The Canadian Pandemic Influenza Plan for the Health Sector

Pandemic Influenza
Pandémie d'influenza

2006

INFORMATION NOTICE

The ***Canadian Pandemic Influenza Plan for the Health Sector*** (the Plan) was developed through a collaborative consultative process including representatives of Federal, Provincial, Territorial, local and regional governments, experts in the respective fields and non-government stakeholders.

Development of the Plan was originally coordinated by Health Canada with direction from the Pandemic Influenza Committee, a Federal, Provincial and Territorial technical advisory committee. The 2006 edition was coordinated by the Public Health Agency of Canada. The Plan is provided for information purposes to support consistent and comprehensive planning for the health sector response to pandemic influenza across Canada by governments and other stakeholders within their respective roles and responsibilities.

DISCLAIMER

The views and recommendations expressed in the Plan and technical annexes were developed through a collaborative consultative process including representatives of Federal, Provincial, Territorial, local and regional governments, experts in the respective fields and non-government stakeholders.

Users should seek their own independent legal and technical advice on how they will put to their own use and purpose the views, and recommendations contained in the Plan.

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The Canadian Pandemic Influenza Plan *for the Health Sector*

Organization of Contents

Foreword and Acknowledgements

The ***Canadian Pandemic Influenza Plan for the Health Sector*** maps out how the health sector can prepare for and respond to pandemic influenza in Canada. It does so by outlining the actions that should be taken during each pandemic phase and clarifying the roles and responsibilities of those who would be involved in such a public health emergency – governments at all levels, public health officials and front-line health care workers. As a practical working tool, it also provides guidelines and checklists to assist various jurisdictions with their emergency planning.

Ongoing planning for the health sector response is expected to raise the overall level of preparedness to deal with pandemic influenza in Canada and to support a sustained state of readiness based on the latest knowledge. Ultimately it is expected that advanced planning in the health and other sectors will together minimize serious illness and overall deaths, in the event of an influenza pandemic, and also ease any social or economic disruption that might be caused by a massive outbreak of the disease. Canada has had a pandemic influenza plan since 1988, and it continues to evolve based on research, evidence and lessons learned.

The ***Canadian Pandemic Influenza Plan for the Health Sector*** is the product of extensive dialogue and collaboration within the *Pandemic Influenza Committee (PIC)*. Created in 2001, PIC consists of 15 voting members, including representatives from all provinces and territories. Expertise within PIC includes Chief Medical Officers of Health, epidemiologists, virologists, communicable disease specialists, clinical, public health and laboratory specialists and an ethicist.

Committee members, in turn, have been greatly assisted through a process of consultation with a wider group of stakeholders, including the health non-government organization community, local governments, emergency planners and bioethicists.

As Co-Chairs of the Pandemic Influenza Committee, it has been a continually enriching experience to watch the document evolve, and to see the sheer amount of time, dedication and commitment poured into the maintenance of the Plan. We would like to thank all of those whose contribution has helped to develop the plan and to keep it up to date.

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PREFACE

Preface

Influenza A viruses periodically cause worldwide epidemics, or pandemics, with high rates of illness and death. Advanced planning for a large scale and widespread health emergency is required to optimize health care delivery during a pandemic. Unlike other public welfare emergencies, an influenza pandemic will impact on multiple communities across Canada simultaneously. Each local jurisdiction must be prepared to respond in the context of uncertain availability of external resources and support. Therefore, contingency planning is required to mitigate the impact of an influenza pandemic through planning and preparation by the co-ordinated efforts of all orders of government in collaboration with their stakeholders.

The overall goal of pandemic influenza preparedness and response is first to minimize serious illness and overall deaths, and second to minimize societal disruption among Canadians as a result of an influenza pandemic.

The *Canadian Pandemic Influenza Plan for the Health Sector* (the Plan) consists of an introduction and a background section, followed by the preparedness, response and recovery sections, which are consistent with the general principals of emergency response. Each section aims to assist and facilitate appropriate planning for the health sector at all levels of government for the next influenza pandemic. The Plan and the annexed guidelines, checklists and other documents were developed to assist all jurisdictions with the main components of health sector planning, including surveillance, vaccine programs, use of antivirals, health services, public health measures and communications. The most effective public health intervention to mitigate the impact of a pandemic is through immunization with an effective vaccine against the novel virus, and, to a lesser extent, through the use of antiviral drugs. In addition, comprehensive planning requires that appropriate surveillance capacity is in place, and that the health sector, emergency services and communities as a whole are informed and equipped to deal with a pandemic.

The Plan is intended to be dynamic and iterative, and will be updated and revised regularly. Since the Plan was first published in 2004, planning has been advancing on multiple fronts. Other sectors have become engaged in developing plans that are envisioned to form a comprehensive set of "nested" plans aimed at not only pandemic influenza planning but also for other public health emergencies. This Plan has a health sector focus and therefore does not fully address emergency response activities and business continuity issues, which would be expected to play an important role in mitigating societal disruption. The Centre for Infectious Disease Prevention and Control (CIDPC), Public Health Agency of Canada (PHAC), coordinated the development of this edition of the Plan in collaboration with the Centre for Emergency Preparedness and Response (CEPR), PHAC, with direction from the Pandemic Influenza Committee (PIC).

For this edition, the Plan has been revised to reflect new developments in pandemic influenza preparedness and to ensure consistencies with best practices. The enhanced Plan includes a number of technical updates, revisions and additions. Two new annexes, Public Health Measures and Surveillance have been added and several others have been updated. For those annexes that have not been updated, a note has been added on the cover page explaining that the content of the annex may not reflect the latest information on antivirals or the latest WHO phase terminology.

This Plan has a national scope and is intended to provide planning guidance and a record of nationally agreed upon approaches to many of the components necessary for a comprehensive response. Operational details regarding implementation of the response have not been addressed in this plan as it would be more appropriate for that level of detail to be included in each jurisdiction's plan.

Section One

INTRODUCTION

Table of Contents

1.0 Goals and Objectives

The goals of influenza 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 goals will be realized only through the coordinated efforts of all levels of government in planning and preparation.

The objectives of the Canadian Pandemic Influenza Plan for the Health Sector are:

To assist and facilitate appropriate planning and response at all levels of government by

- developing, through a federal, provincial and territorial (F/P/T) collaborative process, a national Plan that is acceptable and applicable to stakeholders and that clearly identifies roles and responsibilities;
- developing a Plan that is sufficiently flexible to account for the unknown epidemiology of a pandemic and the needs of different stakeholders;
- recommending planning considerations for the appropriate prevention, care and treatment during a pandemic; and
- recommending planning considerations for appropriate communications, resource management and preventive measures to minimize societal disruption from a health sector perspective.

To provide a Plan that is reviewed on an annual basis to ensure the incorporation of new developments and to ensure consistencies with best practices.

To provide an evaluated Plan that is sufficiently clear and comprehensive to ensure operational viability.

2.0 Overview of the Plan

Pandemic contingency planning activities in Canada began in 1983. The first detailed draft of a plan, then referred to as the Canadian Contingency Plan for Pandemic Influenza, was completed in 1988; there have been several drafts since then. The latest plan, first published in February 2004, now referred to as the Canadian Pandemic Influenza Plan for the Health Sector (the Plan), targets a wide range of people in the health sector who will be involved in planning and responding to an influenza pandemic; these include health emergency responders, health planners, health care workers, public health laboratories, as well as those involved in the manufacture, registration and supply of pharmaceuticals. However, the primary audiences are the P/T Ministries of Health because the provision of health care and essential services is the jurisdiction of the provinces and territories.

Given that an influenza pandemic is the public health event that is the most likely to have a major national impact, a specific plan to address this national public health emergency is needed. The Canadian Pandemic Influenza Plan for the Health Sector is one of several national emergency response plans. The Plan is however focused on the health sector response and therefore is not designed to address other important issues such as business continuity during a pandemic. As a national plan this document is intended to provide guidance and support planning at the P/T, regional, local and facility level. Each level of government and each health care institution should develop their own pandemic plans that use the overall approach in the Plan but contain more operational details relevant to the specific site or jurisdiction.

3.0 Structure of the Plan

The Plan consists of a Preface, the core sections and the annexes. The Introduction Section and the Background Section are followed by the Preparedness Section and the Response Section; a Recovery Section is being developed for a later edition of the Plan. The Introduction and the Background Sections provide the conceptual and historical basis for the Plan and highlight overarching principles, such as roles and responsibilities. The Preparedness and Response Sections and pending Recovery Section reflect the general principals of emergency response of the Plan. Under this framework, the types of preparedness and response activities needed for comprehensive pandemic planning can be summarized as follows:

- **Prevention** activities include planning actions to ensure that all existing or known or unavoidable risks are contained. In conjunction with infection control recommendations (e.g. hand hygiene, respiratory etiquette), immunization with vaccines is the primary means of prevention (e.g., pneumococcal vaccine in the Interpandemic Period and pandemic vaccine once it becomes available); it forms the basis of the pandemic response in Canada and many other countries. The annual vaccine infrastructure is the building block used to develop the pandemic vaccine response.
- **Preparedness** activities include preparing the actual plans, training and simulation exercises to pretest the plans, communications and other interfaces to inform the public and other stakeholders.
- **Mitigation/Response** activities are directed at controlling the pandemic and repressing direct outcomes (mortality and morbidity due to influenza) and indirect associated effects (social disruption). Implementation of these activities would involve a series of escalating and potentially varying (but harmonized) responses as the pandemic unfolds across the country. Implementation also involves documenting activities and outcomes to determine if a more extensive response is required or if adjustments to the planned response are necessary.
- **Recovery** activities may start at different times across the country as the pandemic waves move through the various jurisdictions. These activities involve the organization of post-event activities to ensure restoration of "normal" Interpandemic services and service levels. Dismantling alternative care sites, phasing out alternate care workers, and commencing new services that may be required to address the impacts are examples of these types of activities. Activities would continue until the declaration of the end of the pandemic in Canada and the Interpandemic status is restored.

The content of this comprehensive pandemic influenza plan for the health sector has been organized into components. These components which include; surveillance, vaccine programs, the use of antivirals, health services, public health measures and communications, are first identified in the Preparedness Section. In that section, each component is addressed in terms of current status as well as planning principles and assumptions. Checklists of potential planning activities are also included as an annex (Annex A, Planning Checklists).

The Preparedness Section addresses prevention and preparedness activities during the Interpandemic Period. This section is the result of work that began after the first national meeting on F/P/T and local planning, which was held in January 2000; it is based on the deliberations of a number of pandemic influenza working groups, as well as the input of other stakeholder groups and organizations. The purpose of this section is to provide information and guidelines that can be used in the development of plans for F/P/T and local management of an influenza pandemic.

The Response Section addresses high-level operational activities for an effective national health sector response, including essential F/P/T coordination. (See Annex L, for details on the National Emergency Response System.) The Recovery Section, which is anticipated for the next edition of the Plan, will provide guidance on the coordinated post-pandemic activities for the health and emergency response sectors.

The national working groups and subcommittees addressed specific issues in the Plan and developed the guidelines and reference documents annexed in the Plan. The original working groups included: Surveillance, Vaccines, Antiviral Drugs, Public Health Measures, Communications and Health Services, with the latter divided into Infection Control, Clinical Care, Non-traditional Sites and Workers, and Resource Management. Each annex was created to address specific issues related to the overall goals of pandemic planning: firstly to minimize serious illness and overall deaths and secondly to minimize societal disruption among Canadians. The annexes published with the 2004 edition of the Plan were written based on the data available and prevailing beliefs and approaches to pandemic planning at that time. The annexes have been or are in the process of being updated to reflect current thinking and advancements in science and planning activities, and some new annexes have also been added to this edition to make the Plan more comprehensive.

4.0 Roles and Responsibilities

A coordinated response to pandemic influenza requires collective infrastructures, response capacities and coordinated activities that will permit the F/P/T Ministers of Health and their representatives to anticipate problems, monitor for adverse outcomes and respond to minimize the impact of pandemic influenza within their jurisdictions.

The roles and responsibilities of the Pandemic Influenza Committee (PIC) and the F/P/T Ministers of Health were detailed in a Working Agreement between Deputy Ministers of Health in March, 2001.The Working Agreement is an iterative document that allows for roles and responsibility components to be adapted or added as they are developed. This agreement was drafted prior to the creation of PHAC in September 2004. Currently PHAC and Health Canada, which together now comprise the federal health portfolio, will cover the federal responsibilities.

The F/P/T roles and responsibilities, including joint responsibilities as outlined in the Working Agreement 2001, are captured in the current Plan.

In general, the roles and responsibilities of the respective jurisdictions are as follows:

- The federal government, through Public Safety and Emergency Preparedness Canada, is responsible for the nationwide coordination of the pandemic influenza response, including surveillance, international liaison and coordination of the vaccine response.
- Joint responsibilities of the F/P/T Ministers of Health include ensuring the distribution of plans to all organizations that may be involved in the pandemic response and liaison with these stakeholders on an ongoing basis. The Ministers of Health may also be involved in planning simulation exercises once plans (national, federal and P/T) are in place. Development of cost estimates and options for decision makers will also be a joint F/P/T responsibility.
- The P/T governments are responsible for mobilizing their contingency plans and resources. Health emergency response commences at the local level and moves up the line to P/T levels and then to the federal level of government.
- Local public health authorities are responsible for planning local responses to an influenza pandemic with direction from both the P/T and federal levels. This involves liaising with local stakeholders (e.g. emergency responders, hospitals, mortuary services) in advance of a pandemic to facilitate a coordinated response if pandemic influenza strikes a community. It is likely that the local public health authorities, through existing or enhanced surveillance, may be the first ones to detect influenza in their communities. It is essential that the lines of communication in communities and up the line to the P/T and federal levels are clear and established in advance of a pandemic.

4.1 The Pandemic Influenza Committee

The PIC is a F/P/T committee that first met by teleconference in March 2002. It is co-chaired by two public health experts who represent the federal and P/T governments. The PIC is supported by the CIDPC, PHAC. With the establishment of the Pan-Canadian Public Health Network, PIC now reports to the Communicable Disease Control Expert Group, the terms of reference for PIC are being updated.

The mandate of PIC includes providing advice, expertise, recommendations, liaison and other activities associated with the Interpandemic, Pandemic Alert, Pandemic and Post-Pandemic Periods to support the health and safety mandates of all levels of government. The PIC will also provide advice, assistance and expertise concerning the development, maintenance, testing and evaluation of the Canadian Pandemic Influenza Plan, and when requested to do so, any P/T contingency plan.

Section Two

BACKGROUND

Table of Contents

1.0 Epidemiology of Pandemic Influenza

Influenza A viruses periodically cause worldwide epidemics, or pandemics, with high rates of illness and death. A pandemic can occur at any time with the potential to cause serious illness, death, and extensive social and economic disruption throughout the world. Experts agree that future influenza pandemics are inevitable, but the timing and severity of the next pandemic cannot be predicted. Because there may be little warning, contingency planning is required to minimize the potentially devastating effects of an influenza pandemic.

In nature there are 16 different haemagglutinins and 9 different neuraminidases, which are two important surface glycoproteins of the influenza A virus. Influenza virus subtypes are named according to these "H" and "N" proteins. Although all 16 of the H types can infect birds, to date only H1, H2 and H3 have been associated with widespread human disease and H5, H7 and H9 have demonstrated the ability to cause human disease. It is important to recognize that as birds are the natural reservoir for these influenza viruses, occasionally people who have close contact with infected birds will become infected with novel viruses. Not all novel viruses however will evolve into pandemic viruses; nevertheless the pandemic potential of any new virus must be considered.

The following conditions are necessary for an influenza pandemic to occur:

- a new influenza A virus arising from a major genetic change, i.e. an antigenic shift;
- a virulent virus with the capacity to cause serious illness and death;
- a susceptible population with little or no immunity; and
- a virus that is transmitted efficiently from person to person.

Historic evidence suggests that pandemics have occurred three to four times per century. In the last century there were three influenza pandemics ("Spanish flu" during 1918–1919, "Asian flu" during 1957–1958, and "Hong Kong flu" during 1968–1969); these pandemics were separated by intervals of 11 to 44 years. The worst, during 1918–1919, killed an estimated 30,000 to 50,000 people in Canada and 20 to 50 million people worldwide. During each of the last three pandemics, the greatest increase in death rates occurred among persons less than 60 years of age; during 1918–1919, the greatest number of deaths occurred among those 20 to 40 years of age.

It is uncertain how the next human pandemic virus might arise. However pandemic viruses could arise through genetic mixing (reassortment) between human and avian influenza viruses and perhaps through cumulative mutations. The 1957 and 1968 pandemic viruses were reassortants of human and avian influenza virus genes. Pigs, which can be infected with both human and avian influenza viruses, may act as vehicles for reassortment events. In theory humans can also act as mixing vessels. Mounting evidence, including molecular sequencing, suggests that all 8 genes of the 1918 pandemic virus are avian in origin and the human pandemic potential was acquired through a series of mutations. Further studies are being carried out in order to gain a better understanding of the factors governing virulence and transmissibility of the 1918 pandemic influenza viruses.

Direct transmission of avian H5N1 influenza from chicken to humans was demonstrated during the 1997 Hong Kong "bird flu" incident. The spread of highly pathogenic avian influenza H5N1 in multiple countries in Asia since 2003 has been associated with sporadic human cases and a relatively high mortality rate. The H5N1 viruses identified in human cases have been wholly avian in genetic make up. The majority of new influenza strains emerge in Southeast Asia where large human populations have close interactions with pigs and domestic fowl. The probability of a new strain emerging in North America is thought to be relatively low.

