FPT interface will take place through an FPT Executive Body. This high-level connection is designed to ensure that all key communication, resource, and politically sensitive decisions are made within an FPT forum.

3.3.3 NORTH AMERICAN PLAN FOR ANIMAL AND PANDEMIC INFLUENZA

The *North American Plan for Animal and Pandemic Influenza* (NAPAPI) outlines how Canada, Mexico and the US intend to work together to combat an outbreak of animal influenza or an influenza pandemic in North America. The NAPAPI addresses both animal and public health issues, including early notification and surveillance, joint outbreak investigation, epidemiology, laboratory practices, medical countermeasures (e.g., vaccine and antiviral medications), personnel sharing and public health measures. It also addresses border and transportation issues. While the NAPAPI is not legally binding, it reflects strong commitments by the countries involved to work collaboratively.

3.4 Pandemic Roles and Responsibilities

Collaboration in pandemic planning and response is strengthened by having clearly defined and well-understood roles and responsibilities. While this section focuses on government responsibilities, it is acknowledged that other partners also have important roles and responsibilities in a pandemic. These partners include the non-health sector, private sector, NGOs, municipalities and local/regional health authorities, and international organizations. Similarly, members of the general public bear responsibility for keeping themselves informed and for cooperating with measures to reduce the spread of illness.

3.4.1 WORLD HEALTH ORGANIZATION

WHO's pandemic roles and responsibilities are outlined in the WHO pandemic influenza risk management guidance document and include:²⁵

- coordination of the international response under the IHR (2005), including conducting global risk assessments;
- communication of the global situation using the global pandemic phases;
- declaration of a PHEIC and pandemic as determined;
- provision of information and support to affected States Parties;

²⁵ World Health Organization. Pandemic influenza risk management – WHO interim guidance. 2013. Available from: http://www.who.int/influenza/preparedness/pandemic/influenza_risk_management/en/index.html

- selection of the pandemic vaccine strain and determination of when to move from seasonal to pandemic vaccine production; and
- provision of oversight and support for implementation of the PIP Framework.

3.4.2 CANADA – FPT GOVERNMENTS

Responsibility for health services in Canada is shared across all levels of government. High-level roles and responsibilities for FPT governments are outlined below; more detailed information about roles and responsibilities for specific response components can be found in the CPIP annexes. It is recognized that responsibilities for federal populations, which are summarized at the end of this section, are complex and evolving.

A. INTERNATIONAL ASPECTS

International aspects of influenza management and liaison are a *federal* responsibility.

The *federal government* is responsible for:

- acting as the national focal point for the WHO on all IHR (2005) matters and managing all international aspects of pandemic preparedness and response;
- providing travel health notices and other health related information relevant to international travel; and
- exercising powers under the *Quarantine Act* to protect public health by taking comprehensive measures to help prevent the introduction and spread of communicable diseases in Canada. Such measures may include, but are not limited to, the screening, examining and detaining of arriving and departing international travellers, conveyances (e.g., airplanes and cruise ships) and their goods and cargo.

B. COLLABORATION, COMMUNICATION, INFORMATION SHARING AND POLICY RECOMMENDATIONS

While PT governments are responsible for communications plans and messaging within their jurisdictions, a coordinated pan-Canadian pandemic response requires collective infrastructures, response capacities and coordinated activities.

The *federal government* is responsible for:

- ensuring that risk assessments for novel and pandemic viruses are prepared and communicated as required; and
- facilitating the coordination of the overall pan-Canadian response to a pandemic.

FPT governments will work collaboratively to:

- coordinate and support the process required for development and periodic updating of CPIP and its annexes, for which PHAC acts as the custodian;
- assess capacity gaps for a pan-Canadian response and address gaps as necessary;
- align federal pandemic plans for federal populations, (see Section F for federal populations), with PT plans, where relevant;
- assess surveillance capacity, standards and protocols and modify as necessary;
- assess laboratory capacity, standards and protocols and modify as necessary;
- establish and support pan-Canadian policies and recommendations on the use of antiviral medications and vaccine during a pandemic;

- develop and implement public health guidance;
- ensure development and dissemination of clinical care guidance;
- develop a pan-Canadian communication strategy that reflects Canadian linguistic, literacy and cultural characteristics and allows for the alignment of messaging by FPT jurisdictions where appropriate;
- establish protocols for the sharing of relevant information, including but not limited to FPT plans and drafts; surveillance information; jurisdictional communications, strategies and messaging; and pandemic response interventions and impacts; and
- identify and address rapid research response priorities and leverage their respective research undertakings.

C. ANTIVIRAL MEDICATIONS AND INFLUENZA VACCINE

The *federal government* is responsible for:

- providing regulatory authorization to market antiviral medications and influenza vaccines;
- acting as the focal point for vaccine manufacturers and international regulatory collaboration;
- providing regulatory authorization to conduct clinical trials;
- negotiating with manufacturers and establishing contracts for the FPT purchase of antiviral medications and vaccine for pandemic purposes;
- national monitoring of adverse reactions to antiviral medications and vaccines; and
- providing antiviral medications and vaccine to those federal populations not covered by arrangements for PT provision.

PT governments are responsible for maintenance, monitoring, distribution and administration of antiviral medications and vaccine in their respective jurisdictions. They will work collaboratively to:

- provide antiviral medications and, when available, vaccine to recommended populations;
- share information regarding the distribution and use of antiviral medications and vaccines in their respective jurisdictions; and
- monitor and report adverse vaccine reactions.

The *PT governments* are also responsible for the distribution of vaccines and antiviral medications to most federal populations, but this varies by federal population and jurisdiction (see section F on federal populations).

FPT governments will work collaboratively to develop strategies to mitigate the effects of insufficient or delayed antiviral drug and/or vaccine supply, should such a situation arise.

D. HEALTH SECTOR PREPAREDNESS AND RESPONSE

Health sector preparedness and response remains the responsibility of each jurisdiction. In some jurisdictions responsibility for emergency social services also falls to the health sector.

PT governments are responsible for:

- ensuring that PT pandemic plans (or all-hazards plans depending on the jurisdiction) are developed, tested and periodically updated;
- considering the content and intent of CIP in the development of their PT jurisdictional plans;

- communicating and engaging with the general public, media and stakeholder groups about their respective plans; and
- activating PT pandemic or all-hazards plans.

The *federal government* has similar responsibilities for federal departments within the health sector and for federal populations in collaboration with the PTs (see section F on federal populations).

E. HEALTH CARE PROVISION

The provision of health care is an essential component of pandemic response and is primarily a PT responsibility.

PT governments are responsible for:

- developing plans to increase surge capacity in order to care for affected persons in their jurisdiction;
- providing health care services for persons within their jurisdiction, including for federal populations while leveraging agreements that are in place. Federal populations and federal responsibility are covered in the next section;
- developing and maintaining memoranda of understanding and protocols as needed, preferably before the pandemic, to facilitate interprovincial/territorial movement of patients and licensed health care professionals during a pandemic and other aspects of mutual aid;
- developing, as necessary, a strategy for collecting and monitoring data on health care service use;
- ensuring the provision of medications, supplies and equipment required for provision of pandemic health care services; and
- working collaboratively to establish protocols and guidelines for prioritizing health care services during times of high service demand and staff or supply shortages in the respective jurisdiction.

The *federal government* is responsible for:

- ensuring the provision of health services, medications, supplies and equipment for specified federal populations/employees who normally access federally operated health care services;
- facilitating access to surge capacity, including from federal programs, employees and resources, to support PT responses if required;
- mobilizing medical supplies in the National Emergency Strategic Stockpile (NESS) as surge capacity to support PT responses; and
- facilitating the acquisition of extra medical supplies through Public Works and Government Services Canada and other federal agencies as appropriate.

F. FEDERAL POPULATIONS

Federal populations are those populations for which the federal government either provides health care and benefits, goods and/or services or reimburses the cost of providing health care and benefits. With the exception of the Canadian Forces which has its own distinct health care system for active members, the needs of federal populations must be integrated into PT pandemic planning activities in order to establish a comprehensive and coordinated pandemic response.

Federal populations include the following:

- First Nations on-reserve, inclusive of First Nations who have assumed responsibility for health services under a transfer agreement;
- patients at hospitals operated by Veterans Affairs Canada for services that are not already insured by the province;²⁶
- active members of Canadian Forces;
- federal offenders or inmates of federal penitentiaries;
- refugee claimants, protected persons, detainees under the *Immigration and Refugee Protection Act*, rejected refugee claimants, and other specified populations; and
- Canada-based staff at missions abroad.

The *federal government* is responsible for:

- supporting the provision and distribution of medications, supplies and equipment to federal populations, as noted in the list above, through existing FPT distribution and administration systems.

The *federal government* will work collaboratively with PT governments to:

- ensure that access to pandemic health services for all federal populations is available on the same basis as is provided to other residents of Canada, while leveraging agreements that are in place. This involves but is not limited to access to antiviral medications, influenza vaccines and supplies needed for provision of pandemic health care services; and
- facilitate the coordination of federal planning for federal populations with PT pandemic plans.

3.5 Risk Management Approach

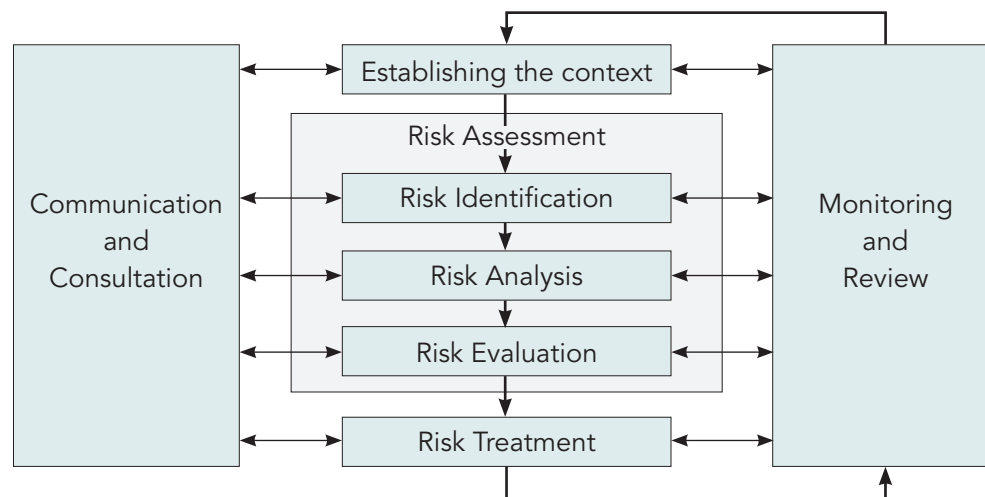
3.5.1 OVERVIEW

Risk management is a systematic approach to setting the best course of action in an uncertain environment by identifying, assessing, acting on and communicating risks. A risk management approach provides a useful framework for addressing the uncertainties inherent in pandemic planning and response. Risk management supports the CPIP planning principles of evidence-informed decision-making, proportionality, and flexibility; and a precautionary/protective approach when there is uncertainty early in an event.

²⁶ The only hospital currently operated by VAC is St. Anne's in Montreal, which is in the process of being transferred to the Province of Quebec.

Figure 1 provides a graphic overview of the risk management process as outlined in ISO 31000, the international standard for risk management. The individual steps involved in risk management are then briefly described.

FIGURE 1 - ISO 31000 RISK MANAGEMENT PROCESS²⁷



Risk assessment is a central component of risk management. Its purpose is to provide evidence-informed information and analyses for making informed decisions on how to treat particular risks and select between options. There are three parts to risk assessment:

- *Risk identification* involves identifying what might happen, or what situations might exist that could affect achievement of the objectives of the organization or system.
- *Risk analysis* involves analysing the risks in terms of their probability and potential impact (who is affected and to what extent). This analysis helps identify the planning considerations and options for each component of the response. The analysis should also assess the public's perception of risk and how it could influence the risk management response, so that communications strategies and messaging can be tailored appropriately.
- *Risk evaluation* involves determining the significance of the level and type of risk in order to make decisions about future actions. Ethical, legal, financial and other considerations are also inputs to the decisions. Decisions may include the need and priorities for treatment, whether an activity should be undertaken or which of a number of paths should be followed.

Risk treatment follows risk assessment and involves identifying and recommending risk treatment options, i.e. options for management or control. Risk treatment options should include steps that need to be taken in advance, as well as potential actions at the time of the pandemic.

Communication and consultation are also integral parts of the risk management process. Effective communication with stakeholders should facilitate adequate understanding of the risk management decision-making process, ensure that the process is transparent and help people to make informed decisions. A risk communications plan should be developed at an early stage.

²⁷ Canadian Standards Association. CAN/CSA-ISO 31000-10. Risk management – Principles and guidelines (Adopted ISO 31000:2009, first edition 2009-11-15). 2010.

Monitoring and review are important for assessing factors that could change over time and for documenting effectiveness of interventions. Such reviews should lead to periodic updates of the risk assessment.

3.5.2 RISK MANAGEMENT CONSIDERATIONS IN PANDEMIC PLANNING AND RESPONSE

Given the large number of variables that are involved in influenza pandemic planning, comprehensive risk management is challenging. The four pandemic planning scenarios described in section 3.7 can assist with risk identification by providing a starting point to think through the risks that would be associated with pandemics of varying impact and their implications.

It is also worthwhile to anticipate key decisions that will need to be taken during the pandemic to help guide the development and analysis of options. It is also worthwhile to clarify ahead of time and to the extent possible what level(s) of government should be involved with which types of decision when the time comes. Examples of these key decisions are as follows:

- determining the scale of the response;
- whether (and when) to escalate or de-escalate the response;
- when, what and how to communicate with the public;
- the amount of vaccine and the formulation(s) to order;
- how vaccine use should be prioritized;
- what public health interventions should be used, when and within which populations, and whether they need to be adjusted over time;
- what influenza testing and treatment strategies to recommend and whether they need to be adjusted over time; and
- what supplementary assessment and treatment services might be needed and, if necessary, when they should be started and stopped.

Anticipating key decisions should be accompanied by identification of the types and sources of information required for decision-making. Establishing robust surveillance for seasonal influenza establishes baselines, develops capacity and forms a platform for escalation during the pandemic.

Anticipating key decisions should also lead to development of relevant options for risk treatment. From a pandemic preparedness perspective, examples of risk treatment include continuity of operations planning; establishment of stockpiles for antiviral medications and other key supplies; development of advance contracts for pandemic vaccine; strengthening influenza surveillance systems, diagnostic and analytical capacity; establishment of protocols for pandemic research; and establishment of communications networks to plan effective and coordinated risk communications strategies.

When a pandemic occurs, planning scenarios are replaced by a real event and response activities will be guided by the available evidence. During the initial stages, little may be known about the likely pandemic impact or the populations most at risk. Many decisions will have to be made before solid information is available and then adjusted, if necessary, as more becomes known, keeping in mind that it is often difficult to scale back a response. As the evidence emerges over time, understanding of the situation will continue to change as new information becomes available and will always be incomplete. A risk management approach will be used throughout the response by all responders. Risk assessments will provide key input into FPT decision-making by identifying what is known at that point in time, what might occur and when, and the major areas of uncertainty.

PHAC will facilitate development of timely and credible risk assessments to support FPT decision-making. These formal risk assessments will be conducted at the start of the pandemic to inform the initial response and then periodically as new information emerges (e.g., at the end of a pandemic wave). Risk assessments will address key information needs, including viral characteristics, the anticipated or experienced impact on the health care system and community, age and risk groups most affected, occurrence of antiviral resistance and estimated effectiveness of control measures. As the pandemic progresses, there will be questions about likely occurrence of more pandemic waves, whether new risk factors are emerging and whether the response should be escalated or de-escalated. Appendix B identifies relevant considerations for initial and ongoing pandemic risk assessments and identifies potential sources for the supporting information.

3.6 Planning Assumptions

This section on planning assumptions and section 3.7 on pandemic planning scenarios describe two important tools for pandemic planning. These tools provide distinct but complementary approaches.

Identifying planning assumptions is a way to deal with uncertainty. Assumptions provide a useful framework for planning but *should not be regarded as predictions*. While planning assumptions are rooted in evidence to the extent possible,^{28,29} they are basically educated guesses. As the pandemic unfolds, emerging evidence is used to guide the response. Informing the planning assumptions identified below is the WHO's Pandemic influenza risk management interim guidance (2013), the UK's Scientific summary of pandemic influenza & its mitigation (2011) and discussions from the Canadian Pandemic Influenza Preparedness Planning Assumptions Workshop held in 2011.

3.6.1 ORIGIN AND TIMING

- The next pandemic could emerge anywhere in the world and at any time of year.
- There may be no lead time before the novel virus reaches Canada.
- The first peak of illness in a geographic area within Canada could occur within weeks of first detection of the novel virus in that area. The first peak in mortality is expected to be several weeks after the peak in illness.

3.6.2 TRANSMISSION

- The pandemic virus will behave like seasonal influenza viruses in significant ways:
 - incubation period – is expected to last from one to three days;
 - period of communicability – adults are infectious from 24 hours before and up to five days from the onset of symptoms, and children may be infectious for up to seven days. Longer periods have been found, especially in persons with immune compromising conditions;
 - methods of transmission – mainly by large droplet and contact (direct and indirect) routes; the role of airborne transmission is unclear.
- Transmission is expected to be relatively lower in spring and summer than in fall and winter (the general pattern of transmission in temperate countries).
- Transmission is possible from asymptomatic persons but is greater when symptoms, such as coughing, are present and viral shedding is high (i.e., early in the symptomatic period).

28 World Health Organization. Pandemic influenza risk management – WHO interim guidance. 2013. Available from: http://www.who.int/influenza/preparedness/pandemic/influenza_risk_management/en/index.html

29 Department of Health. Scientific summary of pandemic influenza & its mitigation. 2011. Available from: http://www.dh.gov.uk/en/Publicationsandstatistics/DH_125318

3.6.3 PANDEMIC EPIDEMIOLOGY

- Most communities will experience two or more pandemic waves of different magnitudes. In any locality, the length of each wave will be from several weeks to a few months but may vary by community.
- There will be geographic variability with regard to the timing and intensity of waves, although multiple jurisdictions will be affected simultaneously.
- The pandemic is expected to last 12 to 18 months.
- The novel virus is expected to displace other circulating seasonal strains during the pandemic. After the pandemic, the pandemic virus will continue to circulate as a seasonal strain. It may completely replace previously circulating seasonal influenza A subtypes or continue as one of several circulating seasonal A subtypes.
- Relatively more severe disease and mortality is expected to occur in the young and in persons without underlying health conditions compared to seasonal influenza.

3.6.4 CLINICAL FEATURES

- Population clinical attack rates (averaged across all age groups) are expected to be 25% to 45% over the course of the pandemic.
- Clinical symptoms are expected to develop in about two-thirds of people who are infected with the pandemic influenza virus.
- The general, uncomplicated clinical picture is expected to be the same as for seasonal influenza: respiratory symptoms, fever and abrupt onset of muscle ache, fatigue and headache or backache.
- Persons at high risk for complications from seasonal influenza³⁰ are expected to also be at increased risk of severe disease and complications from pandemic influenza infection, although additional risk groups may emerge.

3.6.5 IMPACT AND INTERVENTIONS

- Impact will vary across communities, and vulnerable populations are expected to be affected more severely.
- Workplace absenteeism may be higher than the estimated clinical attack rate because of caregiving or concern about personal safety in the workplace in addition to worker illness.
- Vaccine is expected to be available in time to have an impact on the overall pandemic but will not be available for the first wave.
- Personal hygiene measures are expected to help to reduce transmission to and from individuals and within households and other settings.