2.0 Key Planning Assumptions

An influenza pandemic is an inevitable event; however the timing and epidemiology of the next pandemic is unpredictable. In the development of this plan, several assumptions have been made in order to provide some estimates of potential impact and facilitate preparedness in Canada. **These assumptions should not be interpreted as predictions for the next pandemic, but instead a reflection of current opinion regarding a reasonable scenario to guide planning activities.** Pandemic plans need to be flexible in order be useful for a wide range of possible scenarios, recognizing that it is not feasible to completely plan for every possible pandemic scenario.

The key planning assumptions are listed below; planning principles and assumptions are also presented for each component of the Plan in the Preparedness Section. In addition several of the key assumptions have been repeated in Annex M, Public Health Measures, where the recommended actions are linked to these and other more specific assumptions. These assumptions were developed based on information from a review of past pandemics and published reviews of other international plans. The assumptions regarding absenteeism are based on an analysis recently completed by the Department of Finance Canada.

2.1 Origin and Timing

- The next pandemic will first emerge outside of Canada.

  The majority of new influenza strains emerge in Asia where the close proximity of humans, poultry and domestic pigs in farming communities facilitates mingling and genetic exchange between human and avian influenza viruses.

- The next pandemic virus will be present in Canada within 3 months after it emerges in another part of the world, but it could be much sooner because of the volume and speed of global air travel.

  This assumption regarding timing is based on the last two pandemics. In 1918, returning soldiers who had influenza and traveled by train carried the virus from Québec to Vancouver within a few weeks. Given the increase, different patterns and speed of modern travel, a new virus once arriving in Canada could spread quickly in multiple directions throughout the country.

- The pandemic virus may arrive in Canada at any time of year (i.e., potentially outside of the usual influenza season in Canada)

- The first peak of illness in Canada could occur within 2 to 4 months after the virus arrives in Canada. The first peak in mortality is expected to be approximately 1 month after the peak in illness.

Based on past pandemics, when the pandemic virus arrives close to the usual annual influenza season in temperate climates (November to April), the interval from the arrival of the virus to the height of the epidemic can be very short.

- A pandemic wave will sweep across Canada in 1-2 months affecting multiple locations simultaneously.
  - This is based on analysis of the spread of past pandemics including the 1918 pandemic.
- The influenza pandemic will occur in two or more waves. In any locality, the length of each wave of illness will be 6 to 8 weeks. The pandemic will last 12 to 18 months and more than one wave may occur within a 12 month period.

2.2 Epidemiology

- The incubation period, period of communicability and method of transmission for the novel strain will be consistent with other known human influenza strains, that is:
  - Incubation period: 1 to 3 days;
  - Period of communicability: 24 hours before to up to 5 days after onset of illness (usually up to 3 to 5 days in immunocompetent adults, up to 7 days in young children);
  - Method of transmission: large droplet and contact (direct and indirect);
  - Role of airborne transmission is unclear; and
  - Transmission by asymptomatic persons is possible but it is more efficient when symptoms, such as coughing, are present and viral shedding is high (i.e. early in symptomatic period).
- The novel virus will be transmitted efficiently from person to person resulting in large numbers of people being infected, since there will be no significant immunity to the new virus on a population basis.

  Historical evidence suggests that in an entirely susceptible population the average number of secondary cases generated by a typical case of influenza is 1.4 to 1.8 people (this is also known as the "basic reproductive number, R_0"). Interventions such as immunization, antiviral use, infection control measures and public health measures can affect this number. The population will be less susceptible overall if the new virus has circulated previously. For example, the H2N2 virus which caused the 1957 pandemic circulated widely up until 1968, therefore the population born prior to 1968 is expected to have some residual immunity to this particular strain.
- The initial clinical presentation will be consistent with known human influenza strains.
- Sub-clinical infection will occur.

  Based on data from past pandemics, the current U.K. plan assumption is that approximately 50% of the infected population may be asymptomatic.
- The groups that are at high risk for complications or poor outcomes due to annual influenza (as per the National Advisory Committee on Immunization influenza statement) will be at high risk during the pandemic.

2.3 Impact

- The impact of the pandemic in terms of severity, age distribution and extent of spread may be different from annual influenza; however this will not be known until the novel virus starts spreading efficiently in the human population.
- The majority of the population (over 70%) will be infected over the course of the pandemic, but only 15-35% of the population will become clinically ill (i.e., there will be a relatively high rate of asymptomatic infection).
- For planning purposes assume that the majority of cases will occur in the first wave.
  - If the overall clinical attack rate is 35%, assume that 25% of the population will be clinically ill in the first wave.
- For a pandemic of mild to moderate severity (i.e., consistent with the last 2 pandemics) and in the absence of any interventions (e.g., vaccine, antivirals), of those who are clinically ill:
  - up to 50% of will seek outpatient care;
  - 1% will be hospitalized and recover
  - 0.4% will be fatal cases (of fatal cases the majority will also have required hospitalization).
- For a severe pandemic (in terms of health impacts) and in the absence of any intervention, of those who are clinically ill, up to 10% may be hospitalized and 2% may die.
- Individuals who recover from illness caused by the pandemic strain will be immune to further infection by that strain.

2.4 Absenteeism

The following assumption and explanation have been provided by the Department of Finance (federal), Economic Analysis and Forecasting Division, Based on work completed as of September 2006.

- During an outbreak in a specific area, it would be appropriate for employers to plan for a total workplace absenteeism rate of between 20% and 25% during the peak two-week period with lower rates in the preceding and subsequent weeks.
- This contrasts with average total absenteeism in a normal winter of 8%. Peak absenteeism could be expected to vary at the local level and by industry. The health care industry could expect to experience peak absenteeism at the top of this range – the highest of all industries (see Table 1 below). Small work units in which employees engage in a high degree of social interaction could expect higher peak absenteeism than larger work units with less social interaction.
- The prudent planning assumptions are based on modeling conducted by the Department of Finance. They reflect normal absenteeism, peak illness and caregiving absenteeism and a prudent planning buffer to account for heterogeneous effects across work units, possible workplace-avoidance absenteeism and possible absenteeism stemming from public health measures such as school closures.
- Industry variations in normal absenteeism are based on historical data. Estimates of peak illness absenteeism are based on evidence from past pandemics and consistent with a cumulative attack rate of 35%. Estimates of caregiving absenteeism are based on the

historical relationship between sick leave and family leave. Industry variations in peak illness absenteeism are estimated using the historical relationship between total economy and individual industry absenteeism. This relationship is explained by industry variations in social density (the degree to which employees engage in social interaction as part of their work) and in the availability of leave. Below-average morbidity peaks could be expected in relatively low-social-density industries like goods and transportation and warehousing, while above-average peaks could be expected in many services industries, and, in particular, education, health care and social assistance.

- There is no evidence of significant workplace-avoidance absenteeism during any previous pandemic, or during SARS. Nevertheless, it might be prudent for those engaged in business continuity planning to consider the possibility that some workplace-avoidance absenteeism might occur. Possible peak workplace-avoidance absenteeism in individual industries is estimated using a framework in which employees balance the perceived relative risk of the workplace with the cost of an absence. The perceived relative risk of the workplace is determined by the overall morbidity rate and whether an employee or his or her immediate family has already contracted the disease. If workplace-avoidance absenteeism occurs, it could be highest in education services, health care and social assistance and public administration, reflecting a combination of high social density and leave availability in these industries.
- The prudent planning buffer also allows for the impact of possible public health measures such as school closings. All British Columbia public schools and kindergartens were closed for a 2-week period in October 2005 as a result of a teachers' strike. There is no evidence that this caused a reduction in hours worked in the rest of the British Columbia economy. Census data suggests that 3.6 per cent of the workforce would need to make alternative arrangements in the event of school closings. The British Columbia experience suggests that many in this group had access to alternative arrangements that did not require them to miss work. While the experience with the British Columbia teachers' strike suggests limited effects, pandemic-related school closings might require part of the affected workforce to be absent from work.

Table1 : Daily Peak All-Cause Absenteeism by Industry in a Single City – Prudent Planning Assumption (per cent)

	Normal (February)	Illness and Care of Sick	Prudence*	Total
All Industries	8.0	5.6	6.4	20.0
Goods	8.1	3.9	4.9	16.9
Agriculture	7.0	3.1	3.3	13.4
Forestry, Fishing, Mining, Oil and Gas	9.9	3.4	4.7	18.0
Utilities	8.5	4.3	5.6	18.4
Manufacturing	7.5	4.6	5.5	17.6
Services	8.0	6.0	6.9	20.9
Trade	7.0	6.1	6.3	19.4
Transportation & Warehousing	9.5	5.0	5.9	20.4
Finance, Insurance and Real Estate	7.2	6.3	6.6	20.1
Professional, Scientific and Technical Services	6.3	6.1	6.2	18.6
Educational Services	7.5	6.4	8.7	22.6
Health Care and Social Assistance	11.1	6.3	8.2	25.6
Information, Culture and Recreation	3.8	5.7	6.3	15.8
Accommodation and Food Services	6.4	6.3	6.5	19.2
Other Services	6.5	5.0	5.1	16.6
Public Administration	9.4	6.1	7.7	23.2

*includes possible workplace-avoidance absenteeism and additional prudence to reflect work-unit heterogeneity and possible public health measures such as school closings

2.5 Response

- It is unlikely that an effective vaccine will be available at the start of pandemic influenza activity in Canada but it may be available for a second wave.
- Mass immunization campaigns will occur when sufficient quantities of the new vaccine are available; this will increase the demand for public health human resources.
- The use of antivirals to decrease the risk of transmission from the first cases infected with a novel virus and their contacts will be considered as a strategy to contain or slow the spread of novel viruses that have pandemic potential and that are identified in Canada. **The use of this strategy will be limited to cases identified early in the Pandemic Alert Period in Canada**. During the Pandemic Period, this strategy will change to the nationally agreed upon strategy for the pandemic period.
- Public health authorities will manage pandemic vaccine supply when a pandemic vaccine is available, as well as the supply and distribution of antiviral drugs which are contained within the National Antiviral Stockpile.

- The Pandemic Influenza Committee will provide technical expertise during the pandemic period in order to inform the national response and facilitate consistency in response activities across Canada.

3.0 Estimated Impact of an Influenza Pandemic on Canadians

The impact of the next influenza pandemic is difficult to predict; it depends on how virulent the virus is, how rapidly it spreads from population to population, and the effectiveness of prevention and response efforts. Estimates of health and economic impacts are important to guide public health policy decisions and to guiding pandemic planning in the health and emergency sectors.

During "normal" influenza epidemics that occur almost every winter in North America, an average of 10% to 25% of the population becomes ill resulting in an average of 4,000 deaths and 20,000 hospitalizations. During severe influenza A epidemics, 30% to 50% of the population may become ill resulting in 6,000 to 8,000 deaths and 30,000 to 40,000 hospitalizations. The highest rates of infection and clinical illness occur in children but serious complications and death occur mainly in the elderly.

During a pandemic, historic data shows that over 70% of a population may become infected with the novel virus and the age-specific morbidity and mortality may be quite different from the annual epidemics. During the 1918–1919 pandemic, young adults had the highest mortality rates, with nearly half of the influenza-related deaths occurring among persons 20 to 40 years of age. During the 1957–1958 and 1968–1969 pandemics in the United States, persons over 65 years of age accounted for 36% and 48% of influenza-related deaths respectively.

An estimate of the health and economic impacts of a pandemic in Canada was performed in 1999 using a model developed by Meltzer and colleagues, United States Centers for Disease Control and Prevention, Atlanta, Georgia, (available at http://www.cdc.gov/ncidod/eid/vol5no5/meltzer.htm). The assumptions in this model are based on American epidemiologic data on various mutually exclusive population health outcomes (death, hospitalization, outpatient treatment, and ill but with no formal care) for severe annual influenza A epidemics and data from the most recent pandemics (i.e., not the 1918-1919 pandemic). For planning purposes we consider the estimates from this model to reflect a "mild to moderate" scenario in terms of severity of illness. Recently, projections have been made based on a more "severe" scenario. In the severe scenario it is estimated that 2% of clinical cases will die and 10% will require hospitalization for management of their illness. While these higher estimates, which are considered to be more consistent with the outcomes of the 1918-1919 pandemic have been used to describe potential impact of a severe pandemic, to date the emphasis has been on national planning for a pandemic of moderate severity.

The Meltzer model does not include the potential impact of antivirals drugs, public health measures, or an effective vaccine. These estimates, therefore, may over-estimate the potential impact in Canada; they are provided here for planning purposes only and to raise awareness regarding potential health impacts. It is also important to recognize that as the age distribution of the Canadian population changes over time the potential health impacts will also vary. If the age-specific mortality rates remain highest for the age groups on either end of the age spectrum with the elderly having a higher rate than young children (i.e., the typical annual skewed "U-shaped" mortality curve), then as the population ages the potential number of deaths when a pandemic strikes may be higher than projected in this document.

Based on the 1999 analysis using the Meltzer model, during a pandemic of "mild to moderate" severity an estimated 4.5 to 10.6 million Canadians would become clinically ill such that they would be unable to attend work or other activities for at least a half a day (Table 1). This proportion, which represents 15% to 35% of the population, does not include individuals who contract the virus and feel ill but continue their usual activities. In addition, it is estimated that between 2.1 and 5.0 million people would require outpatient care, between 34 thousand and 138 thousand people would be hospitalized and recover, and between 11 thousand and 58 thousand people would die in Canada during an influenza pandemic (Table 1). It is important to note that since these are discrete outcomes the number of people hospitalized during the pandemic will include the entire "hospitalized and recovered" group and those that died in hospital which is expected to be a large proportion of the fatal cases. Moreover, these outcomes would occur as a result of relatively short (6-8 week) pandemic waves, highlighting the intense impact of pandemic influenza compared to other illnesses. These numbers are estimates and do not take into account the differences in the health care systems, practice patterns and health care-seeking behaviour in Canada as compared to the United States or changes in the age-distribution within Canada since 1999; nonetheless, they provide a picture of the magnitude and potential impact of the next influenza pandemic.

Canadian estimates of resource use for patients with these health outcomes and Canadian resource unit costs were applied to provide and estimate of Canadian costs based on this American model. The economic impacts of the health outcomes (direct and indirect) on the health care system and on society were estimated to be between CAN$10 to 24 billion in 1999. This estimate does not include other societal impacts such as those on trade and tourism.

Table 1: Estimated number of cases by outcome for a pandemic of mild to moderate severity

Outcome (based onCanadian Population: 30,301,180)	Attack Rate 15%			Attack Rate 35%		
	Mean number	5th Percentile	95th Percentile	Mean number	5th Percentile	95th Percentile
Death*	17,768	10,544	24,954	41,459	24,603	58,227
Hospitalization with recovery*	46,639	34,042	59,166	108,824	79,431	138,053
Outpatient Care	2,086,327	2,027,496	2,145,282	4,868,097	4,730,825	5,005,657
Ill, no formal care	2,394,443	2,335,458	2,455,967	5,587,035	5,449,401	5,730,591
TOTAL	4,545,177	4,407,545	4,685,464	10,605,415	10,284,265	10,932,623

* Note: Those who die in hospital are not counted in the "hospitalization with recovery" outcome – therefore the number hospitalized during a pandemic will be all of the "hospitalization with recovery" group plus likely a large proportion of the fatal cases.

4.0 Terminology

On April 8, 2005, the World Health Organization (WHO) released an updated version of its 1999 guidance on pandemic planning and preparedness. This new document, *WHO global influenza preparedness plan: The role of WHO and recommendations for national measures before and during pandemics*, (available online at: http://www.who.int/csr/resources/publications/influenza/WHO_CDS_CSR_GIP_2005_5.pdf) contains WHO and national activities organized using new pandemic phase terminology.

To facilitate consistency with the WHO phases and to tie in a descriptor of national levels of novel influenza subtype activity in Canada, the revised nomenclature for Canadian pandemic phases is as follows:

WHO Global Phase . Canadian Activity Level
(example: 3.0)

The WHO Phase number reflects the international risk or activity level with respect to the new influenza virus subtype virus (i.e. Phases 1 to 6) and is determined by the WHO. The Canadian activity level indicator noted after the decimal point would likely be determined by the Pandemic Influenza Committee (PIC) and/or the Public Health Agency of Canada (PHAC) and would summarize the observed new influenza virus subtype activity in Canada. It is proposed that these levels be classified as follows:

0 – No activity observed in Canada,
1 – Single case(s) observed in Canada (i.e., no clusters), and
2 – Localized or widespread activity observed in Canada.

Localized and widespread activity have been combined in one "level" since the response activities associated with these two categories are not sufficiently different to warrant distinguishing between them.

For consistency with the WHO terminology, it was also agreed that the general categories of Interpandemic Period, Pandemic Alert Period, Pandemic Period and Post-Pandemic Period be adopted and used in public communications.

4.1 New Canadian Pandemic Phases and Examples

During the Interpandemic Period (Phases 1 to 2), new emphasis is placed on addressing human health risks posed by animal outbreaks. The Pandemic Alert Period (Phases 3 to 5) now addresses the situation of evolution or adaptation of a novel animal influenza virus with pandemic potential. It places greater emphasis on rapid intervention in an attempt to contain or delay the spread of a new influenza virus subtype in humans. Although it is uncertain if such "containment" measures would be effective or feasible, it is still useful to consider potential early interventions for planning purposes.

Note: The phase terminology used reflects the epidemiological situation and the key objectives of the pandemic response but does not necessarily reflect the level of activation of emergency operations within Canada.