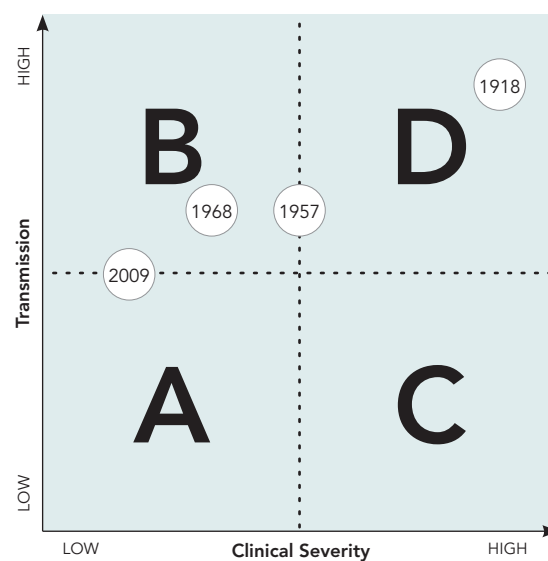
30 National Advisory Committee on Immunization. Statement on seasonal influenza vaccine for 2013-2014. *Can Commun Dis Rep* 2013; 39 (ACS-4):1-37. Available from: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/13vol39/acs-dcc-4/index-eng.php>

3.7 Pandemic Planning Scenarios

This section discusses another important tool for pandemic planning. The use of multiple planning scenarios is specifically intended to support the planning principles of evidence-informed decision-making, proportionality, and flexibility; and a precautionary/protective approach.

Planning scenarios provide a starting point to think through the implications and risks that would be associated with pandemics of varying population impact. Scenarios can also be used for exercises and training in support of pandemic plans. To help with *risk identification*, four pandemic planning scenarios have been developed that describe potential pandemic impacts varying from low to high. Figure 2 displays the four scenarios in a two-by-two table and estimates where the past four pandemics might be placed, according to an analysis conducted by the US Centers for Disease Control and Prevention (CDC).³¹

FIGURE 2 – FRAMEWORK FOR THE PLANNING SCENARIOS, WITH PREVIOUS PANDEMICS PLACED AS PER CDC ANALYSIS³²



Scenario A (low impact) – this scenario involves an influenza virus with low transmissibility (ability to spread) and low virulence (clinical severity). Its impact is comparable to that of moderate to severe seasonal influenza outbreaks or the 2009 H1N1 pandemic. It might be expected to stress health care services.

Scenario B (moderate impact) – this scenario involves an influenza virus with high transmissibility and low virulence. Its impact is worse than seasonal influenza in terms of numbers ill, which would be expected to stress health care services through sheer volume. High absenteeism would put all sectors and services under pressure.

31 Reed C, Biggerstaff M, Finelli L et al. Novel framework for assessing epidemiological effects of influenza epidemics and pandemics. *Emerg Infect Dis.* 2013;19:85-91.

32 Ibid

Scenario C (moderate impact) – this scenario involves an influenza virus with low transmissibility and high virulence. Its impact is worse than seasonal influenza outbreaks in terms of severe clinical illness, which would be expected to stress critical care health services. The high virulence could cause significant public concern and may lead to people staying home from school and work.

Scenario D (high impact) – this scenario involves an influenza virus with high transmissibility and high virulence, and its anticipated impact is much worse than that of seasonal influenza outbreaks. It would cause severe stress on health care services, and high absenteeism would put all sectors and services under extreme pressure.

There are several important points to note about the scenarios:

- Whatever the pandemic impact, the epidemiological picture is expected to be significantly different from that of seasonal influenza, in that relatively more severe disease and mortality will occur in the young and in persons without underlying health conditions compared to seasonal influenza.³³
- The four basic scenarios do not incorporate all of the potential factors (or “what-ifs”) that can affect the impact of a pandemic and should be considered in risk assessment. Some of these factors are population-wide and could affect all scenarios (such as seasonality, pre-existing immunity or antiviral resistance), whereas others might be setting-specific (such as planning for a remote community). See Appendix A for more details about these additional factors and their potential impact. Additional risks may also be identified as planners consider all stages of the pandemic and components of the proposed response.

Table 1 provides some added description to the scenarios for planning purposes, along with potential impact considerations associated with each scenario.

TABLE 1 – DESCRIPTION AND POTENTIAL IMPACT OF THE FOUR PANDEMIC PLANNING SCENARIOS

NATURE OF IMPACT	PANDEMIC SCENARIO			
	A (LOW IMPACT)	B (MODERATE IMPACT)	C (MODERATE IMPACT)	D (HIGH IMPACT)
BASIC VIRUS CHARACTERISTICS	Low transmissibility/ low virulence	High transmissibility/ low virulence	Low transmissibility/ high virulence	High transmissibility/ high virulence
NATURE AND SCALE OF ILLNESS	<ul style="list-style-type: none"> • Similar numbers as in moderate or severe seasonal influenza outbreaks • Mild to moderate clinical features (in most cases) 	<ul style="list-style-type: none"> • Higher number of cases than large seasonal outbreak but similar clinical severity • Overall increased numbers needing medical care and with severe disease 	<ul style="list-style-type: none"> • Similar number of cases as with large seasonal outbreak but illness is more severe • Overall increased numbers needing medical care and with severe disease 	<ul style="list-style-type: none"> • Large numbers of people ill • High proportion with severe disease

³³ Simonsen L, Clarke MJ, Schonberger LB, et al. Pandemic versus epidemic mortality: a pattern of changing age distribution. *J Infect Dis* 1998;178:53-60.

NATURE OF IMPACT	PANDEMIC SCENARIO			
	A (LOW IMPACT)	B (MODERATE IMPACT)	C (MODERATE IMPACT)	D (HIGH IMPACT)
IMPACT ON HEALTH CARE SERVICES	<ul style="list-style-type: none"> • Ambulatory and acute-care services stressed but able to cope • ICUs at capacity • Public health and laboratory services stressed • Long-term care may or may not be affected (depending on pre-existing immunity) 	<ul style="list-style-type: none"> • Ambulatory and acute-care services very stressed • Health care services no longer able to continue all activities • ICUs under severe pressure • Long-term care may or may not be affected • Settings with limited surge capacity (e.g., nursing stations) may be even more stressed 	<ul style="list-style-type: none"> • Ambulatory and acute-care services very stressed • Health care services no longer able to continue all activities • ICUs under severe pressure • Long-term care may or may not be affected • Settings with limited surge capacity e.g., nursing stations) may be even more stressed 	<ul style="list-style-type: none"> • Health care services may be overwhelmed • Ambulatory services fully stretched • Hospitals able to provide only emergency services • Triaging necessary for critical care services • Collapse of services could lead to higher mortality than expected • Settings with limited surge capacity (e.g., nursing stations) may be highly stressed
BROADER SOCIETAL IMPACT	<ul style="list-style-type: none"> • Limited workplace disruption • Some school disruption • Elevated public concern 	<ul style="list-style-type: none"> • High absenteeism • Some services experience pressures • Schools likely disrupted • Some supply chain problems • Elevated public concern 	<ul style="list-style-type: none"> • Potential absenteeism and school disruption from fear of exposure • Considerable public concern over occurrence of very severe disease 	<ul style="list-style-type: none"> • High absenteeism • Services and businesses under extreme pressure • Potentially severe supply chain problems • Could disrupt provision of basic services • Extreme public concern
ECONOMIC IMPACT	Minimal if any	Productivity may be affected	Productivity may be affected	Very high

Initial period when impact is unknown – A formal scenario has not been proposed for the initial period when the pandemic has not yet been characterized in terms of its potential impact. However, some of the possible observations for this preliminary period are as follows:

- sporadic cases and limited outbreaks may be occurring;
- there will likely be elevated demand on telephone information lines, ambulatory care and laboratory services;
- public health services may be stressed;
- elevated media and public concern can be anticipated;
- international travel and trade could be disrupted; and
- there could be increased demand and shortages of publicly available supplies, e.g., infection control and basic emergency supplies, antivirals.

3.8 Pandemic Phases and Triggers for Action

3.8.1 WHO PANDEMIC PHASES

Pandemic phases were introduced into pandemic plans to assist planning and serve as triggers for action, thus supporting the principles of flexibility and proportionate response. Previous Canadian pandemic plans incorporated the WHO pandemic phases, with additional designations proposed to identify activity levels within Canada.

After the 2009 pandemic, the IHR Review Committee³⁴ recognized that the WHO pandemic phases had presented challenges in interpretation and were used in different ways – as a planning tool, as a method to describe the global situation and/or as an operational tool to trigger action. The Committee recommended simplifying the WHO phase structure and separating operational considerations at country level from the WHO global preparedness plan and its phases.

WHO's 2013 pandemic guidance³⁵ describes the four phases that WHO will use to communicate a high-level global view of the evolving picture. The phases reflect WHO's risk assessment of the global situation regarding each influenza virus with pandemic potential that is infecting humans. The four global phases are:

- Interpandemic phase – the period between influenza pandemics;
- Alert phase – when influenza caused by a new subtype has been identified in humans. This phase is characterized by extra vigilance and careful risk assessment;
- Pandemic phase – the period of global spread of human influenza caused by a new subtype. Movement between the interpandemic, alert and pandemic phases may occur quickly or gradually;
- Transition phase – reduction of the assessed risk resulting in de-escalation of global actions.

The global phases and their application in risk management are distinct from (1) the determination of a PHEIC under the IHR (2005) and (2) the declaration of a pandemic. These are based upon specific assessments and can be used for communication of the need for collective global action, or by regulatory bodies and/or for legal or contractual agreements, should they be based on a determination of a PHEIC or on a pandemic declaration.³⁶

34 World Health Organization. Implementation of the International Health Regulations (2005). Report of the Review Committee on the Functioning of the International Health Regulations (2005) in relation to Pandemic (H1N1) 2009. A64/10. 5 May 2011. Available from: http://apps.who.int/gb/ebwha/pdf_files/WHA64/A64_10-en.pdf

35 World Health Organization. Pandemic influenza risk management – WHO interim guidance. 2013. Available from: http://www.who.int/influenza/preparedness/pandemic/influenza_risk_management/en/index.html

36 Ibid.

As pandemic viruses emerge, countries face different risks at different times and should therefore rely on their own risk assessments, informed by the global phases, to guide their actions. The uncoupling of national actions from global phases is necessary since the global risk assessment, by definition, will not represent the situation in each country.

3.8.2 CANADA'S APPROACH TO PANDEMIC PHASES AND TRIGGERS FOR ACTION

Canada's response to the novel/pandemic virus will relate to its presence and activity levels in this country, which may not coincide with the global picture. Therefore, the WHO global phases will not be used to describe the situation in Canada or be used as triggers for action in Canadian jurisdictions. While the triggers for action described below may parallel some of the global WHO phases, it is not expected that they will line up exactly. For example, Canada might be well into the first pandemic wave before WHO announces the global pandemic phase (as happened in the 2009 pandemic) or conversely Canada might be still anticipating the first domestic outbreaks when the pandemic phase announcement is made.

In the 2009 pandemic, there was considerable variation in pandemic wave activity across Canada and even within PTs, in terms of both timing and intensity. This was particularly apparent in the first wave making blanket descriptions, triggers or responses inappropriate.

DESCRIBING PANDEMIC ACTIVITY

Descriptive terms such as the start, peak and end of a pandemic wave, will be used instead of phase terminology to describe pandemic activity in the country or in a jurisdiction within Canada. Pandemic wave activity can be further characterized for jurisdictions of any size using FluWatch definitions for no activity, sporadic activity, localized activity and widespread activity.³⁷

TRIGGERS FOR ACTION

Triggers for action provide guidance for initiation of FPT activities and for their modification and cessation. Pandemic response should be appropriate to the local situation, so it is important that triggers and related actions be applied at PT or regional/local level as appropriate to the situation. Potential triggers for action in Canadian jurisdictions during the initial alert stages and the pandemic itself are identified in Table 2. The typical actions listed are at a high level; more detailed triggers for individual response components can be found in the annexes. Note that the triggers are not necessarily linear; for example, not all jurisdictions may find their capacity exceeded and therefore some may not need to invoke that particular trigger.

³⁷ Public Health Agency of Canada. FluWatch. Definitions & calendar for the current season. Available from: <http://www.phac-aspc.gc.ca/fluwatch/index-eng.php>

TABLE 2 – PANDEMIC TRIGGERS AND TYPICAL ACCOMPANYING ACTIONS

TRIGGER	TYPICAL ACTIONS FOR CONSIDERATION	COMMENTS
NOVEL VIRUS CAUSING HUMAN CASES DETECTED SOMEWHERE IN THE WORLD (NO OR LIMITED TRANSMISSION)	<ul style="list-style-type: none"> • Preparations to enhance surveillance within Canada • Intelligence gathering from affected areas • Relevant public and health sector communications 	<ul style="list-style-type: none"> • Tailored communications to health sector and general public continue throughout the response
NOVEL VIRUS WITH SUSTAINED HUMAN TRANSMISSION DETECTED SOMEWHERE IN THE WORLD	<ul style="list-style-type: none"> • Enhanced surveillance by PTs within Canada • Intelligence gathering from affected areas; preliminary risk assessment • Development of specific laboratory diagnostics • Enhancement of illness prevention messages and other public health measures (e.g., hand hygiene, respiratory etiquette) as appropriate • Confirmation of pandemic vaccine arrangements with manufacturer 	<ul style="list-style-type: none"> • Pandemic may be imminent or have already started
NOVEL/PANDEMIC VIRUS (WITH SUSTAINED HUMAN TRANSMISSION) FIRST DETECTED IN CANADA	<ul style="list-style-type: none"> • Continuation of above activities • Activation of health emergency response protocols • Detailed investigations of early cases to determine epidemiological and clinical characteristics and inform risk assessment • Arrangements for antiviral access/strategic deployment of NAS • Provision of clinical guidelines and public health advice 	<ul style="list-style-type: none"> • Depending on circumstances, activation of health emergency protocols might already have occurred
NOVEL/PANDEMIC VIRUS DETECTED IN PT OR LOCAL JURISDICTION	<ul style="list-style-type: none"> • Treatment of cases • Ramping up health sector capacity to deal with increasing number of cases • Additional public health measures (e.g., school closures) as appropriate • Preparation for vaccine distribution, administration and monitoring • Ongoing surveillance to monitor influenza activity and epidemiological analysis to characterize pandemic • Relevant public and health sector communications 	<ul style="list-style-type: none"> • Escalation of activities as pandemic activity moves from sporadic cases into full pandemic wave, followed by de-escalation as it wanes

TRIGGER	TYPICAL ACTIONS FOR CONSIDERATION	COMMENTS
DEMANDS FOR SERVICE START TO EXCEED AVAILABLE CAPACITY	<ul style="list-style-type: none"> • Further escalation of surge capacity • Prioritization or triage of services as needed • Implementation of broader public health measures (e.g., banning of large gatherings) 	<ul style="list-style-type: none"> • May not reach this level in any or all jurisdictions
THE PANDEMIC WAVE WANES AND DEMAND FOR SERVICE FALLS TO MORE NORMAL LEVELS	<ul style="list-style-type: none"> • Preparation for a resurgence of influenza • Replenishing of supplies as needed in anticipation of another wave • Evaluation of response and revision of plans as required • Preparation for immunization program • Ongoing surveillance to detect resurgence 	
PANDEMIC VACCINE IS AVAILABLE FOR ADMINISTRATION	<ul style="list-style-type: none"> • Administration of vaccine as quickly as possible • Monitoring of vaccine uptake, safety and effectiveness 	
SECOND OR SUBSEQUENT PANDEMIC WAVE ARRIVES	<ul style="list-style-type: none"> • Treatment of cases • Continuation of immunization if already started • Ongoing surveillance to monitor influenza activity, antiviral resistance and strain changes 	
PANDEMIC IS OVER AND NORMAL ACTIVITIES RESUME	<ul style="list-style-type: none"> • Completion of pandemic studies and reports • Evaluation of response and revision of plans as required • Return to more normal operations • Preparation for post-pandemic seasonal influenza 	<ul style="list-style-type: none"> • Identification of lessons learned and their incorporation into pandemic planning are critical activities in the recovery from a pandemic



4.0 KEY COMPONENTS OF PANDEMIC INFLUENZA PREPAREDNESS AND RESPONSE

This chapter provides a high-level overview of the major components of influenza preparedness and response. Each section of the chapter describes the purpose and strategic approach of one of the response components and demonstrates how it supports the overall pandemic goals. Detailed operational guidance and tools for each component can be found in the respective CPIP annex.

All parts of the health sector, including public health, will be under stress during a pandemic. Advance planning, training and exercises will greatly assist in handling this increased demand on health services, staffing, resources and supplies and in providing the best possible clinical outcomes for persons ill with influenza. Continuity of operations and surge capacity planning are key components of health sector preparation, together with strong infection prevention and control and occupational health programs within each organization that provides health services.

Public health authorities play a leadership role in their jurisdiction in pandemic preparedness, response and recovery. They are responsible for communication to the public, the health sector and other stakeholders. The public health response to a pandemic also includes surveillance (both epidemiological and laboratory), the provision of pandemic vaccine and antiviral medications, and the application of public health measures such as promotion of personal and social distancing measures to reduce spread in households and the community.

In planning for the delivery of health services, it is important to encompass the entire continuum of care from medical first response to critical care, and to include community health partners. Planning for the provision of health care needs to be linked with public health and community-wide partners so that interdependencies can be identified and addressed.

The health care system includes workers of many disciplines, who will be at varying levels of risk during an influenza pandemic. HCWs are defined broadly as individuals who provide health care or support services in the health care setting, such as nurses, physicians, dentists, nurse practitioners, paramedics, medical laboratory workers, other health professionals, temporary workers from agencies, unregulated health care providers, students, volunteers and workers who provide support services (e.g., food, laundry, housekeeping). The concepts and advice that are provided for HCWs also apply to other workers who are functioning in a health care capacity, for example police or fire personnel who are providing medical first response.

4.1 Surveillance

The purpose of pandemic surveillance is to provide decision-makers with the timely information they need for an effective response. Pandemic surveillance uses data obtained through routine and enhanced surveillance activities (e.g., data from sources such as laboratories, PT partners, hospital networks and sentinel practitioners) together with information from special studies to obtain a comprehensive and timely epidemiological picture of the pandemic.

These pandemic surveillance programs will monitor parameters such as:

- the geographic spread of the novel/pandemic virus across Canada;
- the trend of disease occurrence as it rises and falls within each PT and across the country;
- the intensity and impact of the pandemic (e.g., clinical cases, hospitalizations and deaths; severe clinical syndromes and associated risk groups; and demands on the health system); and
- changes in the antigenicity and antiviral sensitivity of the virus.

STRATEGIC APPROACH

A risk management approach to an influenza pandemic requires access to timely information, analysed and presented in a way that is useful to decision-makers. Epidemiological and laboratory surveillance data are key components of the formal risk assessments that will be produced to inform the response. One of the most critical needs is an early assessment of the potential impact of the pandemic so as to prepare the health care system and to plan interventions that are proportional to the situation. Systems or studies to produce the early impact assessment and other required information need to be in place before the pandemic.

Pandemic surveillance should be built on existing surveillance systems for seasonal influenza, which involve an extensive network of surveillance partners and are practised every year.

During a pandemic, collection of additional surveillance elements may be required to identify risk factors for severe disease and populations at increased risk. Targeted surveillance activities may be required for remote and isolated communities, including many Aboriginal communities, to describe outbreaks appropriately in these regions. Other special studies (e.g., seroprevalence surveys) will be needed to inform decision-making.

Surveillance activities will need to be adapted in response to rapidly evolving situations; they may be streamlined, expanded or scaled down depending on information needs at particular times within the evolving pandemic. The scope of the pandemic and the urgency of information needs will require expedited and secure electronic data transfer and enhanced capacity for data analysis and interpretation.

More details about pandemic surveillance strategies and activities can be found in the Surveillance Annex.

4.2 Laboratory Services

Laboratory-based surveillance is an integral part of monitoring influenza activity. Because the signs and symptoms of influenza are similar to those caused by other respiratory pathogens, laboratory testing must be conducted to diagnose influenza definitively. Rapid identification of a novel influenza virus and timely tracking of virus activity throughout the duration of the pandemic are critical to the success of a pandemic response. In the early stages of a pandemic, laboratory services also contribute to appropriate clinical treatment.