4.1.1 Interpandemic Period

Phase	Definition	Example(s)	Corresponding former Canadian and WHO Global Phases (1999)
1.0	No new virus subtypes have been detected in humans. An influenza virus subtype that has caused human infection may be present in animals located outside of Canada. If present in animals, the risk of human infection and/or disease is considered to be low.	Highly pathogenic H7N3 detected in poultry outside of Canada	Canada: Phase 0, Level 0 Global: Phase 0, Level 0
1.1	No new virus subtypes have been detected in humans. An influenza virus subtype that has caused human infection is present in animals in Canada but the risk of human infection and/or disease is considered to be low.	Highly pathogenic H7N3 detected in a poultry flock in Canada	Canada: Phase 0, Level 0 Global: Phase 0, Level 0
2.0	No new virus subtypes have been detected in humans. However, an animal influenza virus subtype that poses substantial risk to humans is circulating in animals located outside of Canada.	Highly pathogenic H5N1 detected in poultry flocks outside of Canada	Canada: Phase 0, Level 0 Global: Phase 0, Level 0
2.1	No new virus subtypes have been detected in humans. However, an animal influenza virus subtype that poses substantial risk to humans is circulating in animals in Canada.	Highly pathogenic H5N1 detected in poultry flocks in Canada	Canada: Phase 0, Level 0 Global: Phase 0, Level 0

4.1.2 Pandemic Alert Period

Phase	Definition	Example(s)	Corresponding former Canadian and WHO Global Phases (1999)
3.0	Outside Canada human infection(s) with a new subtype are occurring, but no human-to-human spread or, at most, rare instances of spread to a close contact has been observed. No cases identified in Canada.	Outside Canada sporadic human cases are occurring in connection to an avian outbreak.	Canada: Phase 0, Level 0 Global: Phase 0, Level 1 or Phase 0, Level 2 if more than one human case
3.1	Single human case(s) with a new subtype detected in Canada. The virus is not known to be spreading from human-to-human or, at most, rare instances of spread to a close contact have been observed.	Case imported into Canada from area outside Canada experiencing an avian outbreak. Case arising in Canada "de novo" **or** in association with an avian outbreak in Canada.	Canada and Global: Phase 0, Level 1 or Phase 0, Level 2 if more than one human case
4.0	Outside Canada small cluster(s) with limited human-to-human transmission are occurring but spread is highly localized, suggesting that the virus is not well adapted to humans. No cases identified with these cluster(s) have been detected in Canada.	Outside Canada small cluster(s) of human cases with a novel virus are occurring in connection to an avian outbreak.	Canada: Phase 0, Level 0 Global: Phase 0, Level 3
4.1	Single human case(s) with the virus that has demonstrated limited human-to-human transmission detected in Canada. No cluster(s) identified in Canada.	Detection of an imported case in Canada that is infected with the novel virus known to be causing small clusters of human cases outside Canada.	Canada and Global: Phase 0, Level 3
4.2	Small localized clusters with limited human-to-human transmission are occurring in Canada but spread is highly localized, suggesting that the virus is not well adapted to humans.	Detection of a localized cluster of cases in Canada linked to an imported case **or** from cases arising in Canada.	Canada and Global: Phase 0, Level 3
5.0	Outside Canada larger cluster(s) are occurring but human-to-human spread still localized, suggesting that the virus is becoming increasingly better adapted to humans but may not yet be fully transmissible (substantial pandemic risk). No cases identified with these clusters have been detected in Canada.	Outside Canada larger cluster(s) of human cases with a novel virus are occurring.	Canada: Phase 0, Level 0 Global: Phase 0, Level 3

Phase	Definition	Example(s)	Corresponding former Canadian and WHO Global Phases (1999)
5.1	Single human case(s) with the virus that is better adapted to humans detected in Canada. No cluster(s) identified in Canada.	Detection of an imported case in Canada that is infected with the virus known to be causing larger clusters of human cases outside Canada.	Canada and Global: Phase 0, Level 3
5.2	Larger localized cluster(s) with limited human-to-human transmission are occurring in Canada but human-to-human spread still localized, suggesting that the virus is becoming increasingly better adapted to humans but may not yet be fully transmissible (substantial pandemic risk).	Detection of a large but localized cluster of cases in Canada linked to an imported case OR from cases arising in Canada.	Canada and Global: Phase 0, Level 3

4.1.3 Pandemic Period

Phase	Definition	Example(s)	Corresponding former Canadian and WHO Global Phases (1999)
6.0	Outside Canada increased and sustained transmission in the general population has been observed. No cases have been detected in Canada.	Countries outside of Canada have reported sustained transmission of the new virus in their populations.	Canada: Phase 0, Level 0; Global: Phase 1
6.1	Single human case(s) with the pandemic virus detected in Canada. No cluster(s) identified in Canada.	Detection of an imported case in Canada that is infected with the pandemic virus.	Canada and Global: Phase 1
6.2	Localized or widespread pandemic activity observed in the Canadian population.	Large numbers of clinical cases being rapidly identified in Canada with no history of travel to an affected area.	Canada and Global: Phase 1, 2 or 4

4.1.4 Pandemic waves

The new Canadian phase terminology does not include Canadian phases that would denote the end of the first pandemic wave, the interval between waves or the onset of a second pandemic wave. It is expected the Canadian Phase will reflect the highest level of activity occurring in Canada (using the .0, .1 or .2 nomenclature) and that additional details regarding pandemic waves will accompany this communication. Regional and local influenza activity will be communicated as sporadic, localized or widespread; these terms are similar to current national surveillance (FluWatch) terminology.

4.1.5 Post-Pandemic Period

A recovery period (Phase 5 in the 1999 WHO document) would be expected to occur following Phase 6 (i.e. the Pandemic Period) after which there would be a return to the Interpandemic Period (e.g. Global Phase 1 or 2). Indicators for the return to the Interpandemic Period will be likely based on epidemiologic indicators (e.g. the return of annual fall–winter cycle of influenza activity) rather than on a "return to normal" of societal or economic indicators.

4.1.6 Concurrent circulation of two or more new influenza virus subtypes

The WHO has indicated that, in the event of concurrent circulation of two or more new influenza virus subtypes globally, the declared phase will reflect the highest level of risk for a pandemic. The PIC has also decided to use this strategy. For example, if H5N1 is causing sporadic human illness in Asia but no cases have been detected in Canada, the Canadian Phase would be 3.0. Subsequently, if a domestic avian outbreak of H7N3 occurs in Canada at the same time, it will be stated that Canada is in Phase 3.0 due to the H5N1 virus but is also responding to the occurrence of an avian outbreak caused by H7N3. The Canadian Phase would always reflect the status in Canada with respect to the virus with the highest pandemic risk, regardless of whether that virus is present in or outside of Canada.

5.0 Legal Considerations

The legal considerations that arise in the context of pandemic preparedness and response are varied and complex. Given that pandemic influenza is a global concern, planning and preparation requires the coordianted efforts of all levels of government within Canada in addition to international cooperation. It is important to recognize, therefore, that international laws as well as federal and provincial/territorial legislation may be needed to effectively respond to an influenza pandemic.

At the international level, the International Health Regulations (IHRs) provide a legal framework under WHO to protect against and control the international spread of disease while avoiding unnecessary interference with international traffic and trade. The revised IHRs (available at: http://www.who.int/csr/ihr/en/) substantially update the 1969 IHRs that addressed the potential spread of only three diseases: yellow fever, plague and cholera. They also establish a more effective and transparent process to be followed by WHO and states for determining and responding to a public health emergency of international concern (PHEIC). Most importantly, it broadens the scope of international collaboration to include any existing, re-emerging or new disease that could represent a threat internationally.

New provisions in the revised IHRs include obligations for:

1. States to notify WHO of all potential PHEICs;
2. States to develop core capacity for surveillance and response;
3. States to establish a national focal point as the contact point for WHO on all IHR matters (PHAC will be Canada's IHR focal point); and
4. The establishment of a new legal framework for WHO's global health security epidemic alert and response strategy.

In accordance with the IHRs, there are obligations at all levels of governments. In Canada, provinces and territories would use established protocols to report influenza infections of international concern to PHAC (national focal point) and then PHAC would report potential pandemic flu to WHO.

6.0 Ethics and Pandemic Planning

Public health ethics is a new area of inquiry that aims to identify the underlying values and principles that inform public health interventions. It has been noted that "public health ethics requires that public health improvement come through just and respectful means".[1] In Canada, ethics has increasingly informed health policy.[2] Ethical analysis helps to identify in a logical and transparent way how to "do the right thing". Clearly, this is not always easy, as there may be conflicting ethical principles as well as other factors, such as regulations, scientific evidence and comparable policies in other countries, which must be taken into account. In this section, some of the emerging public health ethics principles that have influenced the development of the Canadian Pandemic Influenza Plan (CPIP) for the Health Sector are identified.

Pandemic influenza involves the entire health system, so it is important to consider how clinical ethics and public health ethics intersect. Clinical ethics is focussed on the health and interests of an individual. In contrast, public health ethics is focussed on the health and interests of a population. In an effective health system, these interests are in a dynamic balance. Seminal values in public health ethics are justice and respect for the individual. This reflects the assumption that a population can be healthy only with the collective support of the many individuals within that population. This support arises from the recognition that it is in an individual's best interest to be part of a healthy population.

The importance given to individual and collective interests will shift according to the nature of the health risk being addressed. When a health risk primarily affects an individual, clinical ethics will predominate and a high value will be placed on individual interests. When a health risk affects a population, however, public health ethics will predominate and a high value will be placed on collective interests. For example, during an infectious disease outbreak the public's health is at risk, and thus collective interests will prevail and individual interests may be temporarily affected (such as limitation of travel). Given the foundational values of justice and respect for individuals, public health ethics helps to identify why, when and how to exercise collective interests for the public good.

The organizing principle of public health ethics is the goal of public health itself: to ***protect and promote the public's health***. This organizing principle is reflected in the Plan's two goals: to minimize morbidity and mortality and to minimize societal disruption. The health protection principle is exemplified in the basic strategies identified in the CPIP: detection and surveillance, public health measures, early treatment with antiviral medications, emergency management, and vaccine development. The health promotion principle is addressed through a well-thought out, nationally coordinated communications strategy that informs the

1 Kass NE. Public health ethics: from foundations and frameworks to justice and global public health. J Law Med Ethics. 2004 Summer;32(2)232-42, 190.

2 The Royal Commission on New Reproductive Technologies (1993), for example, made explicit use of an ethical framework in developing health policy recommendations.

public of the risk from a pandemic, and identifies infection control practices that everyone should adopt.

The debates in public health ethics have not centred around the need to protect and promote the public's health, but rather on the means by which to do this. Specifically, one of the greatest debates in pandemic planning has been around the issue of resource allocation. For example, given that 30 million doses of a pandemic vaccine cannot be made available to everyone at the same time, who will get what by when? The ethical principle that has guided these discussions is distributive justice. Distributive justice implies the distribution of resources in a fair and equitable manner based on need. This principle underlies the recommendation that health care workers form a priority group for the vaccine. However, how the distribution is done is important. Discussions on resource allocation that address the hard realities of limited resources bring into focus a seminal ethical principle adopted by public health ethics: respect for the inherent dignity of all persons.[3] This means that although some people may not be eligible for a vaccine initially, they need to be informed and cared for in a way that is respectful and maintains their dignity. This principle will need to inform the allocation of all scarce resources during a pandemic.

Another major debate in public health ethics, is what to do when the promotion of the public's health occurs at the price of individual freedom. Autonomy is a highly valued principle in bioethics yet this can be at odds with protecting the public's health. One principle that has been developed to address this is the principle of least restrictive means.[4] This principle stipulates that personal autonomy should be infringed upon only to the extent necessary to ensure the public good. This is illustrated in certain provincial public health laws. For example, during SARS public health officers quarantined those who may have been exposed to the SARS virus. This is considered to be a justifiable, temporary limitation of personal autonomy in the interests of limiting the spread of a specific communicable disease.

Other principles in public health ethics helped to inform the Canadian Pandemic Influenza Plan: specifically the need to optimize the risk/benefit ratio of any interventions and to maintain transparency and public accountability in public health decision-making. Optimizing the benefit/risk ratio means that the benefit of any proposed intervention needs to be maximized and the risks minimized. Benefit is assessed largely by evidence of efficacy; risk by anticipating any untoward effects of an intervention. However other factors, such as costs, feasibility, legal requirements and Canadian values also need to be factored in. Conducting a careful risk benefit assessment helps public health professionals ensure excellence. This principle also means decisions may need to be revised in the light of new information on risks or benefits. For example, in the 2004 Plan priority groups were identified for both antiviral treatment and prophylaxis. Based on evidence made available since that time, the decision was made to expand our antiviral stockpile, adopt an early treatment for all who need it strategy and conduct a full review of the prophylaxis issue, including public consultations.

Finally, the principles of transparency and accountability have also informed this Plan. Public health decisions should be publicly justifiable, and as such should be open to public review. The need for transparency and accountability are reflected in the planning process and the public access to the plan itself.

3 Beauchamp TL, Childress JF. 2004. Principles of Biomedical Ethics, 4th Ed. Oxford University Press, New York.

4 Upshur, RE. Principles for the justification of public health interventions. Can J Public Health. 2002;93(2):101-3.

In summary, the principles of public health ethics have informed both the goals of this Plan, and the manner in which those goals should be realized. These principles create a very high standard for public health interventions. A number of ethics-related initiatives are underway both within government and within the academic sector.[5] These initiatives will advance the new field of public health ethics and inform future editions of the Plan.

Summary of the ethical principles informing the Canadian Pandemic Influenza Plan for the Health Sector (2006)

1. Protect and promote the public's health
2. Ensure equity and distributive justice
3. Respect the inherent dignity of all persons
4. Use the least restrictive means
5. Optimize the risk/benefit ratio
6. Work with transparency and accountability

5 One example is the Ontario Health Plan for an Influenza Pandemic 2006 that identifies an ethical framework for decision-making, adapted from Gibson J et al. Ethics in a Pandemic Influenza Crisis. Framework for Decision Making. Joint Centre for Bioethics. University of Toronto (2005).

Section Three

PREPAREDNESS

Table of Contents

1.0 Introduction

1.1 Background

The Preparedness Section of the Canadian Pandemic Influenza Plan for the Health Sector (the Plan) addresses prevention and preparedness activities expected to be undertaken predominantly during the Interpandemic Period. It is based on the deliberations of a number of pandemic influenza working groups as well as the input of other stakeholder groups and organizations.

The purpose of the Preparedness Section is to provide information and guidelines that can be used in the development of plans for federal, provincial and territorial (F/P/T) and local management of an influenza pandemic.

1.2 Populations Under Federal Jurisdiction

Across Canada, various federal departments and agencies provide a varied range of health services to a number of "populations." These populations (e.g. First Nations reserves, large military bases, federal prisons) could potentially cause an unprecedented increase in demand for health services in local health regions during a pandemic. Advanced planning is required to ensure that all P/Ts and regions in close proximity to these populations, as well appropriate federal authorities, have agreed-upon roles and responsibilities in the event of a pandemic.

The current status, outstanding issues and next steps for coordinated planning for First Nations communities are addressed in Annex B. Annex B also puts forward the proposed roles and responsibilities of different players to ensure proper and equitable management of pandemic influenza in First Nations communities.

Discussions at the federal level have been initiated to ensure that the needs of other populations under federal jurisdiction are also addressed within the context of a coordinated pandemic response. These activities should be discussed at the P/T and local levels where many of the issues may have been already raised.

1.3 Emergency Management and Coordination

As a result of recent emergencies, which include the terrorist attacks of September 11, 2001, and severe acute respiratory syndrome (SARS), the Government of Canada has taken a critical look at the way major emergencies are being managed. Following consultation with P/T and regional stakeholders, the federal government has taken and is implementing a number of measures to improve preparedness and response.

One such measure was the consolidation of federal programs related to security and emergency preparedness into a new department, Public Safety and Emergency Preparedness Canada (PSEPC); another was the creation of the Public Health Agency of Canada (PHAC). An identified need for leadership and coordination of activities, while respecting P/T jurisdictions, was fundamental to these changes.

The changes are now resulting in emergency management systems being reviewed, updated or changed. For example, Health Canada (HC) and PHAC are revising their emergency management structure to incorporate the approach of the well-established Incident Management System and to bring it in line with the National Emergency Response System that is also being developed by PSEPC. One common objective of these changes is to ensure that Canada has a complementary framework for dealing with emergencies that transcend provincial or national boundaries, such as a pandemic influenza.

An influenza pandemic is a complex public health emergency and as such the respective Ministries of Health have the primary responsibility for planning. Current activities also include coordination with other sectors to support both the health response and to maintain societal function. For example, as of November 2005, the federal government now has a Deputy Ministers' Committee on Avian and Pandemic Influenza Planning, which will direct and provide oversight for the coordination of all Government of Canada activities related to planning and preparedness for avian and pandemic influenza. In terms of F/P/T activities, Emergency Management Organizations (EMOs) are now represented on the Pandemic Influenza Committee. The "EMO role" is consider to be three fold: 1) managing the normal range of non-health events, 2) coordinating the provision of social/societal support to community residents, and 3) providing support to the health sector as requested and as appropriate, the latter being primarily in the coordination of surge related logistics support. During the pandemic, emergency management organizations at all levels will be engaged in managing the non-health consequences, such as the continuity of operations of essential services impacted by absenteeism.

It is anticipated that the emergency management and coordination of a response to an influenza pandemic will be based on existing plans and structures for health emergencies at all levels of government, including the involvement of the F/P/T Emergency Health Services (EHS) and Emergency Social Services (ESS). The unique aspects of responding to an influenza pandemic need to be addressed as part of preparedness activities; this is so all stakeholders involved in the response are well versed in how a generic health emergency response structure might be modified for pandemic influenza. An Emergency Social Services Generic Infectious Disease Plan is currently under development. This plan will outline pandemic response roles for ESS and the Centre for Emergency Preparedness and Response (CEPR).