The purpose of laboratory services during a pandemic is to:

- identify the first cases of a novel influenza strain occurring in Canada;
- support public health surveillance by monitoring the geographic spread of disease and the impact of interventions;
- facilitate clinical management by distinguishing patients infected with the pandemic influenza virus from those with other respiratory diseases;
- monitor circulating influenza viruses for antiviral resistance and strain characteristics; and
- assess influenza vaccine match and support vaccine effectiveness studies.

STRATEGIC APPROACH

The pandemic laboratory response is built on the principles of collaboration, flexibility and use of established practices and systems. As part of annual influenza surveillance, all public health laboratories and other laboratories that routinely test for influenza submit aggregate data weekly during the influenza season to the National Microbiology Laboratory (NML). These data are collated and disseminated by PHAC through the Respiratory Virus Detection Surveillance System and FluWatch. In addition, public health laboratories and other designated laboratories across the country submit isolates to the NML to monitor for antigenic changes within the circulating viruses. This information is shared with international partners through GISRS. Sustaining these relationships and strengthening capacity within the laboratory system during the interpandemic period will support a timely and effective pandemic response.

During a pandemic, influenza testing laboratories will support epidemiological efforts to track the spread and trends of the pandemic, monitor antiviral resistance and support clinical management. The Canadian Public Health Laboratory Network (CPHLN) will support public health and diagnostic laboratories by providing recommendations and best practices for specimen collection and testing for the novel influenza virus. The NML will share protocols, reagents and proficiency panels to ensure that test methods are capable of detecting the new virus. Molecular testing is the primary method used for the diagnosis of influenza.

Antiviral resistance will be monitored and outcomes will inform clinical management of patients. Antiviral resistance testing is conducted primarily at the NML, as well as some provincial laboratories.

The laboratory response will be adjusted as the pandemic progresses. Initially the NML will be heavily engaged in characterization of the novel virus and development of diagnostic reagents. All laboratories should anticipate high test volumes initially as the novel virus spreads across the country. During peak periods, laboratories will need to prioritize specimen collection to prevent overload. At this point, diagnosis of influenza in the community will be made primarily by clinical assessment; however, testing to support the management of certain patients (e.g., those requiring admission to hospital) will be expected to continue together with identification of outbreaks and surveillance. If ongoing monitoring shows increasing levels of antiviral resistance, more testing may be necessary to support clinical management of severely ill patients, especially those not responding to treatment.

Throughout the pandemic, public health, diagnostic and research laboratories, including those involved in the Canadian Immunization Research Network (CIRN), will also play an important role in supporting studies to better understand the novel pandemic virus and its impact.

More details about pandemic laboratory strategies and activities can be found in the Laboratory Annex.

4.3 Public Health Measures

Public health measures are non-pharmaceutical interventions that can be taken by individuals and communities to help prevent, control or mitigate pandemic influenza. Public health measures range from actions taken by individuals (e.g., hand hygiene, self-isolation) to actions taken in community settings and workplaces (e.g., increased cleaning of common surfaces) to those that require extensive community preparation (e.g., pro-active school closures). The purpose of public health measures is to

- reduce transmission of the novel/pandemic virus, thereby helping to reduce the overall size of the outbreak and the number of severely ill cases and deaths; and
- slow the rate of transmission in order to reduce the peak burden on the health care system and buy time in anticipation of vaccine.

STRATEGIC APPROACH

Public health measures are typically implemented at the community level. The responsibility and legislative authority for implementing public health measures belong to the relevant PT and local public health authorities, with the exception of international border and travel related issues for which the federal government is responsible. In addition, the Canadian Forces Health Services is responsible for implementing public health measures on all Canadian Forces establishments/bases/wings/stations across Canada and for Canadian Forces personnel deployed abroad.

There are important concepts to consider when planning and implementing public health measures. The measures should be used in combination to provide “multi-layered protection”, as the effectiveness of each measure on its own may be limited. Actions should be tailored to the anticipated pandemic impact and the local situation, supporting the principles of flexibility and proportionality. Some measures, like hand hygiene and respiratory etiquette, are applicable in all pandemics. Other measures (e.g., proactive school closures and travel restrictions) might be used only in moderate- to high-impact situations, as they can be associated with significant societal and economic costs.

A risk management approach will help weigh the potential advantages of particular interventions against their disadvantages and unintended consequences. Decisions about which measures to deploy also raise fundamental ethical challenges. For example, when considering restrictive measures, it is important to balance respect for autonomy against protection of overall population health. In such situations, the principles of proportionality, reciprocity and flexibility are involved, with a view to safeguarding individual freedom to the extent possible while promoting protection against the health and societal consequences of influenza infection.

There are several types of public health measures for jurisdictions to consider during an influenza pandemic:

- **Individual measures** – Public health advice will be provided to protect well individuals against influenza and prevent ill individuals from spreading infection, e.g., through hand hygiene, cough etiquette, staying home while sick. These measures should already be familiar through annual public health campaigns.
- **Community-based measures** – Guidance will be produced and disseminated to minimize illness and transmission of infection within settings such as workplaces, schools, post-secondary institutions, childcare centres, communal living facilities, remote and isolated communities, camps and cruise ships. Social distancing measures or strategies may be used to minimize close contact among persons in public places, e.g., pro-active school closures; cancellation or modification of public gatherings; and alternative workplace approaches, such as teleconferences and working from home. Because

of their potential societal impact, social distancing measures are most applicable in pandemics of moderate to high impact.

- **Border and travel measures** – These interventions include provision of travel health advice, screening of travellers and travel restrictions. Evidence for their effectiveness is limited and their implementation would depend on the risk assessment and resultant risk/benefit analysis of the actions being considered.
- **Case and contact measures** – Some circumstances involving novel/pandemic viruses may warrant case and contact management by public health authorities. These might include an individual human case or cluster involving a novel virus, suspected human infections associated with an animal influenza outbreak, or initial cases of the pandemic virus in the country or area. The extent of the investigation and recommended measures should be feasible and relevant to the situation.

While aggressive measures (e.g., widespread antiviral use and restriction of movement) to attempt to contain or slow an emerging pandemic in its earliest stages were previously considered possible on the basis of modeling, experience from the 2009 pandemic has resulted in general agreement that such attempts are impractical, if not impossible.

Additional details about public health measures can be found in the Public Health Measures Annex.

4.4 Vaccine

Immunization of susceptible individuals is the most effective way to prevent disease and death from influenza. The purpose of Canada's pandemic vaccine strategy is to

- provide a safe and effective vaccine for all Canadians as quickly as possible;
- allocate, distribute and administer vaccine as efficiently as possible; and
- monitor the safety and effectiveness of pandemic vaccine.

The phrase "vaccine for all Canadians" is intended to be interpreted broadly. It refers to all persons in Canada (whether or not they are citizens) as well as Canada-Based Staff (CBS), their dependents and Locally Engaged Staff (LES) at Canadian missions abroad and Canadian active duty personnel (Canadian Forces) abroad.

An effective pandemic vaccine strategy is built on strong seasonal influenza immunization programs. The overall impact of the pandemic vaccine strategy will depend on vaccine efficacy and uptake, as well as the timing of vaccine availability in relation to pandemic activity. Using current technologies, it takes four to six months to develop and produce pandemic vaccine, so it is not likely to be available by the time the first pandemic wave reaches Canada. Furthermore, it will become available in batches, which may require prioritization of initial vaccine doses.

STRATEGIC APPROACH

In 2011, Canada entered into a new ten-year contract for pandemic influenza vaccine supply to ensure that there is rapid and priority access to a supply of adjuvanted pandemic influenza vaccine produced in Canada. A second contract provides access to a back-up supply of a pandemic vaccine if needed.

Health Canada has developed a regulatory strategy to review and authorize a safe and efficacious pandemic vaccine for use in Canada within the shortest time frame possible. A pan-Canadian approach to pandemic immunization, including prioritization of populations during initial roll-out of the vaccine, will help optimize equitable access and desirable outcomes. Pan-Canadian guidance will include an

allocation plan for equitable vaccine distribution, recommendations for pandemic vaccine use and recommendations for prioritization of initial supplies.

Other key elements of the national vaccine strategy include the monitoring of vaccine uptake, adverse events and vaccine effectiveness, building on existing systems such as the Adverse Events Following Immunization (AEFI) surveillance system. Rapid studies will be carried out to confirm or refute vaccine safety concerns.

PTs, Canadian Forces Health Services, and federal departments with the responsibility for immunization should have plans for efficient and timely vaccine administration, including the ability to target key population groups and collect information on vaccine uptake and adverse events. Lessons learned from the 2009 pandemic indicate that vaccine registries and electronic information systems to capture and transmit data are essential tools to support the vaccine program.

More details about the pandemic vaccine program can be found in the Vaccine Annex, including a prioritization framework to guide decision-making if vaccine is expected to be in short supply.

4.5 Antiviral Medications

Antiviral medications (anti-influenza drugs) can be used to treat influenza cases or to prevent influenza in exposed persons (prophylaxis). Antiviral medications are the only specific anti-influenza intervention available that can be used from the start of the pandemic, when vaccine is not yet available.

Canada's antiviral strategy supports FPT stockpiles of antiviral medications for use in the event of an influenza pandemic, primarily for early treatment and for outbreak control in closed facilities. Early treatment of influenza cases, preferably within 48 hours, is recommended in order to reduce the severity and duration of illness, particularly the occurrence of influenza-related complications, hospitalization and death. Early treatment may also help mitigate societal disruption by reducing the duration and severity of illness experienced by workers in the health care and other critical infrastructure sectors.

STRATEGIC APPROACH

There are two national stockpiles in Canada:

- The NAS is an FPT stockpile that is held and managed by the PTs. The NAS is predominantly composed of the antiviral medications oseltamivir and zanamivir, with oseltamivir dosage formulations that are appropriate for both adults and children.
- The National Emergency Strategic Stockpile (NESS) is a federally owned stockpile of emergency supplies. The NESS is held and managed by PHAC and includes a stockpile of oseltamivir and zanamivir. NESS antivirals are intended to provide surge capacity in support of the PT response during a pandemic.

Federal government departments, such as the Canadian Forces (for active duty personnel) and Global Affairs Canada (for mission staff overseas), hold stockpiles of antiviral medications to meet the anticipated needs of their staff.

Jurisdictions need strategies to facilitate timely access to antiviral medications, particularly for high-risk persons including pregnant women, children (who need special formulations), vulnerable populations, and residents of remote and isolated communities. Pre-positioning of antiviral medications should be considered for some communities to facilitate rapid access (e.g., remote northern communities).

Clinical guidelines have been developed for antiviral use for seasonal influenza.³⁸ These will be updated for pandemic influenza when the pandemic occurs. Pandemic use will focus primarily on early treatment of influenza cases, particularly persons with severe disease or with risk factors for complications or severe disease. There are limited indications for the use of antiviral medications for prophylaxis during a pandemic, primarily for control of laboratory-confirmed influenza outbreaks in closed health care facilities and other closed facilities where high-risk persons reside.

Distribution and uptake of antiviral medications should be monitored in real time to optimize appropriate use, identify the need for additional purchases during the pandemic, and support post-pandemic utilization and effectiveness studies. Monitoring adverse reactions and antiviral resistance helps inform decision-makers as to whether changes in the recommendations regarding antiviral use are required. Adverse reaction reports are collected and assessed through the Canada Vigilance Program of the Marketed Health Products Directorate (MHPD) of Health Canada. Ongoing monitoring of antiviral resistance is conducted by the public health laboratory system and reported as part of FluWatch.

More details about antiviral medications and their use in a pandemic can be found in the Antiviral Annex, including a prioritization framework to guide decision-making if antiviral medications are expected to be in short supply.

4.6 Infection Prevention and Control and Occupational Health

A major influenza outbreak may have a substantial impact on the ability of health care organizations to keep those providing or receiving health care services safe. Infection prevention and control (IPC) and occupational health (OH) programs should work together to prevent exposure to and transmission of pandemic influenza during the provision of health care. Working jointly with occupational health and safety committees is essential in meeting these goals. The application of appropriate IPC and OH processes by HCWs and organizations is important in all health care settings along the continuum of care, including but not limited to medical first response, practitioners' offices and other ambulatory care settings, acute care, long-term care and home care settings.

STRATEGIC APPROACH

A timely pandemic response is only possible when an organization and its personnel are experienced in IPC and OH protocols and practices, supported by strong programs. Well-functioning IPC programs should prevent, limit or control the acquisition of health care associated infections for everyone in the health care setting, including patients, HCWs, visitors and contractors. Well-functioning OH programs should identify workplace hazards and support appropriate processes and training to ensure that employees can perform their duties in an environment that minimizes exposure to environmental hazards.

Important elements of IPC and OH programs for pandemic preparedness and response in the health care setting include the following:

- adequate staffing of IPC and OH professionals in the health care organization to conduct education and training for front line staff;
- organizational risk assessments, best carried out in the interpandemic period, to identify engineering, administrative and personal protective equipment (PPE) controls that will best protect patients, HCWs and visitors in the health care setting;

38 Aoki FY, Allen UD, Stiver HG, Evans GA. The use of antiviral drugs for influenza: A foundation document for practitioners. *Can J Infect Dis Med Microbiol.* 2013;24 Suppl C:1C-15C.

- comprehensive education and training for HCWs in the organization on influenza IPC and OH issues;
- point-of-care risk assessments that are carried out by individual HCWs before they enter a patient's environment or initiate patient care to determine the appropriate PPE, isolation and cohorting strategies for a given patient, during a given intervention, in a specific room, area or facility;
- provision of influenza vaccine to persons working for or being cared for by the organization;
- ongoing surveillance for health care associated infections, including respiratory infections;
- respiratory protection programs to ensure that HCWs who may need to wear a respirator (including N95 respirators) are trained, fit-tested and prepared;
- a wide range of "source control" policies, including a 2-metre spatial separation between infected sources (e.g., patients) and uninfected hosts (e.g., other patients); admission screening; screening of visitors; and expanded respiratory and hand hygiene programs for HCWs, patients and visitors; and
- systematic administrative practices to enable rapid identification and segregation of patients, HCWs and visitors with symptoms of influenza-like illness (ILI).

For detailed guidance about IPC and OH activities during a pandemic, see the annex on *Prevention and Control of Influenza during a Pandemic for all Healthcare Settings*.

4.7 Health Care Services

The effective provision of health care provides patients with the right level of care in the right place, at the right time. In a pandemic this means managing an influx of patients with influenza, while maintaining patient care required for patients with urgent non-influenza conditions. It is necessary for any organization that provides health care to plan for a range of scenarios, including those with very high patient load and potential high staff absenteeism, as demand for health care services may exceed the capacity of the existing system. At the start of a pandemic, early assessment of its anticipated impact will help the health care sector to implement plans to manage the anticipated workload.

STRATEGIC APPROACH

Planning for the delivery of health care in a pandemic is a particular challenge as there is little excess capacity in the Canadian health care system, particularly in remote and isolated communities. Nonetheless surge capacity planning is an essential component of pandemic preparedness for all levels of care, including telephone information lines, primary and ambulatory care practitioners, emergency medical services, hospital and critical care, long-term and palliative care, home care and other community care. *Surge capacity planning* involves development of strategies for enhancing levels of staff and volunteers, equipment and supplies and, potentially, space to accommodate more patients. It also includes consideration of novel approaches to enhancing assessment and care. Surge capacity plans should include regional or even province-wide components.

The 2009 pandemic highlighted the importance of improving integration and coordination so that the health care response functions as a system during an emergency. This involves integration across the continuum of care within a health region and across and among PTs. Integration is facilitated by involving stakeholders from all levels of care in planning and exercises, including emergency medical services, community service providers, volunteer organizations and public health. Electronic information management systems are essential tools for monitoring service delivery and resource utilization across the health care system and transferring information among organizations.

The collection of health care delivery data is an important aspect of seasonal and pandemic influenza surveillance. Monitoring hospital and ICU admissions and ventilator use were added surveillance components in the 2009 pandemic, contributing valuable information on the epidemiology of severe disease and its risk factors. Surveillance of emergency department utilization can indicate when community health services are at or reaching capacity so that other measures can be considered.

Best practices and lessons learned advise that health care organizations and practitioners carry out *business continuity planning* and maintain strategic reserves of critical equipment and supplies. Detailed plans to store, distribute and track use of stockpiled items should be developed and exercised.

Pandemic-specific issues for health care provision include the following:

- **Self-care instructions** – self-care instructions can empower individuals and families, improve care and optimize the use of the health system; they are useful for dealing with seasonal as well as pandemic influenza. During the 2009 pandemic, many jurisdictions used the media, public announcements and credible websites to promote tools to assist the public on conducting an influenza self-assessment, self care and when to seek medical attention or go to the hospital.
- **Telephone advice lines** – these were extensively used in the 2009 pandemic to provide information and advice, and to triage people with suspected influenza from those with other respiratory infections. Trained operators directed people to appropriate clinical assessment and care if needed, and helped avoid unnecessary visits to physicians and emergency departments by providing advice on self-care at home. Heavy, and sometimes overwhelming, demand reinforced the necessity for business continuity planning and for operation on a 24/7 basis during a pandemic.
- **Primary care** – the primary care sector will be responsible for the assessment and treatment of ambulatory influenza patients. PTs often face challenges in engaging primary care practitioners, who may not be well linked to the rest of the system. PTs should work with professional associations to develop communications strategies, protocols and guidelines, e.g., for office business continuity planning and IPC. At the time of the pandemic, PTs should anticipate providing primary care practitioners with situation updates, guidance on laboratory testing and clinical management of influenza patients, information on pandemic vaccine (with clear direction on their role in its provision) and access to additional or pre-positioned PPE and supplies. Primary care surge capacity can be enhanced by PT strategies such as new fee codes for telephone advice and prescribing, temporarily allowing practice expansion to patients who are not registered with the practice (when this is not normally permitted), and expanding the role of other health professionals and non-traditional workers (e.g., allowing prescribing of antiviral medications by pharmacists). Influenza assessment centres and alternate care sites may be needed in some communities, particularly in high-impact situations. Responsibility for their establishment is best determined in advance so that appropriate planning can take place.
- **Hospital-based care** – the impact on the acute care sector and the demand for critical care will be influenced by the epidemiology of the pandemic, i.e., the overall numbers with severe disease, the age and risk groups most at risk of severe disease and the dynamics of the pandemic wave (compacted or prolonged), as well as the extent of early antiviral treatment in the community. Critical care planning and preparation for high demand for ventilators or other specialized equipment (e.g, extracorporeal membrane oxygenation) needs special attention. Critical care surge capacity plans should include triage tools that contain both ethical guidance and processes to address bed flow and ventilator utilization. Service needs for paediatric patients (including critical care) and pregnant women should be specifically addressed.

- **Health care in remote and isolated communities** – There may be limited capacity to provide acute care and/or a lack of appropriate medical equipment and services (e.g., ventilators, oxygen therapy) for treating critically ill patients in remote and isolated communities. Under normal circumstances, these needs are met through medical evacuations to acute care facilities in larger centres. However, an increase in medical evacuations could overwhelm the receiving jurisdictions, making it essential to coordinate with receiving jurisdictions and to do everything possible to detect ILI as early as possible and to treat and keep affected persons in the community.
- **Other health care services** – services such as mental health, home care, palliative and hospice care, long-term care and other community health and social services may not be well linked to regional and local pandemic planning processes. Though often overlooked in pandemic planning, their functioning is critical to achieving the pandemic objectives by providing early and appropriate treatment outside of hospitals to those who do not need acute hospital care. These organizations must be involved in pandemic planning and encouraged to have business continuity plans in place so that they can continue to provide their services to some of the most vulnerable patients in the community with minimal interruption during a pandemic.

4.8 Clinical Care Guidelines

Clinical care involves the assessment and treatment of persons with suspected or confirmed pandemic influenza. The spectrum of illness seen with influenza is broad and ranges from asymptomatic infection to severe illness causing death, which is frequently due to exacerbation of an underlying chronic condition or secondary bacterial pneumonia. Certain aspects of pandemic influenza management may be unfamiliar to some practitioners, and new risk factors and presentations may emerge. Critically ill patients may require extraordinary support measures, some of which may not be universally available in a high-impact pandemic.