See Annex L for more information about the Canadian emergency preparedness and response system.

2.0 Components of Pandemic Preparedness

The components of the 2004 edition of the Plan included surveillance, vaccine programs, antivirals, health services, emergency services, public health measures and communications. In this edition of the Plan, the emergency services component has been removed; it is now addressed as part of the preparedness for overall emergency management and coordination.

Federal, provincial, territorial and local planners are encouraged to consider the psychosocial implications of pandemic influenza when developing their plans for preparedness and response activities. It is anticipated that a component focusing on psychosocial issues will be added to future versions of the Plan.

Each of the Plan components in this section is addressed in terms of current status (including outstanding issues), and planning principles and assumptions. A list of potential planning activities is also included.

2.1 Surveillance

Influenza surveillance is required to identify when, where, and which influenza viruses are circulating, the intensity and impact of influenza activity, and high-risk populations. It is also required to detect unusual events (e.g. new strains, unexpected outcomes, changes in distribution or severity). Both virologic and disease surveillance are necessary for identifying influenza virus variants and for determining their ability to spread and cause disease. Surveillance data will drive the pandemic response because it will be used to determine the pandemic phase and to track progression through the phases. FluWatch, Canada's national influenza surveillance program, includes surveillance activities that aim to meet the general objectives stated below.

Laboratory surveillance involves the isolation of influenza viruses for analysis of antigenic and genetic properties. This activity is essential for monitoring the antigenic drift and shift of influenza viruses circulating among humans. Because the signs and symptoms of influenza are similar to those caused by other respiratory pathogens, laboratory testing must be conducted to definitively diagnose influenza. Rapid identification of a novel influenza virus and timely tracking of virus activity throughout the duration of the pandemic is critical to the success of a pandemic response. Prompt identification of a novel strain increases the lead-time for the development of a vaccine and the implementation of prevention and control measures.

The collection of epidemiologic data on influenza-like illness (ILI) and influenza-related hospitalizations and deaths is essential for determining the extent and severity of influenza epidemics. Access to real-time data is particularly important during outbreaks or epidemics associated with a newly recognized influenza variant. Determination of epidemiological parameters and indicators (e.g. indicators of human-to-human transmission, incubation period, period of communicability) is critical to informing the public health response. During the pandemic, epidemiologic data will be used to inform those developing prevention and control strategies, for example those strategies that require the identification of high-risk groups.

Jurisdictions need to be prepared to rapidly implement or modify enhanced surveillance activities. For the purpose of informing public health risk assessment and response activities, a coordinated and rapid epidemiological investigation that includes the collection, collation and analysis of detailed epidemiological, laboratory and clinical data is required. Further, rapid sharing of data and efficient communication at all levels of government are critical for facilitating a coordinated response.

The objectives of influenza surveillance are to:

- Provide data on currently circulating strains and facilitate comparison with vaccine composition and vaccine recommendations.
- Describe the affected population thereby facilitating the identification of high-risk groups and comparisons with other populations or other influenza seasons.
- Detect unusual events including unusual or new strains, unusual outcomes and/or syndromes, or unusual distribution or severity of the disease in the population.
- Inform the pandemic response through the early detection and tracking of the emergence, spread and impact of novel influenza viruses in the population.

2.1.1 Current Status

The national FluWatch surveillance system incorporates data on a weekly basis, year-round. Data sources include ILI surveillance from a sentinel primary-care network, virologic data from the national network of laboratories, influenza activity levels reported from P/T jurisdictions, and real-time paediatric morbidity and mortality data from the Immunization Monitoring Program, ACTive (IMPACT) surveillance network. Data akin to that provided by IMPACT for the paediatric population are not currently available for the adult population, however pilot projects are underway.

At the federal level, regular environmental scanning for the detection of potentially significant ILI is conducted using official information sources for influenza surveillance (e.g. World Health Organization [WHO] and government influenza surveillance programs from other countries) and unconfirmed reports from early warning systems (e.g. ProMed and other media scanning software, such as the Global Public Health Intelligence Network).

On an ongoing basis, the newly created national expert Working Group for Vaccine Preventable and Respiratory Infections Surveillance (VPRIS-N) will be assessing surveillance systems and making recommendations for enhancements and improvements for the Interpandemic, Pandemic Alert and Pandemic Periods. Recommendations from this group are being refined on an ongoing basis; current recommendations are included in Annex N, Pandemic Influenza Surveillance Guidelines.

The need for timely surveillance for severe respiratory illness in travellers and the development of special study protocols that can be activated at the time of a pandemic has been recognized by the Pandemic Influenza Committee (PIC) and currently remains an outstanding issue.

The Canadian Public Health Laboratory Network has updated the laboratory guidelines for pandemic planning and preparedness (Annex C, Pandemic Influenza Laboratory Preparedness Plan). There is a need to enhance laboratory-based surveillance including laboratory-testing capacity and the standardization of testing protocols. Progress has been made with respect to the increasing the capacity to detect novel influenza viruses in Canada. The National Microbiology Laboratory now has the ability to detect all novel influenza subtypes and the capacity to do antiviral resistance testing, and provincial laboratories are developing the capacity to perform polymerase chain reaction testing for novel subtypes.

Progress has also been made with respect to linkages and collaboration with animal health experts involved in influenza surveillance and control.

2.1.2 Planning Principles and Assumptions

During each phase of a pandemic, epidemiologic and virologic data needs will change. Surveillance objectives during each phase will aim to meet the evolving information needs that will occur during the pandemic. Accordingly, surveillance roles and responsibilities for all levels of government are outlined by phase in Annex N, Pandemic Influenza Surveillance Guidelines.

Because surveillance data will drive the pandemic response, it is important that physicians and other health care workers are educated and updated on an ongoing basis about the importance of ILI surveillance as well as their roles in the system. Surveillance systems must be established in advance of a pandemic because there will be little time to augment capacity at the time of a pandemic. At the time of a pandemic, surveillance and laboratory-testing capacity will be reduced (e.g. due to staff absenteeism and potential supply shortages) compared with pre-pandemic periods; only streamlined, resource-efficient systems will

continue to function. Special study protocols if required (e.g. to determine epidemiology or to investigate reported adverse events following immunization) at the time of a pandemic must be developed and pretested during the pre-pandemic period, recognizing that refinements may be necessary at the time of a pandemic.

The intensity and methods of virologic surveillance will differ depending on the phase of the pandemic. Initially, efforts should be directed at detecting the arrival of the novel virus into previously unaffected areas and collecting epidemiologic data on infected persons. This data will be used to characterize virus activity and to better target prevention and control measures. In addition, the arrival of the novel virus in a particular area will guide the mobilization of resources that are needed to implement control measures. After the virus has spread throughout the country, a basic level of virologic surveillance should continue in order to detect any changes in the virus, including the development of resistance to antiviral drugs in different populations. Targeted studies may include serologic studies of immunity to the virus in different populations.

Studies of the etiologic agents that are responsible for secondary complications of influenza and their susceptibility to antimicrobial drugs will also be important, especially in times of short supply. In addition, surveillance data and targeted studies will be useful in assessing the impacts of the pandemic on the health care system as well as its social and economic impacts.

2.2 Vaccine Programs

Vaccination of susceptible individuals is the primary means to prevent disease and death from influenza during an epidemic or pandemic. The National Advisory Committee on Immunization (NACI) produces annual recommendations on the use of influenza vaccine in persons who are most at risk for influenza or those who could spread influenza to persons at greatest risk. These interpandemic recommendations are published annually in the *Canada Communicable Disease Report*. In the event of a pandemic, PIC, which includes representation from NACI, will provide recommendations to F/P/T immunization programs on the development, production and use of the pandemic vaccine, and priority groups for immunization. Efforts should be made to encourage all jurisdictions to adopt the national recommendations on priority groups at the time of a pandemic in order to facilitate equitable access and consistent messaging.

The objectives of the pandemic vaccine program are to:

- Provide a safe and effective vaccine program to all Canadians as quickly as possible.
- Allocate, distribute and administer vaccine as rapidly as possible to the appropriate groups of people.
- Monitor the safety and effectiveness of vaccination programs.

2.2.1 Current Status

The annual influenza vaccine available in Canada is a trivalent vaccine, which is composed of two influenza A subtypes and one influenza B subtype. The vaccine contains 15 micrograms of hemagglutinin antigen for each constituent strain. For adults and older children previously exposed to viruses similar to those present in the vaccine, a single dose is normally recommended. In children (under the age of 9 years) lacking such previous exposure, two doses are recommended.

Currently, Canada uses approximately 10 million doses of trivalent influenza vaccine a year (equivalent to 30 million monovalent doses of 15 micrograms), which are delivered mainly by publicly funded programs with established vaccine delivery infrastructures. Provinces and territories vary in their target populations for annual influenza programs; the majority provides vaccine to NACI-recommended high-risk groups. Some P/Ts have expanded their programs to include populations not currently identified as high-risk groups (e.g. the Ontario "universal" program) and have experience in conducting large influenza vaccination campaigns.

Influenza vaccine is usually available in October of each year and is currently provided by three suppliers. Annual influenza immunizations are administered in a variety of settings across Canada, including physician offices, public health clinics at schools or other community settings, workplace clinics and other settings (e.g. pharmacies).

The Canadian approach to vaccine procurement and supply contingency planning includes the development of the domestic infrastructure, a standby supply of fertilized hens eggs and other essential vaccine production supplies, the phasing-in of new technologies and further security of supply through multiple suppliers. In 2005, the federal government committed CAN$34 million to the development of prototype ("mock") vaccines to facilitate testing and streamlining of the pandemic vaccine strategy.

Health Canada is the regulatory authority in Canada that is responsible for ensuring the safety, efficacy and quality of all drugs, including vaccines, marketed in Canada for human use. Vaccine regulation in Canada is subject to the provisions of the ***Food and Drugs Act*** and Regulations. New vaccines are authorized for marketing in Canada following the review of data that is submitted by the manufacturer to support the safety, efficacy (immunogenicity) and quality of the vaccine. The regulatory challenge for a pandemic influenza vaccine will be to have mechanisms in place that can be used to review and authorize a safe and efficacious vaccine for use in Canada, within the shortest time frame possible, and to verify, once that vaccine is in use, that it is effective. Health Canada has prepared a regulatory preparedness strategy, outlining how this authorization will be accomplished in the circumstances of a pandemic. This documentation is available on the internet at:
http://web.hc-sc.gc.ca/ dhp-mps/brgtherap/reg-init/vac/pandemicvaccine_nov2005_e.html
http://web.hc-sc.gc.ca/dhp-mps/brgtherap/reg-init/vac/pandemicvaccine_nov2005_f.html

Although enough vaccine will be made to immunize all Canadians, it is anticipated that the new pandemic vaccine will become available in batches, necessitating prioritization within the population as the initial doses become available. The Vaccine Working Group has made recommendations with regard to the priority groups for immunization in the event of a pandemic (see Annex D, Recommendations for the Prioritized Use of Pandemic Vaccine). In addition, P/T and local jurisdictions have developed guidelines for planning a mass immunization campaign (e.g. *Mass Immunization Campaigns: A 'How To' Guide*, Capital Health Region of Alberta, April 2000, and *Guideline to Planning a Mass Immunization Campaign*, Waterloo Region Community Health Department, Ontario, January 2001), Guide pour la réalisation d'une vaccination de masse – À l'usage des directions de santé publique,

Ministère de la Santé et des Services sociaux, Février 2006); these can be adapted for use during a pandemic. (Access these documents through the respective organizations). The Vaccine Working Group will also develop guidelines for monitoring of vaccine use during a pandemic and identify issues related to adverse events following immunization (AEFI) tracking and liability. In addition, this group with other experts will provide input into clinical trial protocols.

The Immunization and Respiratory Infections Division of the Centre for Infectious Disease Prevention and Control (CIDPC) maintains an AEFI surveillance system. Reports of adverse events associated with influenza vaccination are monitored through reports from P/T Ministries of Health (approximately 95%), with some being reported by health care professionals and manufacturers directly to Health Canada (approximately 5%). The reporting is based mainly on voluntary notifications by clinicians and public health nurses, although there is a legal reporting requirement in some P/Ts such as Saskatchewan, Ontario, Quebec and Nova Scotia. The network of children's hospitals that participate in IMPACT provide data on hospitalizations of children with possible AEFIs.

Outstanding issues with respect to vaccine programs include the dose in micrograms required to achieve a protective response to a novel strain in a naive host, if one or two doses of vaccine will be required, and the timing of vaccine availability in conjunction with onset of pandemic activity in Canada. This information is unlikely to be available until the pandemic has begun. Continued international vaccine research efforts are a priority, including clinical studies to evaluate influenza vaccines that contain novel subtypes (e.g. H5N1 vaccines) in immunologically naive populations. Priorities also include the development and evaluation of new vaccine technologies (e.g. non-egg based production technologies, recombinant vaccines, adjuvant vaccines) to increase the capacity to produce an effective pandemic vaccine, reduce the lead time for vaccine production and increase the capacity to vaccinate larger populations.

Another outstanding issue is the equitable distribution of vaccine to P/Ts and the development ofimplementation plans. The implementation plans will need to take into account the vaccination of federal populations (i.e., First Nations, Royal Canadian Mounted Police, Canadian Forces and federal penitentiary inmates).

2.2.2 Planning Principles and Assumptions

The vaccines currently available in Canada are inactivated vaccines that are manufactured in fertilized hens' eggs. This production depends on egg availability, and it is characterized by stringent time requirements for the identification of vaccine candidate strains, the preparation of seed lots, testing and licensing, and manufacturing and distribution. Manufacturers typically require a minimum of 48 days from the availability of the seed strain to the production of the first lot of vaccine for testing.[1] Delays in the production of pandemic vaccine seed strains may occur as highlighted by the difficulties encountered in trying to produce a vaccine against the H5N1 virus that was involved during the 1997 Hong Kong outbreak. Consequently, vaccine may not be available when the first wave of the pandemic strikes Canada.

1 The figure of a minimum of 48 days for availability of first lot (through to availablility of internal quality control tests) assumes delivery of seed virus on day 0 and receipt of the ncessary reagent on later than 13 days after the seed strain has been provided.

At the time of a pandemic, it is assumed that monovalent vaccines containing only the pandemic strain will be used. The dosage and schedule of the pandemic vaccine needed to induce immunity in different populations must be determined through clinical testing. Where possible, clinical testing with vaccines for novel virus subtypes should be performed during the Interpandemic Period and confirmatory trial for the specific pandemic vaccine should be carried out at the time of a pandemic.

It is assumed all persons who lack previous exposure to the pandemic virus subtype will likely require two doses of vaccine, but the dosage is unknown (e.g. two 15-microgram doses or higher). It may be possible to give in advance an initial immunization with a generic vaccine of the correct H type and then give a second dose with the specific antigen. If that is possible, domestic vaccine production and immunization could begin before Canada has the required specific strain. Strategies to enhance the immunogenicity of influenza vaccines and reduce the amount of antigen required (e.g. use of adjuvants, whole-cell vaccines, intradermal route of injection) require further research.

Most countries will probably view a pandemic as a national health emergency or a threat to national security, therefore embargos on vaccines must be anticipated by countries with capacity for influenza vaccine production. Canada has invested in a domestic supplier to offset this possibility.

When vaccines become available, initial supplies may not be sufficient to immunize the whole population and prioritization of vaccine administration will be necessary. The F/P/T governments will control the allocation and distribution of influenza vaccine during a pandemic and will implement specific recommendations with regard to priority groups for immunization. Priority groups, based on the overall pandemic preparedness goal of minimizing serious illness, overall deaths and societal disruption, have been proposed in Annex D, Recommendations for the Prioritized Use of Pandemic Vaccine. However these priority groups may change when more is known about the epidemiology of the pandemic. It is assumed that for a two-dose program, completion of the second dose should be carried out as soon as possible to effect immunity; administration of the second dose should not wait until after every priority group has received a first dose. This strategy will require extensive planning that involves tracking and recall mechanisms.

The aim during a pandemic is to vaccinate the whole Canadian population on a continuous prioritized basis as quickly as possible. The current domestic pandemic vaccine production capacity is 8 million 15 microgram (ug) doses per month as specified in the current contract with this supplier. The possibility of increasing this capacity is currently being explored. Knowledge regarding anticipated schedules (i.e., antigen per dose, number of doses, and interval between doses) to optimize immunity may be derived from prototype vaccine clinical trails before a pandemic. Further clinical trails may be needed at the time of the pandemic. Vaccine recommendations may not be finalized until pandemic activity has commenced. These recommendations will be distributed as national guidelines as soon as possible, to facilitate a consistent and equitable approach.

For vaccine program planning purposes, it is important to be prepared to immunize 100% of the population; however, the actual proportion of the population that will voluntarily seek vaccination will depend on public perception of the risk and the severity of the disease. Therefore, the demand, which will manifest as clinic attendance, will likely vary among jurisdictions and within each jurisdiction as the pandemic evolves. Previous experience with outbreak-related immunization clinics indicates that it would be prudent to prepare for an initial demand of 75% of the target population. It is recommended that planning activities also

focus on delivering a two-dose program to ensure that the public health response is ready to deal with this possibility.

A plan needs to be in place to monitor vaccine safety and to ensure the timely communication of any potential adverse event following immunization (AEFI) during the pandemic. Information on potential AEFIs must still be communicated in a timely manner from local to P/T public health authorities and on to the Immunization and Respiratory Infections Division, CIDPC, PHAC. The CIDPC will provide information to the Biologics and Therapeutic Products Directorate, HC and other stakeholders. Specific targeted studies and epidemiological investigations may be required in addition to passive surveillance.