STRATEGIC APPROACH

During a pandemic, health care practitioners will need clinical guidelines for assessment, laboratory testing, treatment (including antiviral medications), and management of secondary infections and critically ill patients. Service needs for specific populations (e.g., paediatrics, pregnant women) should be specifically addressed. Guidelines specific to the clinical management of patients in remote and isolated communities should also be available, as there are unique considerations in these settings.

Clinical care guidelines must be timely and user-friendly, and be produced by sources that practitioners consider reliable. Establishing and testing agreed upon approaches for the development of clinical guidelines during the interpandemic period will help to ensure that the necessary processes are in place to support the pandemic response.

4.9 Communications

Communication of information and advice is often the first and most important public health intervention during an emergency. This is especially true for an emerging pandemic, where behaviour change is a central part of risk management. Providing clear and consistent information about the disease, who it affects, how it spreads and ways to reduce risk is an effective way to help reduce the spread of infection before other interventions like vaccine are available. Open and honest public communication also reinforces trust in public health authorities and helps to minimize societal and economic disruption.

Communications planning for an influenza pandemic uses a risk communications approach.³⁹ It integrates a broad range of communication capacity and expertise, including social marketing, stakeholder consultation and use of social media. It involves collaboration of all partners involved in the pandemic response to deliver consistent, complementary, and effective communications that meet the needs of the public and stakeholders.

STRATEGIC APPROACH

Pandemic risk communications incorporate the principles of collaboration, proportionality, flexibility and use of established practices and systems. Research conducted during and after the 2009 pandemic reinforced the importance of core risk communication principles such as transparency and stakeholder collaboration in achieving pandemic response objectives.⁴⁰

It is essential to be proactive about communication throughout the pandemic, with information and updates for the media, the public, and other stakeholders. Information may be limited initially and will change as the science evolves and more is learned. The post-2009 reviews identified difficulties in communicating uncertainty and dealing with changing information, particularly for pandemic vaccine. Therefore, strategies to communicate risk, uncertainty and changing information are critical.

Communicating in ways that demonstrate transparency, cultural sensitivity and use of plain language is essential in building and maintaining public trust. Consistent messaging and “speaking with one voice” will also foster trust and understanding and help avoid confusion.

While communication and messaging within jurisdictions is ultimately a PT responsibility, pandemic communications planning should involve all health partners. The FPT communication response will be coordinated through the PHN Communications Network. Collaboration with nongovernmental, private sector and international organizations is also important. The media should be seen as a key partner and engaged in the interpandemic period as well as during the pandemic.

Communication with the public – Research has demonstrated that risk perception is the strongest indicator of willingness to change behaviour during a public health event, and that it is largely shaped by the public’s emotional response to the event.⁴¹ Monitoring of public perception, information needs and concerns is an important role in the pandemic response and should be planned for. Effective stakeholder identification and engagement will also play a large part in this work. Building relationships with stakeholders in the interpandemic period will help facilitate productive interactions during the pandemic. Federal and PT pandemic communications plans should pay particular attention to reaching vulnerable populations and persons who may have limited access to mainstream media. These groups may require a tailored communications approach, using a variety of formats and delivery mechanisms (e.g., using ethnic media outlets as a conduit to ethno-cultural communities).⁴²

39 Health Canada. Strategic risk communication framework. 2005. Available from: http://www.hc-sc.gc.ca/ahc-asc/pubs/_ris-comm/framework-cadre/index-eng.php

40 Risk Sciences International. Risk communication for H1N1 pandemic influenza. 2012. Report to the Public Health Agency of Canada (unpublished)

41 Ibid

42 Greenberg J. Emergency-risk communication for vulnerable populations in Canada. April 2012. Report to the Public Health agency of Canada (unpublished)

Communication with the health care sector – Communications with HCWs and organizations deserves special attention in the planning process. These stakeholders should be engaged in two-way dialogue to help ensure that products and messages meet their needs for timely, clear, concise and relevant communications. Resources should be developed in the interpandemic period so they can be quickly adapted when a pandemic occurs.

For details on the pandemic risk communication approach, see the Communications Annex.

4.10 Research

Research plays a key role in addressing knowledge gaps about the influenza virus and effective influenza prevention, treatment and control for both seasonal and pandemic influenza. Much of this research can be carried out in the interpandemic period, but some can only be conducted during a pandemic. Given the potentially long interval between pandemics, it is important not to miss these infrequent but invaluable opportunities and to plan for a rapid research response.

STRATEGIC APPROACH

Key components of a successful pandemic influenza research strategy include identification of research needs, development and ongoing support of partnerships and research networks, identification of sustained funding sources, and advance establishment of protocols and rapid ethics review processes for pandemic research. Knowledge translation strategies to bring significant findings to decision-makers in a useful and timely way are other key components.

Identification of research needs – It is important that influenza research needs are periodically reviewed and prioritized. This information is helpful to funding agencies like the Canadian Institutes of Health Research (CIHR) and PHAC, and feeds into similar international initiatives by WHO and others. The annexes to this document identify existing research needs in specific areas of the response, such as vaccines and antiviral medications.

Research networks – Networks that are created to conduct research in the interpandemic period are well placed to facilitate pandemic research. Provincial public health agencies and PHAC are increasingly collaborating on epidemiological and other public health studies. PCIRN played a key role in the vaccine response in the 2009 pandemic. The new national network of key vaccine researchers (CIRN) will be active in ongoing influenza vaccine research projects. The mathematical modeling community has developed several networks and is collaborating more closely with public health. Canadian intensive care researchers have developed new international clinical networks, such as the International Forum for Acute Care Trialists (InFACT), that will establish open access protocols, data-sharing processes and ethical frameworks to streamline the response to a new emerging disease or pandemic. These existing networks need ongoing support. As they may not be sufficient to address all of the pandemic research needs, ongoing focus on this aspect is required to ensure readiness for the research response.

Rapid research response – Special research studies, such as seroprevalence studies and the role of bacterial pathogens in serious outcomes, will be needed to inform pandemic decision-making. As these studies must be mounted quickly, advance planning is critical for their success and timeliness. Leveraging existing partnerships among PHAC, Health Canada, provincial public health agencies, clinical and

academic institutions and networks together with populations of research interest such as CIRN and CIHR and engaging them in planning for a rapid research response is essential. Advance plans should include preliminary agreements with potential researchers and development of research protocols and strategies for rapid ethics approval and funding arrangements.

Knowledge translation – Many important decisions must be made quickly during a pandemic. Evidence-informed decision-making requires strong knowledge translation strategies to ensure that existing and new research findings are taken into account. Enabling strategies include compiling research findings from the 2009 pandemic and maintaining up-to-date literature reviews in key areas, such as the effectiveness of public health measures, relevant vaccine studies, and antiviral treatment and resistance. Processes for critical appraisal and dissemination of new research findings should be established in the interpandemic period. Strategies should also be developed to help decision-makers understand and make optimal use of evidence and research.



5.0 ASSESSMENT AND EVALUATION OF PANDEMIC PREPAREDNESS AND RESPONSE

Preparing for and responding to a pandemic is a complex process that requires the coordinated efforts of all orders of government in collaboration with their stakeholders. To ensure that pandemic plans (or all-hazards plans according to the jurisdiction) are comprehensive and effective, jurisdictions should assess their level of preparedness, test their plans regularly and evaluate their pandemic response.

5.1 Assessing Preparedness

Preparedness is a responsibility of individuals, organizations and jurisdictions at all levels. PTs are responsible for preparedness activities that will take place at the PT level and they may also provide advice and/or support to regional and local areas. Assessing the level of pandemic preparedness enables jurisdictions to monitor the progress of their pandemic planning, identify gaps and prioritize future planning efforts. Use of checklists, perhaps coupled with site visits, are potential tools for monitoring progress and levels of preparedness.

It is also important to determine whether responses can be implemented effectively so as to achieve the intended results. Training and exercises should be conducted on a regular basis to maintain preparedness levels as part of a cycle of continuous improvement. Training should also be made a priority for new workers. Exercises can take many forms, ranging from discussion-based activities such as seminars and workshops to larger more complex activities such as activating plans and simulating response activities. It is best for organizations to work their way up to larger exercises. This progression allows organizations to understand their plans better and identify interdependencies, and to make changes and adjustments before attempting a larger, more complicated activity. Following an exercise a formal After Action Report should be prepared, along with an implementation plan to address the gaps identified. Problem areas or weaknesses should be corrected through additional training and/or changes or additions to plans.

In addition to specially designed exercises, seasonal influenza provides annual opportunities for all jurisdictions to test specific components of a plan. For example, seasonal influenza immunization campaigns allow PTs to test rapid distribution of vaccine and supplies while local jurisdictions can practise mass clinic strategies and use of their health emergency management mechanisms to organize the clinic rollout. Other emergencies also provide opportunities to practise and refine components of an effective pandemic response, like command and control and communications.

5.2 Evaluating the Pandemic Response

For future reference, it is important to document completely the processes and activities used and decisions made during the response to the pandemic, along with the outcomes achieved. The response should be evaluated to see if it was carried out as intended and that it led to the desired outcomes. This evaluation helps ensure that lessons learned from the real life event are captured and remain available to inform pandemic plan revisions. The evaluation involves assessment through an After Incident or Lessons Learned report following the pandemic, accompanied by an implementation plan to address the identified gaps. A critical opportunity to evaluate and adjust the response also comes at the end of the first pandemic wave.

In addition to gleaning lessons learned from the pandemic response, it is important to ascertain how well the pandemic response met the goals and objectives of pandemic preparedness and response in Canada. Lessons learned would focus on the assessment of the strategic approach for the key components outlined in this document as a measurement of how well the response met the identified purposes of each of the key components. This higher level and formal evaluation of the pandemic response would involve FPT partners and consider various aspects of the pandemic response. A comprehensive, harmonized approach to pandemic evaluation across jurisdictions should be developed in the interpandemic period so that the main findings and best practices can be identified.



APPENDIX A – FACTORS AFFECTING PANDEMIC IMPACT

The table lists a series of factors that could affect the impact of a pandemic and describes their potential impact. Consideration of these factors and their potential mitigation will supplement use of the basic planning scenarios and help planners prepare a more adaptable response.