Clinical trial protocols should be developed in advance of a pandemic and updated as needed, based on available knowledge about influenza vaccines and changing technologies. Phase three clinical trials for vaccine efficacy may not be performed prior to the implementation of vaccine programs at the time of a pandemic. Estimation of vaccine effectiveness may need to be carried out by studying predetermined target populations during the pandemic. The PHAC will coordinate studies on vaccine effectiveness with P/Ts, researchers and the vaccine manufacturer.

During the Interpandemic Period, consideration should also be given to improving pneumococcal vaccination coverage levels in NACI-recommended "high-risk" groups and to optimizing vaccine coverage in children with the 7 valent conjugate vaccine. *Streptococcus pneumoniae* is a common cause of secondary bacterial pneumonia. The incidence and severity of secondary bacterial pneumonia during the pandemic may be reduced if there is a high level of immunity to the most common serotypes of *Streptococcus pneumoniae* in the high-risk groups.

2.3 Antivirals

Vaccines, when available, will be the primary public health intervention during a pandemic. However at the start of the pandemic, vaccines may not be available as soon as required and two doses of vaccine may be necessary to achieve an adequate immune response. Antivirals (anti-influenza drugs) are effective for both treatment and prophylaxis of annual influenza. These drugs were not available during past pandemics, but are expected to be effective against pandemic strains of the influenza virus. Antivirals will likely be the only virus-specific intervention during the initial pandemic response. Protection afforded by antivirals is virtually immediate and does not interfere with the response to inactivated influenza vaccines.

Two classes of antiviral drugs are currently available in Canada for the prevention and treatment of annual influenza infection: M2 ion channel inhibitors (cyclic amines) and neuraminidase inhibitors. M2 ion channel inhibitors interfere with the replication cycle of influenza A, but they are not effective against influenza B. Amantadine and rimantadine are examples of M2 ion channel inhibitors. Zanamivir and oseltamivir are examples of neuraminidase inhibitors. These drugs interfere with replication of both influenza A and B viruses and are well tolerated; they have been used effectively for the prophylaxis and treatment of influenza A and B infections. The latest data regarding these drugs and recommendations for their strategic use are provided in Annex E, Planning Recommendations for the use of Anti-influenza (Antiviral) Drugs in Canada during a Pandemic.

The objectives of the antivirals initiative are to:

- Recommend a strategy for the use of antivirals during a pandemic.
- Address issues around the security of supply of antivirals.
- Monitor drug resistance during the pandemic.
- Facilitate planning to ensure the distribution of antiviral drugs in the national stockpile according to the nationally agreed upon strategy.

2.3.1 Current Status

The neuraminidase inhibitor oseltamivir, previously approved in Canada for treatment purposes only, was approved for post-exposure prophylaxis in December 2003. Prior to December 2003, only amantadine was approved for use in Canada for both prophylaxis and treatment of influenza A infections. Rimantadine is not currently approved for use in Canada, and zanamivir is approved for treatment purposes only. At this time neuraminidase inhibitors are much more expensive than amantadine which is made by several generic drug manufacturers.

Antivirals are usually prescribed during the annual influenza season by individual physicians on a first-come, first-served basis. Early in the 2005-2006 influenza season higher than expected demand, possibly due to heightened public concern regarding the outbreak of avian influenza in Asia, resulted in the manufacturer of oseltamivir limiting public access to this drug. This move was intended to ensure that sufficient quantities of this previously relatively low usage drug would be available for the management of influenza outbreaks in institutions for the duration of the annual influenza season. While the supply of oseltamivir is expected to increase, this occurrence highlights the potential surges in demand that may occur both in the public and private sector as recognition and use of this drug increases.

The WHO has encouraged countries, where it is economically feasible, to start stockpiling antiviral drugs because not only national but global supplies of antivirals could be consumed rapidly at the start of a pandemic. Many developed countries now have antiviral stockpiles, at least 10 of which intend to stockpile enough neuraminidase inhibitors to treat 20-40% of their population.

In Canada, a National Antiviral Stockpile composed of 1.6 million treatment courses of oseltamivir was established in the fall of 2004 to ensure that all P/Ts would have access to antiviral drugs. The antivirals from this stockpile were distributed on a per capita basis to the P/Ts. Further work in this area yielded recommendations from the national Antivirals Working Group and the PIC to increase the size and diversify the composition of the national stockpile.

At a joint meeting of the Council of Chief Medical Officers of Health (CCMOH) and the Public Health Network in February 2006, recommendations for the size, composition and use of the National Antiviral Stockpile were formalized. In alignment with the overall goals and principles of the Canadian Pandemic Influenza Plan, it was recommended that the size of the National Antiviral Stockpile be increased to 55 million doses (5.5 M treatment courses) of neuraminidase inhibitors[2] in order to provide for early treatment of those with illness. It was

2 This recommendation was endorsed by the F/P/T Ministers of Health in May 2006 when the Ministers agreed to seek authority as necessary to increase the joint National Antiviral Stockpile from 16 million to 55 million doses.

agreed that the national stockpile should be used for early treatment with targeting those with ILI who are deemed to be most at risk of serious morbidity and mortality. Furthermore, there was agreement that a national process should be developed, including broad consultation, to facilitate more informed decision making regarding the inclusion of antivirals for prophylaxis in the national stockpile.

It was also recommended at this meeting that the national stockpile be composed of approximately 10% zanamivir and sufficient oseltamivir solution (approximately 2 million doses) to treat young children and people who cannot swallow capsules. In addition, as part of a comprehensive containment strategy, it was agreed that a specified quantity of antiviral drugs should be designated for containment of spread of a novel virus during the Pandemic Alert Period in the event that this becomes necessary in Canada. The use of antivirals as part of the containment measures during the Pandemic Alert Period is briefly addressed in Annex M, Public Health Measures. Development of a comprehensive containment strategy requires further planning and discussion at the national level.

In addition to the National Antiviral Stockpile, the National Emergency Stockpiling System (NESS) also contains oseltamivir which could be used during domestic avian influenza outbreaks or for P/T support during the Pandemic Alert or Pandemic Period.

Mechanisms for the delivery, administration and monitoring of the use of antivirals still needs to be addressed with most of the implementation details requiring P/T and local level planning. Other outstanding issues include the development of protocols for monitoring drug resistance during the pandemic and for determining the appropriate treatment dose and duration for the novel virus.

Health Canada currently receives adverse drug reaction reports from health care providers. Although further discussions are required on the unique needs of monitoring the extensive use of antivirals during a pandemic, it is expected that the current reporting system will be used.

2.3.2 Planning Principles and Assumptions

An effective intervention with antivirals will require:

- a secure supply (i.e. stockpile(s) of effective drugs);
- a well-planned distribution and monitoring system under the direction of F/P/T governments in collaboration with suppliers;
- a strategy enabling early access to treatment;
- availability of rapid diagnostic tests for influenza;
- enhanced surveillance for the detection of the virus, resistance of the virus to antivirals and drug-associated adverse events;
- clinical guidelines for the appropriate use of antivirals;
- study protocols to further assess the effectiveness of antivirals during a pandemic; and
- effective communication and education materials on antivirals for health care workers and the public.

The Antivirals Working Group is currently addressing many of these issues.

During a pandemic, antiviral strategies should use all the types of effective anti-influenza drugs that are available to Canadians, and should be adaptable to changing disease epidemiology and vaccine availability. If the novel virus is found to be susceptible to

amantadine, which is not currently part of the National Antiviral Stockpile, it is recommended that amantadine be used for prophylaxis (not treatment) only. Oseltamivir could be used for both treatment of cases and prophylaxis. The efficacy of oseltamivir and amantadine are approximately equal for the treatment of cases infected with sensitive strains; however, amantadine is recommended exclusively for prophylaxis to minimize the development of amantadine resistance (which would render the drug ineffective) during the pandemic. The timing of the use of antivirals during a pandemic should be guided by local surveillance data.

Planning by the health sector should focus on implementation of an early treatment strategy using neuraminidase inhibitors (mostly oseltamivir), as this has been agreed upon as the use for the drugs in the current National Antiviral Stockpile. In determining this approach consideration was given to the effectiveness, efficiency and ethical implications of the strategy and the role of the antiviral strategy as one part of the comprehensive response.

The role and impact of antivirals in preventing transmission and slowing down the spread of a novel influenza virus during the Pandemic Alert Period is unknown. Although this potential role is now under discussion as part of the containment measures for the Pandemic Alert Period, it is currently not recommended for the Pandemic Period.

Depending on the epidemiology of the pandemic, the recommended treatment course (e.g., if changes need to be made to duration or dosage), and the antiviral supplies available at the time, it may be necessary to focus on treating those at highest risk for complications. This decision will be made based on the information available at the time. For planning purposes, those implementing the strategy need to determine in advance:

- how patients would be identified and managed in order to receive the antivirals in a timely manner (i.e., ideally within 48 hours of symptom onset),
- any screening procedures for identification of high-risk or pregnant/nursing women,
- how the different drugs in the stockpile would be dispensed (e.g., oseltamivir suspension, zanamivir) and supplies monitored.

2.4 Health Services Emergency Planning

During the pandemic there will be a marked increase in demand for people (health care providers and others) to care for the sick and for appropriate locations and equipment to facilitate the provision of health care. Communities and health care organizations will need to have plans in place that will address what will be done when the health care system is overwhelmed and care must be provided by persons, both health care workers and volunteers, doing work that is not normally part of their daily activities and possibly in settings not usually used for health care.

The objectives of health services emergency planning are to:

- Identify issues that will require multi-level collaborative planning during the Interpandemic Period.
- Facilitate awareness of the potential impact of a pandemic on the health care system.
- Prepare resources and guidelines that may be adapted during a pandemic.

2.4.1 Current Status

Outbreaks of influenza occur annually in Canada. The morbidity and mortality during any given influenza season depends mainly on the circulating strain(s) of influenza virus and the susceptibility of the population. Those normally at high risk of influenza complications are the elderly, persons with chronic cardiac or respiratory conditions, and the immuno-compromised.

The spectrum of illness seen with influenza is extremely broad and ranges from asymptomatic infection to death, which is frequently due to secondary bacterial pneumonia or exacerbation of an underlying chronic condition. Many institutions in Canada are presently running at maximal or near maximal bed capacity. Even currently, during peak annual influenza activity, it is difficult for many facilities to manage the increased demand for beds and emergency room care. A report by the Manitoba Centre for Health Policy and Evaluation showed that the total number of hospital admissions and ambulatory visits provided by the Winnipeg health care system increased only slightly (5% to 7%) during severe influenza seasons; however, the number of patients presenting with ILI increased substantially (approximately 70% for ILI related admissions and 35% to 40% for ILI related physician visits). (This report is available at: http://www.umanitoba.ca/centres/mchp/reports/reports_97-00/seasonal.htm). The report suggests that there is an overall maximum level of service that can be provided; it increases somewhat in response to need, but the patient mix that requires care also affects it.

The scarcity of health resources will be exacerbated during a pandemic and could exceed the capacity of the current health care setting to cope; therefore, it is imperative that planning occur at the individual facility level in addition to regional and P/T levels. "FluSurge" is a spreadsheet-based model that provides the user with estimates of the surge in demand for hospital-based services during an influenza pandemic. The program estimates the number of hospitalizations and deaths attributable to an influenza pandemic (the length and virulence of the pandemic are determined by the user) and compares the number of persons hospitalized, the number of persons requiring care in intensive care units, and the number of persons requiring ventilator support during a pandemic, with existing hospital capacity. This program is a useful tool for local and regional level planners, and it is available free of charge on the United States Centers for Disease Control and Prevention Web site at: http://www.cdc.gov/flu/flusurge.htm. This program might also be of assistance when examining the potential increased demand for health care related supplies and equipment. Given that many facilities operate on a "just in time" delivery system for medical supplies, strategies for dealing with a sudden increase in demand should be developed in advance of the pandemic.

Various PIC working groups have developed health services guidelines to assist acute- and chronic-care institutions, health care planners, clinicians and other stakeholders with planning for and coping with large numbers of influenza cases, some of whom may have severe disease or life-threatening complications. These guidelines are presented as annexes for ease of use. They can be broadly classified into the following categories, which correspond to the main responsibilities of each of the working groups: clinical care, infection control (including physical management) and occupational health for traditional and non-traditional settings, resource management and non-traditional workers. The annexes provide options, worksheets and guidelines to facilitate planning for a consistent and comprehensive response within the health sector.

The working groups will also be looking at training and education modules for health care workers, volunteers and the public, and aftercare and recovery planning issues.

2.4.2 Planning Principles and Assumptions

Because of the broad scope of planning activities, this section has been subdivided according the subgroups that have worked on them. Documents or tools in the annexes will be referred to where relevant.

i) **Infection prevention and control, and occupational health**

The incubation period for influenza usually ranges from 1 to 3 days. Person-to-person transmission of influenza virus occurs through droplets from the respiratory tract that are spread by direct contact, through coughing or sneezing, or by hands (or other surfaces) contaminated with respiratory secretions. The importance of the airborne route in transmission is unknown. Influenza is highly contagious; it can spread quickly in settings where large groups of people (e.g. institutionalized populations) are gathered together.

The period of communicability for influenza is during the 24 hours before the onset of symptoms and during the most symptomatic period, usually 3 to 5 days from clinical onset in adults and up to 7 days in young children. Although viral shedding occurs in the 24 hours prior to symptom onset, transmission of the virus to another person is much more efficient once symptoms are present. In adults, the amount of viral particles shed (e.g. while sneezing or coughing) is related to the severity of illness and temperature elevation. For those receiving antiviral therapy, the duration of viral shedding is likely to be shorter.

Survival of the influenza virus outside the body varies with temperature and humidity. It generally survives 24 to 48 hours on hard, non-porous surfaces; 8 to 12 hours on cloth, paper and tissue; and 5 minutes on hands. Survival of the virus is enhanced under conditions of low humidity and in cold temperatures.

During the pandemic, it will be imperative to keep health care workers as healthy as possible. Occupational health issues that need to be considered include vaccination of health care workers, use of personal protective equipment, criteria for work exclusion and/or fitness to work, and work reassignments (see Annex F, Infection Control and Occupational Health Guidelines During Pandemic Influenza in Traditional and Non-Traditional Health Care Settings).

See Annex F for institutional infection control guidelines for traditional health care settings, including acute and long-term care institutions, ambulatory and community settings. The topics addressed include immunization, hand hygiene, use of personal protective equipment (e.g. masks, gloves, gowns), patient isolation and accommodation, restriction of visitors, staff cohorting, environmental cleaning and education for staff, patients and visitors. The same topics are addressed for non-traditional settings (e.g. self-care, triage, pandemic hospitals) as well. Also see Annex J, Guidelines for Non-Traditional Sites and Workers.

The community section of Annex F contains infection control and occupational health guidance for the general public, health care workers providing services in the community, as well as for office-based medical and non-medical health care providers (e.g. public health clinics, physician offices, dental offices, physiotherapy clinics, alternative health care providers). The topics addressed include hand hygiene, the use of personal protective equipment (e.g. masks, gloves) and cohorting of persons with ILI.

Infection control recommendations for the prevention of human infections during avian influenza outbreaks are available on the PHAC website.

ii) **Clinical management of influenza**

The last two influenza pandemics occurred during 1957–1958 and during1968–1969. Therefore, the majority of currently practicing clinicians would have little or no experience with pandemic influenza disease and may not be aware of its potential variant presentations. The clinical guidelines in Annex G provide recommendations on the triage of pediatric and adult patients and recommendations on the management of patients in long-term care facilities. The Clinical Management of Influenza forms in Annex G are designed to help health care staff with case management. One form has sections on investigations that should be considered, treatment recommendations, as well as information about the selection of patients (children and adults) for hospital admission and for admission to intensive care. Standardized admission and primary care forms, with a triage component, will help to ensure consistency and minimize paper work.

During a pandemic, it will be essential to inform both the public and health professionals about the symptoms and treatment of influenza, as well as when to seek advice (see Annex G, Clinical Care Guidelines and Tools, and Annex M, Public Health Measures). The fact sheets on the clinical features of influenza and secondary complications are designed to assist health care providers with diagnosis and the general public with self-treatment (see Annex G). These fact sheets include information pertaining to children, adults and the elderly. Any educational materials will require advance preparation in addition to a plan for efficient and timely distribution.

iii) **Resource management**

Although the impact of a pandemic is unpredictable, it is advisable for planning purposes to expect a major disruption in critical community services. The response of the health care system to this situation will be crucial. Regional, local and institutional planners will need to assess their health-resource utilization and the capacity of their health systems to cope during severe influenza epidemics, and to compare this information with the estimated capacity that will be needed to respond to a pandemic in their catchment areas. The FluAid software (available at: http://www2.cdc.gov/od/fluaid/default.htm), which is an American model for estimating the health impact of a pandemic, may be considered for resource planning purposes. However, with the American model, health outcome is based on health care-seeking behaviour or the treatment received. It is expected that the treatment for a person in Canada who is similarly ill with flu may be quite different because of the differences in the health care systems, practice patterns and health care-seeking behavior. The model further assumes that health care is available for all persons seeking care, which is consistent with the American demand-driven health economy.

Although in the majority of cases, influenza is an acute, self-limiting upper-respiratory infection, complications do occur. The overall attack rate is relatively high for influenza epidemics and pandemics, and the impact is usually seen over the course of a few weeks in any one location. Consequently, even a low frequency of complications result in marked increases in rates of hospitalizations. It is important to consider that, although the waves of the pandemic tend to last for 6 to 8 weeks in any locality, the demand on the health care system will not be at a constant rate during this period because the number of new cases seeking health services is likely to increase, peak and then decline. The next pandemic wave may closely follow the first wave and therefore leave little time for recovery. Resource needs will need to be reassessed continuously during this potentially overwhelming situation. It will be a challenge for acute care facilities to manage high ward

census, high intensive-care unit census and high emergency department volumes in the face of the reduced availability of health care workers and the limited supply of respiratory support equipment (see Annex H, Resource Management Guidelines for Health Care Facilities). Advance consideration should be given to the management of adult and pediatric patients with respiratory distress when oximeters, ventilators and other respiratory-support equipment must be rationed.

Each facility needs to evaluate its human resources. Because health care and hospital workers include a great number of individuals in many different occupations, a list of health care workers has been developed to assist with planning (see Annex H). Emergency reallocation of staff and the maintenance of staffing levels will be essential. Health care worker training and continuing education to encourage workers to maintain their skills, incentives to maintain training, and ongoing communication are all important; these items should be planned during the pre-pandemic period. During the pandemic, needs for child care, emotional support and grief counseling should be addressed to help maintain adequate staffing levels.

Elective medical and surgical admissions will need to be prioritized, and possibly some admissions will be cancelled to meet the increased health care demands of influenza. See Annex H, Resource Management Guidelines for Health Care Facilities, for a checklist of issues that acute-care facilities should consider during this prioritization process. Each institution will also need to evaluate their bed and ventilator capacity. Annex H also contains a worksheet to help facilities determine their potential surge capacity.

Pandemic influenza historically has been associated with excess mortality. It will be essential for jurisdictions to include a corpse management plan as part of their pandemic plan. See Annex I for guidelines on the management of mass fatalities. Items addressed in this annex include morgue capacity, corpse storage, transportation, management, burial, cremation and grief counseling.

All levels of government and health service institutions need to plan and put into place strategies to meet the greatly increased demand for medical supplies and services along with staff shortages that are anticipated (See planning assumptions regarding absenteeism in Background Section).

See Annex H, Resource Management Guidelines for Health Care Facilities, for recommendations on how to manage scarce resources during an influenza pandemic.

iv) **Non-traditional workers: health care workers and volunteers**

Communities and health care organizations need to have strategies in place that will address what will be done when health care facilities are overwhelmed and medical care must be provided in non-traditional settings. Alternate treatment centres and outpatient clinics may need to be set up to provide care. See Annex J for guidelines on the provision of care in non-traditional settings. Items addressed in this annex include administrative options for non-traditional hospitals, potential resources and sites, critical characteristics, support services needed, type of work done at sites and liability protection. Guidelines in Annex J also address potential sources of additional labour during a pandemic, volunteer recruitment and screening, liability and personal insurance of workers, temporary licensing of workers, roles and responsibilities, and training programs.

2.5 Public Health Measures

Certain decisions will have to be made at each level of government as novel virus and pandemic alerts occur. Local public health officials will be asked about measures that can be taken by the public and within a community to prevent, control or mitigate pandemic influenza in their jurisdictions. These decisions will range from population-based recommendations (e.g. canceling public gatherings, closing schools) to individual measures (e.g. if members of the public should wear masks). For the most part, the effectiveness of these types of measures for the control of disease within a population has not been systematically evaluated. In addition, the potential impact of these measures will vary depending on the level of pandemic activity in the particular community and the availability of other interventions, such as vaccines and antivirals. The purpose and effectiveness of these measures may also be different in isolated communities compared with large urban centres.

The implications of these potential measures, which range from local school closures to quarantine recommendations for ports of entry into Canada, must be recognized by all potential stakeholders and discussed during the Interpandemic Period.

The objectives of public health measures planning are to:

- Make recommendations regarding public health measures (e.g. quarantine, cancellation of public gatherings, school closures).
- Foster the development of a common approach in Canada and also, if possible, between other countries and Canada, especially on issues for which there is a lack of scientific evidence to guide decision making.
- Encourage planning at all levels of government to raise awareness about the potential impact of these measures so that the necessary partnerships and consultations with external stakeholders start during the Interpandemic Period and continue through all pandemic phases.

2.5.1 Current Status

Prior to the outbreaks of avian H5N1 influenza in Asia starting in 2003, pandemic planners did not pay much attention to the concept of a prolonged "pandemic alert" period. In March 2004, WHO held an international consultation on public health measures that could be implemented during each pandemic phase. At this meeting, the concept of pandemic prevention by containing outbreaks that occur during the Pandemic Alert Period was discussed extensively for the first time. There was agreement that containment of a novel virus, which is not transmitted as efficiently from person to person as a "routine" seasonal influenza, should be attempted using aggressive public health measures. The role of antiviral drugs, contact tracing, quarantine and exit screening were highlighted as the keys to potential containment.

The Public Health Measures Working Group had already considered these interventions. However, following the international consensus that containment should be attempted during the Pandemic Alert Period, the need for clear direction on implementing these types of measures in Canada was recognized. Consequently, the working group developed an annex on public health measures for this edition of the Plan that includes recommendations on public health management of cases and contacts, community-based control strategies, and travel and border issues (see Annex M, Public Health Measures).

2.5.2 Planning Principles and Assumptions

The recommendations of the Public Health Measures Working Group are aimed at facilitating a consistent and optimal response to public health communicable disease control issues during a pandemic. Because there is a lack of scientific data on the effectiveness of these types of disease control measures, especially in conjunction with other influenza control measures, it is unlikely that the benefits of these measures will be quantifiable. Therefore, in the absence of any conclusive data, the expert opinions expressed in Annex M, Public Health Measures will assist jurisdictions with the consistent implementation of timely measures that are in line with the objectives of each pandemic period, i.e. preparedness during the Interpandemic Period, containment during the Pandemic Alert Period and mitigation during the Pandemic Period.

The P/T and local planners are encouraged to explore the feasibility and implications of these types of control measures in their jurisdictions and to educate stakeholders (e.g. school boards, the business community, etc.) should it become advisable to implement these types of restrictive measures.

2.6 Communications

The overarching objectives of communications preparedness are to prepare Canadians to take appropriate action during a pandemic, and to build and maintain the confidence of Canadians in our organizations (e.g. various levels of government, stakeholders). Pandemic influenza communications planning is based on a strategic risk communications approach. This approach focuses on developing communications that are based on a solid understanding of what people know about pandemic influenza, what they do not know, and what they want and need to know. Establishing a dialogue with citizens is the core of this approach. Citizens need to be engaged in a dialogue about pandemic influenza preparedness activities for several reasons:

- Citizens need to be aware of the planning and the preparedness activities so that they are better prepared to take action when they are asked.
- Successful implementation of the Plan during a pandemic hinges on the public and stakeholders having confidence in it and the process used to develop it.
- Citizen dialogue is essential for developing communications products that reflect what people want and need to know.
- Dialogue with citizens ensures that we are making well-informed decisions leading to responsible and ethical risk management.

As the pandemic evolves, the number of organizations that become involved with the media on this issue will be enormous; there will be financial issues, human resource issues and social issues—issues that affect every facet of society. Because of the broad scope of these issues, working towards the development of consistent, coordinated messages that various levels of government and stakeholders agree to in advance of a pandemic is critical to ensure that Canadians are prepared to take action to protect themselves and their loved ones.

The information demands during a pandemic will be sustained over a long period, resulting in tremendous information demands. Sustaining public confidence over many months will be a huge challenge that will require consistent and coherent messages.

All key stakeholders (external, internal, international) must receive consistent and relevant information in a timely manner during any type of emergency. Planning activities are to ensure

consistent and coherent messaging across Canada as well as predefining roles and responsibilities as much as possible.

The objectives of communication planning are to:

- Create a strong communications network (nationally and internationally).
- Define clear roles and responsibilities for each phase of the pandemic.
- Define a variety of communications options, strategies, methods, and tools at each stage.
- Develop consistent, coordinated messages for each pandemic period.

2.6.1 Current Status

i) **Provincial, territorial and local**

Most communication activities related to influenza take place immediately preceding and during the typical influenza season from October to May each year. The P/Ts produce materials to promote immunization each fall; these are specific to the programs they offer in their jurisdictions. Most communication materials and strategies, which target the general public, media, health care workers and other community organizations (considered as "external" key stakeholders), are geared to promoting immunization and reducing unnecessary hospital visits. These materials are developed at the P/T and local levels with minimal federal input. To date, there has not been a centrally coordinated education campaign with regard to pandemic influenza that targets the external key stakeholders. Although campaigns have not been centrally coordinated, substantial work is going into ensuring a greater coordination of key messages. Within the pandemic communications planning process, F/P/T and non-governmental organizations are working on the development of messages that can be adapted to the specific stakeholders in each jurisdiction.

ii) **Federal, provincial and territorial**

Communication with "internal" key stakeholders, mainly government decision makers and policy advisors, occurs at all levels of government. In addition, communications have established several communications networks for F/P/T interaction. A Health Emergency Communications Network (HECN) has been created. It was mobilized in response to the SARS outbreak and continues to be a key component in communication planning for pandemic influenza and other health emergencies. The HECN will be a key component of the pandemic influenza communications response. As well, a communications subcommittee has been created as part of the PIC and is responsible for pandemic influenza communications planning.

iii) **Federal**

Federal communications on influenza currently focus on the dissemination of surveillance data by FluWatch bulletins. These bulletins are directed to public health professionals, but they are available to the public through the PHAC Web site. They are produced on a weekly basis throughout the influenza season. Information about international influenza activity is disseminated by CIDPC, mainly through the Canadian Integrated Outbreak Surveillance Centre e-mail alert system or Web site postings, to key stakeholders as necessary. As well, fact sheets on influenza, including influenza vaccines, are posted on the HC Web site. The PHAC also communicates with "international" key stakeholders, including WHO and the Pan American Health Organization, about influenza activity within and outside of Canada.

For emergency situations, PHAC has a public information line that can be set up for "around-the-clock" coverage. Other communication issues are also being addressed as part of the "all-hazards approach" to crisis communications.

2.6.2 Planning Principles and Assumptions

The guiding principles for pandemic influenza communications planning are as follows:

1) Pandemic influenza communications planning is based on a strategic risk communications approach that:
   - Assures we openly communicate pandemic influenza risks and control options.
   - Ensures transparency in the decisions we are making during the pandemic planning process.
   - Where facts are uncertain or unknown, we will be clear about what gaps remain and what efforts are being made to fill them.
2) Our approach is a collaborative one that reflects the agreement reached among the PIC communications subcommittee members.
   - Each level of government in Canada has stakeholders to whom they are responsible and responsibilities that it must fulfill.
   - The work of the PIC communications subcommittee will acknowledge these differences while at the same time reflect the ongoing need for all levels of government to deliver a consistent message to the public during an influenza pandemic.
3) Stakeholders are a focal point of our approach.
   - Those who face the greatest risk deserve the greatest attention as well as those who are most concerned with the management of particular risks.
   - Stakeholders can provide valuable information, knowledge, expertise and insights throughout the process.
4) Strategic risk communications is itself a process requiring continuous evaluation and improvement. This must be built into our ongoing work plan for pandemic influenza communications.
   - We will adopt scientific standards for our pandemic influenza communications that reflect the best natural and social sciences research for developing and evaluating our messages and processes.

5) The PIC communications subcommittee will work collaboratively with the technical experts on the PIC and its other subcommittees to ensure that communications planning reflects the best evidence and information available from the natural and social sciences.

- Sound scientific information and expert knowledge are the foundation for pandemic influenza planning. Communication plans must recognize expertise in the full set of relevant disciplines, as well as accommodate stakeholder knowledge.
- The relevance of the communicated information depends on the decision-making context and the outcomes that matter to stakeholders. The strategic risk communications process is the primary means for addressing these integrated communication needs and demonstrating that the risk management process has addressed them.

The PHAC Communications, through PIC and with stakeholders at the F/T and local levels, will coordinate and facilitate Canada's public health communications response to pandemic influenza. Stakeholders have varying roles and responsibilities; therefore, coordination is crucial to ensure that messages are accurate and consistent and that jurisdictional boundaries are respected.

The development of a strategic risk communications plan is underway and would become a key part of communications planning for pandemic influenza. The PHAC is working with P/T Ministries of Health to develop key messages and mechanisms to communicate these messages to target stakeholders.

3.0 Planning Activities and Preparedness Checklists

Planning and response activities can be broadly divided into four categories: prevention, preparedness, response and implementation, and post-event recovery and after care. During the Interpandemic Period, activities will focus on prevention and preparedness. Implementation of the response activities will occur in concordance with each change in Canadian Pandemic Phase. Recovery and evaluation activities will occur in the Post-Pandemic Period. Front-end investment of resources in prevention and preparedness activities will facilitate effective management of the pandemic and mitigation of negative outcomes.

To manage an emergency effectively, it is essential to have comprehensive response plans in place. With respect to pandemic planning, the existence of these plans needs to be communicated to all potential stakeholders. Copies should be distributed to organizations and individuals that will be involved in the pandemic response and, if possible, advance testing of these plans should be coordinated with a mechanism to provide feedback for improvement and updating.

In Annex A, Planning Checklists, planning activities are listed and grouped according to Plan components (i.e. surveillance, vaccine programs, antivirals, health services emergency planning and response, public health measures, communications). The checklists are designed to facilitate planning at the P/T and local levels, and they essentially reflect planning activities that should be undertaken during the Interpandemic Period.

Section Four

RESPONSE

Table of Contents

1.0 Introduction

In this Response Section of the Canadian Pandemic Influenza Plan (the Plan), activities corresponding to each component (i.e. surveillance, vaccine programs, the use of antivirals, health services, public health measures and communications) are organized in a table format by each Canadian pandemic phase. The tables include the key actions necessary to facilitate a comprehensive and consistent response to pandemic alerts and an influenza pandemic. However, it is recognized that additional details and modifications will need to be added as the pandemic unfolds. For example, it cannot be determined in advance of the appearance of a novel virus when an effective vaccine might be available; therefore, all activities listed under "Vaccine Programs" in the tables may occur at different phases than the ones that are currently listed (in the tables).

2.0 Use of Pandemic Phases

The pandemic phases declared by the World Health Organization (WHO) are based on the evaluation of pandemic risk situations, with the declared phase representing the highest global risk. Therefore if there is concurrent circulation of two or more novel influenza viruses, the phase will correspond to the situation presenting the highest risk of pandemic. In April 2005, WHO published new terminology for pandemic phases, which replaced the terminology published in 1999. The new terminology includes six phases spanning three pandemic periods: Interpandemic Period, Pandemic Alert Period and the Pandemic Period. A Post-Pandemic Period has also been identified but it is not linked to a numerical phase.

To succinctly summarize the global situation and the situation in Canada, the Pandemic Influenza Committee (PIC) developed Canadian pandemic phase terminology that combines the WHO phase and an indicator of the highest level of novel influenza activity in Canada. The Canadian pandemic phases are described in the Background Section of the Plan. In general, the nomenclature is the WHO phase followed by a decimal point and then 0, 1 or 2 to indicate absence of cases, single (unlinked) cases, or localized or widespread activity in Canada (e.g. 3.1). This Response Section has been updated since it was first published in February 2004 to include this terminology.

For responders at the time of a pandemic, the focus will be on more localized "triggers" that may or may not correspond to the Canadian pandemic phase because the phase is based on the highest level of novel influenza activity observed in Canada. It is expected that differences in influenza activity within Canada will be described on the basis of surveillance data that is reported similarly to that during the annual influenza season. Planners at all levels in the health and emergency service sectors, from municipal to federal, are encouraged to think about the "phase" under which their specific jurisdictions would fall based on influenza activity within the jurisdictions. This is so they can operationalize an appropriate response for the jurisdiction, recognizing that their plans will also be affected by the epidemiology of the pandemic nationally and globally.

Other unknown factors (e.g. age distribution, severity of the illness caused by the pandemic strain, efficiency of transmission from human to human) will also affect the response measures. The Plan assumes that progression to a pandemic will occur if novel influenza activity occurring during the Pandemic Alert Period is not halted. Therefore the response to novel virus activity during the Pandemic Alert Period may need to be significantly modified from what is outlined in this Plan if the epidemiology (e.g. of a domestic AI outbreak) does not suggest the need for aggressive measures.

3.0 Federal Emergency Response

Planning at the federal level has resulted in the development of a generic emergency management structure. This structure, which indicates roles and responsibilities of specific groups in response to an emergency, is included in Annex L, Federal Emergency Preparedness and Response System. The specific composition, roles and responsibilities of the Advance Planning Group still need to be determined; however, members that can provide technical advice specific to pandemic influenza will be essential.

Also included in Annex L is a flow diagram that aligns response activities with the phases. This tool provides a visual overview of the response from a federal perspective.

The Canadian Pandemic Influenza Plan is a disease-specific plan. It is an example of a specific, technical emergency plan that has been developed as part of much larger initiative to create plans to deal with all types of national emergencies. By creating a set of plans that are increasingly specific, i.e. range from generic emergency response issues to more specific threats (e.g. infectious diseases) and finally to detailed disease-specific threats, it is anticipated that a set of "nested" or linked documents will be available; these nested documents will be comprehensive and flexible enough to cover off any type of national emergency.

4.0 The Severe Acute Respiratory Syndrome Experience

Prior to March 2003, when the severe acute respiratory syndrome (SARS) arrived in Canada, the vast majority of health care professionals and certainly the general public had limited personal experience with large outbreaks of serious respiratory infections. The SARS outbreak caused an exponential increase in the knowledge of and experience with this type of health threat. Awareness of SARS, the severity of the illness, method of spread and the implementation of control measures penetrated Canadian society from coast to coast regardless of the actual case count in each province or territory.

Those involved in disease surveillance and pandemic planning saw SARS as a type of "dress-rehearsal" for pandemic influenza. They recognized that many of the response issues would be the same but on a much larger scale. Although the costs due to SARS were high in terms of morbidity and mortality and economic losses, the costs of pandemic influenza have the potential to be much greater. The response to pandemic influenza also would need to be sustained for a longer period of time and would likely include a mass immunization effort on top of the demands of acute care for patients.