TABLE - FACTORS THAT AFFECT PANDEMIC IMPACT AND THEIR POTENTIAL IMPACT

CATEGORY	FACTOR	POTENTIAL IMPACT
VIRUS CHARACTERISTICS		
TRANSMIS-SIBILITY	Degree of transmission	High infectivity means that a large number of people will become ill. This would affect absenteeism in schools and workplaces, including health care settings. Health care services would face increased demand. Disruptions in basic services could occur if absenteeism affects critical infrastructure.
	Speed of spread	A concentrated wave with many people ill over a short period would have higher impact on absenteeism and demand for health care than the same number of cases spread over a longer period.
	Season of arrival	Transmission is lower in spring and summer so pandemic waves in that period might be smaller. Higher impact would also be expected with late fall/winter waves due to juxtaposition of usual winter pressures from other viruses and co-circulating bacteria.
VIRULENCE	Clinical severity	High virulence means a high proportion of severe cases among the ill, placing strain on acute and critical care services. The typical pandemic mortality age shift to younger age groups could also increase public concern. Unexpected clinical features could affect provision of acute and critical care.

CATEGORY	FACTOR	POTENTIAL IMPACT
POPULATION VULNERABILITY		
POPULATION VULNERABILITY	Pre-existing population immunity	Pre-existing population immunity might be present in persons above a certain age due to previous circulation of related strains. This could reduce their risk of infection (although their age might increase their risk of severe disease if they did become ill). Sparing of older persons would significantly reduce overall impact on hospitals and long term care facilities. Higher impact would be anticipated if all age groups are involved.
	Unexpected risk factors	New risk factors for severe disease could mean that more people need health care services. They could also affect vaccine prioritization.
	Special groups and settings	Impact may be increased in high-risk populations or settings (e.g. remote communities, homeless shelters and overcrowded housing). Risk could be elevated because of age, underlying conditions, poor access to health care, poor socioeconomic conditions, etc.
RESPONSE FACTORS		
PUBLIC HEALTH INTERVENTIONS	Vaccine availability, timing, effectiveness	Timing of vaccine availability in relation to pandemic activity could influence vaccine prioritization and affect uptake. Vaccine impact would be reduced if most people experience illness before vaccine is available.
	Antiviral availability and resistance	Antiviral supply might be insufficient in a very large pandemic. Antiviral drug resistance would reduce supply of effective antiviral medications, thus resulting in need to prioritize use. Supply issues could lead to increased numbers of hospitalizations, severe illness and death.
	Public health measures	In some circumstances (e.g. virus with lower transmissibility), wide adoption of public health measures could lead to significant reduction in transmission.

CATEGORY	FACTOR	POTENTIAL IMPACT
HEALTH CARE SYSTEM RESPONSE	Access to care	Good access to primary care and early antiviral treatment would reduce rates of complications and hospitalizations. Lack of access to critical care could increase mortality in seriously ill patients.
	Surge capacity	Lack of surge capacity could affect outcomes if demand for services outstrips supply. Triaging of critical care services would be needed as surge capacity is exceeded. As services become overwhelmed, mortality might increase in both influenza and non-influenza emergency patients.
	Availability of antibiotics and other drugs, supplies	Drug supply problems or antibiotic resistance could affect clinical outcomes. Shortages of infection control supplies could affect viral transmission and increase staff concern.
RISK COMMUNICATIONS	Behavioural response	Levels of public awareness and understanding and risk perception, along with level of trust in health authorities, could affect degree of adoption (and therefore potential effectiveness) of preventive behaviours such as infection prevention behaviours, social distancing, and uptake of vaccine and antiviral medications.



APPENDIX B – PANDEMIC RISK ASSESSMENTS

The table identifies relevant considerations for initial and ongoing pandemic risk assessments and identifies potential sources of data to generate the information needed. In a pandemic, the Public Health Agency of Canada will prepare or arrange for the risk assessments to be prepared and disseminated.

TABLE - PANDEMIC RISK ASSESSMENTS

CATEGORY	WHAT INFORMATION IS NEEDED?		HOW WILL THIS BE LEARNED?
	INITIAL RISK ASSESSMENT	ONGOING RISK ASSESSMENTS	
OVERALL RESPONSE			
NATURE OF RESPONSE	What will be the overall impact?	Is the impact changing? How are we coping?	Estimates/predictions of impact (see sections below)
CHARACTERISTICS OF THE VIRUS			
TRANSMISSIBILITY	How fast will it spread?	Will there be more than one pandemic wave? Is transmissibility changing?	Molecular and genetic studies Incubation period and generation time Reproductive number (R_0) Real-time modeling
	How many will be affected? <i>See also population vulnerability</i>	Will follow-up waves be larger or smaller? When will the next wave begin, peak, end?	As above Serological attack rate Clinical attack rates in various settings

CATEGORY	WHAT INFORMATION IS NEEDED?		HOW WILL THIS BE LEARNED?
	INITIAL RISK ASSESSMENT	ONGOING RISK ASSESSMENTS	
VIRULENCE (CLINICAL SEVERITY)	<p>How severe is the disease?</p> <p>What proportion of ill people will have complications, need hospitalization, die?</p> <p>Are there unusual clinical presentations?</p>	<p>Is disease severity changing?</p>	<p>Molecular and genetic studies</p> <p>Rates of hospitalization, intensive care unit (ICU) admission, ventilator use</p> <p>Case fatality rate/ratio</p> <p>Clinical case series of persons with severe disease</p> <p>Outbreak reports</p>
POPULATION VULNERABILITY			
POPULATION VULNERABILITY	<p>Will all age groups be affected and to what extent?</p>	<p>How is population immunity changing as the outbreak progresses?</p>	<p>Levels of pre-existing population immunity</p> <p>Periodic seroprevalence surveys</p>
	<p>What are the risk factors for severe disease?</p>	<p>Are new risk factors/groups emerging?</p>	<p>Epidemiological studies</p> <p>Clinical case series</p> <p>Outbreak reports</p>
	<p>Are there settings and populations at increased risk?</p>	<p>Are there additional settings and populations at increased risk?</p> <p>Are we effectively targeting our interventions?</p> <p>Any unintended consequences from our interventions?</p>	<p>Epidemiological studies</p> <p>PT/NGO feedback</p> <p>Socioeconomic data</p>

CATEGORY	WHAT INFORMATION IS NEEDED?		HOW WILL THIS BE LEARNED?
	INITIAL RISK ASSESSMENT	ONGOING RISK ASSESSMENTS	
PUBLIC HEALTH INTERVENTIONS			
ANTIVIRAL MEDICATIONS	Is there antiviral resistance? Will antivirals be safe? Will antivirals be effective? Are we able to effectively mobilize the NAS?	Are antiviral resistance patterns changing? Are the antivirals safe? Are the antivirals effective? Are the right patients receiving them in a timely way?	Antiviral susceptibility and resistance testing Antiviral distribution and uptake Adverse reaction reports Effectiveness studies Distribution reports and special studies
VACCINE	Will vaccine be safe? Will vaccine be effective? When will it be available?	When will vaccine be available? Are there changes to the usual high-risk groups? Is there adequate capacity for rapid immunization? How can vulnerable groups be reached? Is pandemic vaccine safe? Is it effective?	Early epidemiological studies (re: high-risk groups) PT monitoring and feedback Vaccine uptake and effectiveness AEFI reports
PUBLIC HEALTH MEASURES	What is the anticipated impact, including transmission?	Are the interventions acceptable? Are they effective?	Measures of transmissibility and virulence Mathematical modeling Public opinion research Community surveys
INFECTION PREVENTION AND CONTROL (IPC)	Will the usual IPC measures be effective? If not or unsure, what additional precautions should be taken?	Are the usual IPC measures effective? If not or unsure, what additional precautions should be taken? Are there unintended consequences?	Information on incubation period, infectivity, routes of transmission, etc.

CATEGORY	WHAT INFORMATION IS NEEDED?		HOW WILL THIS BE LEARNED?
	INITIAL RISK ASSESSMENT	ONGOING RISK ASSESSMENTS	
SYSTEM RESPONSE			
PUBLIC HEALTH	What will be the potential impact?	What is the impact on public health services and health human resources (HHR)? Are they able to cope?	Measures of transmissibility and virulence Surveillance and clinical studies PT feedback
COMMUNITY HEALTH CARE	What will be the potential impact?	What is the impact on community health care services and HHR? Are they able to cope?	Measures of transmissibility and virulence Surveillance and clinical studies Information on antiviral resistance PT feedback Media monitoring
ACUTE CARE SERVICES	What will be the potential impact?	What is the impact on acute care services and HHR? Are they able to cope? What bacterial complications are occurring? Are the treatment strategies effective?	Measures of transmissibility and virulence Surveillance and clinical studies Information on antiviral and antibiotic resistance Clinical studies PT monitoring and feedback Media monitoring
LONG-TERM CARE AND OTHER COMMUNITY RESIDENTIAL CARE	Will long-term care or other residential facilities for the elderly or disadvantaged be at significant risk of outbreaks?	What is the impact on these facilities, their services and HHR?	Information on pre-existing immunity Surveillance and outbreak investigations PT feedback Media monitoring

CATEGORY	WHAT INFORMATION IS NEEDED?		HOW WILL THIS BE LEARNED?
	INITIAL RISK ASSESSMENT	ONGOING RISK ASSESSMENTS	
SOCIETAL IMPACT	<p>Will there be significant workplace or school absenteeism?</p> <p>Will community services be affected?</p>	<p>What is the impact on schools, businesses, critical infrastructure and other community services?</p> <p>What is the impact on vulnerable populations?</p> <p>What is the economic impact?</p>	<p>Measures of transmissibility and virulence</p> <p>School and workplace absenteeism surveillance</p> <p>PT feedback</p> <p>Media monitoring and public surveys</p>
RISK COMMUNICATIONS	<p>What will be the level of public concern?</p> <p>What issues will be of most concern?</p>	<p>What are the levels of public concern?</p> <p>What issues are of most concern and are we addressing them effectively?</p> <p>What is the level of public awareness and understanding of the situation?</p>	<p>Traditional and social media monitoring</p> <p>Tracking of public inquiries</p> <p>Public opinion research</p> <p>Stakeholder feedback (PTs and NGOs)</p>