The SARS experience reinforced the need for preparedness activities as cited in the Preparedness Section of the Plan. In particular, the need for resources and surge capacity within the health system to deal with public health emergencies is highlighted. Advanced preparation and removal of potential barriers in communication systems, data management technology, and the acquisition and mobilization of supplemental health care workers and settings are just a few of the other needs identified in the Plan and validated by the SARS experience.

It is with this experience behind us that those involved in drafting this Plan have identified the key action items listed in this Response Section.

5.0 Avian and Animal Influenza

Outbreaks caused by novel influenza viruses in avian or animal populations present opportunities for transmission to humans. Sporadic human infection with a number of avian (e.g. H5, H7, H9) and swine (e.g. H1N1) influenza subtypes have been documented. In addition, there may be opportunities for reassortment between animal and human influenza viruses when they simultaneously infect the same swine or human host. Such reassortment events may result in the development of a new influenza virus subtype with pandemic potential.

Since 2003, an unprecedented number of avian outbreaks of influenza have been detected worldwide. Human cases, ranging in severity from conjunctivitis to fatal cases, have resulted from these various outbreaks. The WHO global phases now include the occurrence of avian and animal influenza outbreaks and the role of these outbreaks as potential precursors to a pandemic.

As a result of the avian outbreak of H7N3 in British Columbia in 2004, a guideline document was developed by PHAC to provide recommendations for public health authorities and other stakeholders involved in the management of actual and potential human health issues related to domestic avian influenza outbreaks. This document has recently been updated and expanded to include guidance on the management of all AI events with potential human health implications (see *Human Health Issues Related to Avian Influenza in Canada*, on the PHAC website). Because the actions in the guideline document pertain to the new Canadian Phases 1.1, 2.1 and 3.1, the human health issues document is referenced in the tables in section 6 below. Although the control of animal influenza outbreaks is a key part of preventing the emergence of a human influenza pandemic—and there are critical animal and human health linkages—the responses to the actual animal outbreaks are best addressed in animal health guidelines and plans. The Canadian Food Inspection Agency (CFIA) is the lead agency for AI outbreak response and animal health and food safety issues.

6.0 Key Response Actions by Pandemic Phase

The key response actions listed in the following tables are organized by the component of the response to which they relate (Component) and by the phase during which each action should take place (Phase). High-level activities for emergency management and coordination have also been added to the tables. It is assumed that each jurisdiction will refer to the phase that is consistent with their respective levels of novel influenza activity. For example, if the southern part of one province is experiencing localized pandemic activity, the Canadian Phase would be 6.2 (the Canadian Phase always reflects the highest level of activity in the country) and the geographic areas or region with the activity would follow the actions under Phase 6.2.

However if no other pandemic activity was occurring in Canada at that time, then the areas with no known cases would take the actions consistent with Phase 6.0 until they started to experience pandemic activity.

As previously discussed, flexibility in the response is needed because the availability of resources (e.g. vaccine, antiviral drugs) may require deviation from the proposed sequence of response actions. It is expected that many of the response actions under each phase will need to occur simultaneously. The action items have not been prioritized within each phase. More detailed actions are provided in many of the technical annexes.

Response actions and messages are organized by pandemic period rather than by Canadian phase in Annex K, Communications; therefore, readers are referred to this annex in each of the phase-specific tables below.

The tables also include Response Level designations (see legend below) that are provided for guidance only. It is likely that many response actions, especially those for which national consistency is desirable, will be led by PIC or collaborative federal, provincial, territorial processes. Other non-governmental responders (e.g. Salvation Army, Red Cross) will be likely involved in the response but have not been specifically identified in the Plan because it is anticipated that their respective roles and activities would be developed in conjunction with public health authorities at the P/T, regional and local level.

Legend for the Canadian Pandemic Phase Tables

Acronyms for organizations

CATMAT = Committee to Advise on Tropical Medicine and Travel
CEPR = Centre for Emergency Preparedness and Response
CIHR = Canadian Institutes for Health Research
CPHLN = Canadian Public Health Laboratory Network
HPFB = Health Products and Food Branch
NACI = National Advisory Committee on Immunization
NML = National Microbiology Laboratory
PHAC = Public Health Agency of Canada
PWGSC = Public Works and Government Services Canada

Abbreviations for response levels

F = Federal
L = Local
P/T = Province/Territory

Note: The term "animal" in the tables below is intended to cover both avian and animal species.

6.1 Interpandemic Period

Canadian Phase 1.0	No new virus subtypes in humans, animals *outside* Canada may be infected with a new subtype that is considered low risk for humans		
Component	**Focus**	**Actions**	**Response Level**
Surveillance	Pandemic Preparedness activities	▸ As per Preparedness Section – Ensure links to veterinary counterparts are in place as part of general pandemic preparedness – Routine human influenza surveillance	F,P/T, L
	Information sharing	▸ Disseminate available surveillance information from countries experiencing animal cases and/or outbreaks to public health stakeholders	F (Lead: PHAC)
		▸ Provide updates on ongoing risk assessment for pandemic influenza potential	F (Lead: PHAC)
Public Health Measures	Public education	▸ If animal outbreaks are occurring: – Provide general travel health information pertaining to safe food handling, respiratory etiquette	F (Lead : PHAC)
All other components	Pandemic Preparedness activities	▸ As per Preparedness Section	
Emergency Management and Coordination		▸ Develop/maintain response plans	F,P/T, L
		▸ Explore need to stockpile (e.g. syringes, other medical supplies)	F,P/T, L
		▸ Identify how essential services will be maintained during a pandemic	F,P/T, L
		▸ Practice emergency plans	F,P/T, L
		▸ Train staff that may be re-assigned during a pandemic	F,P/T, L

Canadian Phase 1.1	No new virus subtypes in humans, animal(s) *inside* Canada infected with a new subtype that is considered low risk for humans		
Component	**Focus**	**Actions**	**Response Level**
Surveillance, Vaccine Programs, Antivirals, Health Services, Public Health Measures, Communications	Veterinary Outbreak Control	▸ As per *Human Health Issues Related to Avian Influenza in Canada* document; Rapid sharing of information among animal and human health professionals	F, P/T, L
	Prevention of Human Infection	▸ Provide updates on ongoing risk assessment for pandemic influenza potential and make recommendations for increased vigilance for surveillance and public health action	F, P/T, L
Emergency Management and Coordination		▸ Continue as per Phase 1.0 actions and;	
		– Ensure that response network is ready to respond	F,P/T, L
		– Provide technical information liaison	F,P/T, L
		– Report situation to PSEPC (daily report)	F (Lead : PHAC)
		– Share PHAC/HC info with regional officers	F (Lead : PHAC)
		– Facilitate sharing of information between animal and human health authorities	F (Lead : PHAC)

Canadian Phase 2.0	No new virus subtypes in humans, animals *outside* Canada infected with a new subtype that has a substantial risk for humans		
Component	**Focus**	**Actions**	**Response Level**
Surveillance, Vaccine Programs, Antivirals, Health Services, Public Health Measures, Communications	Pandemic preparedness, Information sharing, Public education	▸ As per Phase 1.0 with messages reflecting the increased risk to human health ▸ Design and seek agreement on a common strategy for the communication of epidemiological data (nationally and with WHO internationally)	F,P/T, L F,P/T, L
Emergency Management and Coordination		▸ As per Phase 1.1 with increased communications/liaison with other government departments	F,P/T, L

Canadian Phase 2.1	No new virus subtypes in humans, animals *inside* Canada infected with a new subtype that has a substantial risk for humans		
Component	**Focus**	**Actions**	**Response Level**
Surveillance, Vaccine Programs, Antivirals, Health Services, Public Health Measures, Communications	Veterinary Outbreak Control Prevention of Human Infection	▸ As per *Human Health Issues Related to Avian Influenza in Canada* document ▸ All measures would reflect the increased risk associated with this novel virus	F, P/T, L F, P/T, L
Emergency Management and Coordination		▸ As per Phase 2.0	F, P/T, L

6.2 Pandemic Alert Period

Canadian Phase 3.0	Human infection(s) with a new virus subtype occurring *outside* Canada - no or at most rare instances of human to human transmission.		
Component	**Focus**	**Actions**	**Response Level**
Surveillance	Establish and/or heighten existing surveillance systems	▸ Verify epidemiological data and current risk assessment from official sources (WHO, Ministries of Health)	F (Lead : PHAC)
		▸ Review and confirm that all inter-pandemic surveillance activities (via FluWatch) are operating optimally	
	Information sharing	▸ Convey current international risk assessment in Canadian context	F, P/T, L (Lead: PHAC)
		▸ Provide information and national recommendations to F/P/T stakeholders	
Vaccine Programs	Mitigation of potential complications of influenza through use of current vaccine resources	▸ Promote use of annual influenza vaccine	P/T, L
		▸ Promote pneumococcal vaccination to "high-risk" and age-specific target groups to reduce the incidence and severity of secondary bacterial pneumonia	
		▸ Collaborate on international vaccine development initiatives, including the development and testing of prototype vaccine strains as needed.	F (Lead: PHAC)
		▸ Review pandemic vaccine infrastructure readiness with domestic manufacturer	F (Lead: PHAC)
Antivirals	Review of preparedness status and updating of strategy	▸ Assess and/or re-assess availability of antiviral medications	F,P/T,L
		▸ Review recommended priority groups and plans for antiviral use based on available epidemiological data	F,P/T
		– Consider adequacy of stockpiled quantities in light of estimated sizes of the respective priority groups in your jurisdiction	F,P/T
		▸ Review and modify if necessary, contingency plans for storage, distribution and administration of antiviral drugs through public health and other providers to nationally defined priority groups	F,P/T,L

Canadian Phase 3.0	Human infection(s) with a new virus subtype occurring *outside* Canada - no or at most rare instances of human to human transmission.		
Component	**Focus**	**Actions**	**Response Level**
	Communication and education	▸ Communicate antivirals strategy as part of pandemic educational materials (including which priority groups will likely be covered, current supply and any shortfalls)	F,P/T,L
		▸ Ensure staff are trained and infrastructure is in place to track who is receiving the drugs for the purpose of treatment and prophylaxis	F,P/T,L
Health Services	Evaluation of laboratory capacity Information gathering	▸ Ensuring at least one laboratory within the P/T has the capability to isolate and subtype influenza virus, and if not establish anticipatory "back-up" process	P/T (Lead: CPHLN)
		▸ Ensure that estimates of health care personnel capacity are current (i.e., estimated number of health care workers (HCWs) by type (physician, nurses, respiratory therapists, radiology technicians, etc), and by work setting (hospital, community, LTCF, para – Identify if possible HCWs by type of work that they usually do	F, P/T, L
Public Health Measures	Information preparation	▸ As per Annex M (Public Health Measures) ▸ Review and update educational materials on all aspects of influenza for health care professionals, travellers, other special audiences and the general public	F, P/T, L
Communications		▸ As per Annex K (Communications)	
Emergency Management and Coordination		▸ Provide case count to PSEPC	F (Lead : PHAC)
		▸ Notify P/T's emergency service managers (ESS+CHEMD)	F (Lead : PHAC)
		▸ Coordinate international consultations (WHO/CDC)	F (Lead : PHAC)
		▸ Alert P/T's	F (Lead : PHAC)
		▸ Inform CMOH	F (Lead : PHAC)

Canadian Phase 3.1	Sporadic human infection(s) with a new virus subtype occurring *inside* Canada - no or at most rare instances of human to human transmission.		
Component	**Focus**	**Actions**	**Response Level**
Surveillance	Monitoring of evolving situation	▸ Investigation of sporadic cases, including collection of detailed epidemiologic data, contact tracing, and public health monitoring	F (Lead : PHAC), P/T
		▸ Ensure that enhanced surveillance is in place across Canada for rapid detection of potential spread	
	Dissemination of data	▸ Review/Revise standard reports for dissemination of epidemiological data within Canada	F (Lead: PHAC)
		▸ Establish and convey current risk assessment to national and international surveillance partners	
		▸ Dissemination of epidemiological data, as needed	F,P/T
		▸ If occurring in conjunction with an animal outbreak in Canada – refer to *Human Health Issues Related to Avian Influenza in Canada* document for more details	
Vaccine Programs	Reduce potential for genetic re-assortment	▸ Immunize close contacts of cases with annual influenza vaccine if available as per Annex M (Public Health Measures)	F, P/T, L
	Inventory and resource assessment	▸ Conduct initial availability assessment of supplies (e.g. syringes, adrenalin, sharps disposal units), equipment and locations potentially required for a vaccine-based response (i.e., mass clinics)	
	Preparation (Legal, Educational etc.)	▸ Develop list of currently qualified vaccinators and sources of potential vaccinators	F, P/T, L
		▸ Review educational materials re. Administration of vaccines and adapt/update as needed	F, P/T, L
		▸ Ensure that any legal issues that may impede rollout of a mass immunization program are addressed	P/T, L
		▸ Ensure domestic vaccine manufactures are alerted and participating in international efforts	F (Lead: PHAC)

Canadian Phase 3.1	Sporadic human infection(s) with a new virus subtype occurring *inside* Canada - no or at most rare instances of human to human transmission.		
Component	**Focus**	**Actions**	**Response Level**
Antivirals	Antiviral strategy	▸ Use neuraminidase inhibitors for treatment of cases as per Annex M (Public Health Measures)	F,P/T (Lead: PHAC)
		▸ Perform an inventory assessment (drugs, formulations, and expiry dates)	
		▸ Test stockpiled antivirals for potency if necessary (i.e., if past expiry date)	
Health Services	Rapid case confirmation	▸ Laboratory testing as per Annex C (Laboratory Procedures)	P/T (Lead: CPHLN)
	Guideline review and/or revision	▸ Review protocols and guidelines for prioritization of laboratory services during times of high service demand and staff and supply shortages	P/T (Lead: CPHLN)
	Preparation (Legal, Educational etc.)	▸ Ensure that any legal and insurance issues that may impede recruitment and use of active and retired health care workers and volunteers have been addressed with P/T licensing bodies	P/T
		▸ Prepare and/or update communications defining the extent of care that health care workers and volunteers can perform according to P/T laws and union agreements	P/T
	Case and Contact management	▸ Manage cases and contacts as per recommendations in Annex M (Public Health Measures) – Isolation of cases – Surveillance of contacts	F, P/T, L
Public Health Measures	Resource assessment and preparation	▸ Review staffing requirements for implementation of a pandemic response including mass immunization clinics, control measures, and public education	
		▸ Consider delaying introduction of public health programs that may not be adequately resourced if situation evolves into a pandemic or other alternatives such as contracting out	P/T, L
		▸ Preparation of educational material for public	F, P/T, L
Communications		▸ As per Annex K (Communications)	

Canadian Phase 3.1	Sporadic human infection(s) with a new virus subtype occurring *inside* Canada - no or at most rare instances of human to human transmission.		
Component	**Focus**	**Actions**	**Response Level**
Emergency Management and Coordination		▸ As per Phase 3.0 and;	
		– Report to International Health Regulations as required	F (Lead : PHAC)
		– Assess risk and disseminate information to and with stakeholders	F,P/T, L
		– Review NESS availability	F (Lead : PHAC)
		– Review medical personnel availability	F,P/T, L
		– Review federal legislative authorities	F,P/T, L
		– Aquire (when available) and disseminate any laboratory testing materials (i.e., reagents)	F (Lead: NML/CPHLN)

Canadian Phases 4.0 and 5.0	Clusters with limited human-to-human transmission occurring *outside* of Canada, spread is localized, no cases in Canada		
Component	**Focus**	**Actions**	**Response Level**
Surveillance	Establish and/or Heighten enhanced surveillance systems	▸ Verify epidemiological data and current risk assessment from official sources	F (Lead : PHAC)
		▸ Enhance current surveillance activities based on circumstances	F, P/T, L
		▸ Review and/or revise case definitions, minimum data sets, and data collection forms	F, P/T (Lead: PIC)
	Border issues	▸ Implement border-based surveillance (depending on origin of cases) coordinated by CEPR, as per Annex M (Public Health Measures) – Include notifications to ill and well travellers	F, P/T (Lead: PHAC)
	Plan for streamlined data collection	▸ Initiate ramped up surveillance activities to detect and monitor increased morbidity and mortality	P/T, L
	Dissemination of data	▸ Review and/or revise standard reports for dissemination of epidemiological data within Canada	F, P/T, L
Vaccine Programs	Planning for vaccine distribution	▸ Ongoing involvement in vaccine development initiatives	F (Lead: PHAC with vaccine manufacturers)
	Mass campaign infrastructure	▸ Review and modify if necessary, contingency plans for storage, distribution and administration of influenza vaccine through public health and other providers to nationally defined high-priority target groups (See Annex J for use of non-traditional sites and workers)	F,P/T (Lead: PIC)
		▸ Ensure staff are trained and infrastructure is in place to record immunizations, including requirements for a two-dose immunization program (i.e. re-call and record-keeping procedures)	P/T, L
		▸ Review estimates of the number of people within the P/T who fall within each of the priority groups for vaccination (i.e., high risk groups, health care workers, responders, specific age groups) and access strategies	F, P/T, L

Canadian Phases 4.0 and 5.0	Clusters with limited human-to-human transmission occurring *outside* of Canada, spread is localized, no cases in Canada		
Component	**Focus**	**Actions**	**Response Level**
		▸ Ongoing promotion of current annual influenza vaccine for NACI recommended groups and for travellers (as per CATMAT recommendations)	F, P/T (Lead: PIC/NACI)
Antivirals	Supply of antiviral drugs	▸ Perform an inventory assesment of available supplies	F,P/T (Lead: PHAC)
	Planning for antiviral drug distribution and tracking	▸ Review recommended priority groups and plans for antiviral use based on available epidemiological data	F,P/T (Lead: PIC)
		▸ Review and modify if necessary, contingency plans for storage, distribution and administration of antiviral drugs through public health and other providers to nationally defined high-priority target groups	F,P/T,L
		▸ Review estimates of the number of people within the P/T who fall within each of the priority groups for receipt of antiviral drugs (i.e., high risk groups, health care workers, responders, specific age groups) and access strategies	F, P/T, L
		▸ Ensure staff are trained and infrastructure is in place to track who is receiving the drugs for the purpose of treatment and prophylaxis	P/T, L
Health Services	Prepare for management of suspect cases detected through enhanced surveillance	▸ Implement/Review infection control precautions for case management	F, P/T, L (Lead: PHAC)
		▸ Review national recommendations for clinical management of cases and modify if necessary	F, P/T (Lead: PIC)
		▸ Anticipate and plan to mobilize human and financial resources	F, P/T, L
	Preparation for increased demand on acute care sites	▸ Review and update local and P/T data on the number & type of health care facilities, and capacity: hospital beds, ICU beds, swing beds, LTC beds with enhanced level of care, emergency department, ventilatory capacity, oxygen supply, antibiotic supply	P/T, L

Canadian Phases 4.0 and 5.0	Clusters with limited human-to-human transmission occurring *outside* of Canada, spread is localized, no cases in Canada		
Component	**Focus**	**Actions**	**Response Level**
		▸ Conduct availability assessment of medications, supplies and equipment potentially needed for the response	P/T, L
		▸ Review,modify, and distribute P/T guidelines (or national guidelines) for prioritizing health care needs and service delivery, accessing resources and implementing infection control measures during a pandemic	F, P/T, L
		▸ Disseminate information on medical supply stockpiles and potential need for, and sources of, additional supplies	F, P/T (Lead: PHAC)
		▸ Review, modify, and distribute detailed regional and facility-level plans for providing health services during a pandemic, including the type of care to be delivered at non-traditional health care settings and the triage across sites; human resource, mate	P/T, L
		▸ Disseminate strategy for collecting and monitoring data on health care service use and demands	P/T, L
Public Health Measures	Preparation of educational materials and public health resources	▸ Review national recommendations as per Annex M (Public Health Measures) for public health management of cases and other control measures and modify if necessary	F, P/T (Lead: PIC)
		▸ Ensure adequate resources are available to implement recommended public health measures including isolation of cases	P/T, L
		▸ Prepare and revise (if necessary) educational and guidance materials for public health partners (specifically provincial/territorial and local health departments who will be on the front lines with respect to prevention and control measures), the general	F, P/T, L
Communications		▸ As per Annex K (Communications)	

Canadian Phases 4.0 and 5.0	Clusters with limited human-to-human transmission occurring *outside* of Canada, spread is localized, no cases in Canada		
Component	**Focus**	**Actions**	**Response Level**
Emergency Management and Coordination		▸ For Phase 4.0 -actions as per Phase 3.1 and;	
		– Prepare to respond to GOARN request for participation	F (Lead : PHAC)
		– Anticipate and plan to mobilize human and financial resources	F,P/T, L
		– Disseminate information on medical supply stockpiles and potential need for sources of additional supplies	F,P/T, L
		– Alert voluntary organisations	F,P/T, L
		▸ For Phase 5.0 -actions as per Phase 4.2	F,P/T, L

Canadian Phases 4.1 and 5.1	Sporadic infection(s) with virus that has demonstrated limited human-to-human transmission detected in Canada. No clusters identified in Canada but clusters have occurred outside of Canada		
Component	**Focus**	**Actions**	**Response Level**
Surveillance	Prompt identification of any secondary cases Collect,compile and distribute epidemiological data for cases reported in Canada	▸ Collection and dissemination of epidemiological and clinical data for cases occurring in Canada ▸ Review and if necessary, revise case definitions, minimum data sets, and data collection forms ▸ Review protocols for special studies and prepare dedicated teams as necessary to ensure prompt activation of the studies when appropriate	F,P/T, L F. P/T, L (Lead: CIHR or other NGO)
Vaccine Programs	Vaccine development Preparation for mass immunization clinics Implementation of targeted immunization clinics	▸ Ongoing involvement in vaccine development, testing and production initiatives ▸ Review and modify if necessary, plans for vaccine security (i.e., during, transport, storage and clinic administration) ▸ **If a potentially effective vaccine is available:** – Follow national recommendations for use of the available vaccine – Implement streamlined VAAE surveillance, in collaboration with PHAC – Arrange for direct shipping of vaccine to health districts	F (Lead: PHAC HPFB, manufacturers) P/T, L P/T, L F, P/T, L (Lead: PHAC) F (Lead: PWGSC)
Antivirals	Localized use of antivirals (treatment and prophylaxis of contacts) for containment purposes	▸ Treat cases and provide prophylaxis for contacts of cases, based on local epidemiology and available supplies as per Annex M (Public Health Measures) ▸ Ensure prompt mobilization of antivirals supplies allocated for early containment ▸ Ensure that stakeholders are aware of how to report adverse drug reactions if antivirals are being used	P/T, L F, P/T (Lead: PHAC) F, P/T, L
Health Services	Use of optimal infection control practices to prevent spread	▸ **As per Phase 3.1 and**; ▸ Evaluate infection control and occupational health recommendations and practices and revise as necessary	 F, P/T (Lead: PHAC)

Canadian Phases 4.1 and 5.1	Sporadic infection(s) with virus that has demonstrated limited human-to-human transmission detected in Canada. No clusters identified in Canada but clusters have occurred outside of Canada		
Component	**Focus**	**Actions**	**Response Level**
Public Health Measures	Resource and risk assessment	▸ Ensure adequate resources are available to implement recommended public health measures including isolation of cases	P/T,L
		▸ Establish current level of risk to guide public health actions (e.g. transmission characteristics associated with secondary cases)	P/T,L
	Case and Contact management	▸ Manage cases and contacts as per recommendations in Annex M (Public Health Measures) – Isolate cases – Quarantine or activity restriction of contacts – Update educational material (with Communications staff)	P/T, L
	Advance planning	▸ Review staffing requirements for implementation of a pandemic response including mass immunization clinics, control measures, and public education	P/T, L
		▸ Consider delaying introduction of public health programs that may not be adequately resourced if situation evolves into a pandemic or other alternatives such as contracting out	P/T, L
Communications		▸ As per Annex K (Communications)	
Emergency Management and Coordination		▸ For Phase 4.1 -actions as per Phase 4.0	F,P/T,L
		▸ For Phase 5.1 -as per Phase 4.2 and; – Prepare dedicated team as necessary	F,P/T,L

Canadian Phases 4.2 and 5.2	Localized cluster(s) with limited human-to-human transmission occurring in Canada but spread is localized, suggesting that the virus is not yet well adapted to humans or fully transmissible		
Component	**Focus**	**Actions**	**Response Level**
Surveillance	Timely collection, compilation and dissemination of epidemiological and clinical data	▸ Refer to actions from phase 4.1, 5.1	F (Lead: PIC)
		▸ Revise case definitions based on observed clinical presentation of cases	F, P/T, L
		▸ Implement any special studies identified for these phases	F, P/T, L (Lead: CIHR or other NGOs)
Vaccine Programs	Vaccine development	▸ Ongoing involvement in vaccine development, testing, and production initiatives	F (Lead: PHAC HPFB, manufacturers)
	Preparation for mass immunization clinics	▸ Review recommended priority groups for immunization based on available epidemiological data	F,P/T (Lead: PIC)
		▸ Review and modify if necessary, plans for vaccine security (i.e., during, transport, storage and clinic administration)	P/T, L
	Implementation of targeted immunization clinics	▸ **As per Phases 4.1 and 5.1, if a potentially effective vaccine is available**	
		– Follow national recommendations for use of the available vaccine	P/T, L
		– Implement streamlined VAAE surveillance, in collaboration with PHAC	F, P/T, L (Lead: PHAC)
		– Arrange for direct shipping of vaccine to health districts	F (Lead: PWGSC)
Antivirals	Localized use of antivirals (treatment and prophylaxis of contacts) for containment purposes	▸ **As per Phases 4.1 and 5.1**	
		– Treat cases and provide prophylaxis for contacts of cases, based on local epidemiology and available supplies as per Annex M (Public Health Measures)	P/T,L
		– Ensure prompt mobilization of antivirals supplies allocated for early containment	F, P/T (Lead: PHAC)
		– Ensure that stakeholders are aware of how to report adverse drug reactions if antivirals are being used	P/T, L

Canadian Phases 4.2 and 5.2	Localized cluster(s) with limited human-to-human transmission occurring in Canada but spread is localized, suggesting that the virus is not yet well adapted to humans or fully transmissible		
Component	**Focus**	**Actions**	**Response Level**
Health Services	Use of optimal infection control practices Management of increased demand on health care system	▸ Evaluate infection control and occupational health recommendations and practices and revise as necessary	F, P/T (Lead: PHAC)
		▸ Ensure protocols and guidelines for prioritization of laboratory services during times of high service demand and staff and supply shortages have been distributed	P/T, L
		▸ Review and implement mechanisms for coordinating patient transport and tracking/managing beds (e.g. central bed registries, call centre and centralized ambulance dispatch)	P/T, L
Public Health Measures	Outbreak control and containment	▸ Manage cases and contacts as per recommendations in Annex M (Public Health Measures) – Isolate cases – Quarantine or activity restriction of contacts	F, P/T, L
		▸ Evaluate interventions and revise recommendations as necessary	F, P/T
		▸ Integrate national recommendations for isolation into practice at the local level	P/T, L
		▸ Implement use of mandatory isolation orders if necessary	F, P/T
		▸ Review and, if necessary, update and disseminate national recommendations regarding containment strategies (i.e., cancellation of public gatherings, school closures) as per Annex M (Public Health Measures)	P/T, L
		▸ Monitor and track compliance with containment recommendations	L
		▸ Develop or update educational materials for the public and health care providers as the situation evolves	F, P/T, L
Communications		▸ As per Annex K (Communications)	

Canadian Phases 4.2 and 5.2	Localized cluster(s) with limited human-to-human transmission occurring in Canada but spread is localized, suggesting that the virus is not yet well adapted to humans or fully transmissible		
Component	**Focus**	**Actions**	**Response Level**
Emergency Management and Coordination		▸ For Phase 4.2 -actions as per Phase 4.0	
		– Consider sending a Liaison Officer to CDC (and vice versa)	F (Lead : PHAC)
		– Implement use of mandatory isolation orders if necessary in federal jurisdictions	F (Lead : PHAC)
		▸ For Phase 5.2 -actions as per Phase 5.1	

6.3 Pandemic Period

Canadian Phase 6.0	Outside Canada, increased and sustained transmission in the general population has been observed (i.e., pandemic activity). No cases have been identified in Canada		
Component	**Focus**	**Actions**	**Response Level**
Surveillance	Timely collection, compilation and dissemination of epidemiological and clinical data	▸ Verify international epidemiological data and current risk assessment from official sources	F (Lead: PHAC)
		▸ Revise case definitions based on international assessment of observed clinical presentation of cases	F (Lead: PHAC)
		▸ Distribute data collection forms and database transmission instructions and protocols if not done previously	F, P/T (Lead: PHAC)
		▸ Follow any new recommendations regarding a switch-over to aggregate reporting of data	F, P/T (Lead: PHAC)
		▸ Review protocols for special studies and prepare dedicated teams as necessary to ensure prompt activation of the studies when appropriate	F. P/T, L (Lead: CIHR or other NGO)
Vaccine Programs	Vaccine development	▸ Ongoing involvement in vaccine development, testing and production initiatives	F (Lead: PHAC HPFB, manufacturers)
	Preparation/Implementation of mass immunization clinics	▸ Review and if necessary revise recommended priority groups for immunization based on available epidemiological data	F, P/T (Lead: PIC)
		▸ Modify or refine of nationally defined priority target groups depending on local circumstances	P/T, L
		▸ Modify or refine other aspect of the federal guidelines, as needed for P/T and local application	P/T, L
		▸ Review and modify if necessary, plans for vaccine security (i.e., during, transport, storage and clinic administration)	P/T, L
		▸ **When vaccine is available**	
		– National coordination on vaccine purchase	F,P/T (Lead: PWGSC)
		– Activate immunization clinic capability	P/T,L
		– Implement streamlined VAAE surveillance, in collaboration with PHAC	F, P/T, L (Lead: PHAC)

Canadian Phase 6.0	Outside Canada, increased and sustained transmission in the general population has been observed (i.e., pandemic activity). No cases have been identified in Canada		
Component	**Focus**	**Actions**	**Response Level**
		– Arrange for direct shipping of vaccine to health districts	F (Lead: PWGSC)
		– Communicate with bordering jurisdictions (other P/Ts and the U.S.) to facilitate awareness of the vaccine distribution plan and coordination and collaboration on efforts as much as possible	F, P/T, L
Antivirals	Strategic and controlled use of antivirals	▸ Review and if necessary revise national recommendations on antiviral use based on available epidemiological data	F, P/T (Lead: PIC)
Health Services	Use of optimal infection control practices Preparation for increased demand on health care system	▸ Evaluate infection control and occupational health recommendations and practices and revise as necessary	F, P/T (Lead: PHAC)
		▸ Review protocols and guidelines for prioritization of laboratory services during times of high service demand and staff and supply shortages	P/T, L
		▸ Review mechanisms for coordinating patient transport and tracking/managing beds e.g. central bed registries, call centre and centralized ambulance dispatch	P/T, L
		▸ Contact and prepare sources of additional HCWs and volunteers i.e., Emergency Measures Organizations and NGOs (Red Cross, St. John ambulance)	F, P/T, L (Lead: PHAC)
		▸ Acquire extra supplies needed to provide medical care in non-traditional sites	P/T, L
Public Health Measures	Preparation of implementation of public health response	▸ **As per Phases 4.0 and 5.0**	
		▸ Review national recommendations as per Annex M (Public Health Measures) for public health management of cases and other control measures and modify if necessary	F, P/T, L
		▸ Ensure adequate resources are available to implement recommended public health measures including isolation of cases	P/T, L

Canadian Phase 6.0	Outside Canada, increased and sustained transmission in the general population has been observed (i.e., pandemic activity). No cases have been identified in Canada		
Component	**Focus**	**Actions**	**Response Level**
		▸ Prepare and if necessary revise educational and guidance materials for public health partners (specifically, P/T and local health departments who will be on the front lines with respect to prevention and control measures), the general public; Some documents for the public should emphasize infection control in homes, schools, places of work	F, P/T, L
Communications		▸ As per Annex K (Communications)	
Emergency Management and Coordination		▸ **As per Phase 5.1** – Ensure NESS resources are ready to be deployed – Contact and prepare sources of additional HCWs and volunteers (NGO's)	

Canadian Phases 6.1 and 6.2	Pandemic virus detected in Canada (Phase 6.1 – single case(s) occurring, Phase 6.2 – localized or widespread activity occurring)		
Component	**Focus**	**Actions**	**Response Level**
Surveillance	Timely collection, compilation and dissemination of epidemiological and clinical data	▸ 6.1: Confirm that clinical spectrum of disease (based on feedback from local level experts), is consistent with what is being observed internationally (revise case definitions if necessary)	F, P/T, L
		▸ 6.2: Scale back to streamlined surveillance	F, P/T (Lead: PHAC)
		▸ 6.2: Implement any special studies identified for these phases	F, P/T, L (Lead: possibly PHAC, PIC and/or CIHR)
	Monitoring the progress of pandemic	▸ 6.2: **When indicators suggest activity appears to be decreasing (i.e., end of a pandemic wave)**	
		– Determine ongoing surveillance needs for both documentation of end of first wave and detection of any new cases or outbreaks	F, P/T, L (Lead: PIC)
Vaccine Programs	Vaccine development	▸ **As per Phase 6.0 (i.e., if not completed prior to Phase 6.1 or 6.2)**	F (Lead: PHAC HPFB, manufacturers)
		– Ongoing involvement in vaccine development,testing and production initiatives	
	Preparation/Implement ation of mass immunization clinics	– Review and if necessary revise recommended priority groups for immunization based on available epidemiological data	F, P/T (Lead: PIC)
		– Modify or refine nationally defined priority target groups depending on local circumstances	P/T, L
		– Modify or refine other aspect of the federal guidelines, as needed for P/T and local application	P/T, L
		– Review and modify if necessary, plans for vaccine security (i.e., during, transport, storage and clinic administration)	P/T, L
		▸ **As per Phase 6.0, when vaccine is available**	
		– National coordination on vaccine purchase	F,P/T (Lead: PHAC)
		– Activate immunization clinic capability	P/T,L

Canadian Phases 6.1 and 6.2	Pandemic virus detected in Canada (Phase 6.1 – single case(s) occurring, Phase 6.2 – localized or widespread activity occurring)		
Component	**Focus**	**Actions**	**Response Level**
		– Implement streamlined AEFI surveillance, in collaboration with PHAC	F, P/T, L (Lead: PHAC)
		– Arrange for direct shipping of vaccine to health districts	F (Lead: PWGSC)
		– Communicate with bordering jurisdictions (other P/Ts and the U.S.) to facilitate awareness of the vaccine distribution plan and coordination and collaboration on efforts as much as possible	F, P/T, L
Antivirals	Strategic and controlled use of antivirals	▸ If not previously completed in Phase 6.0, review and if necessary revise national recommendations on antiviral use based on available epidemiological data	F, P/T (Lead: PIC)
		▸ Based on local epidemiology and available supplies, administer antiviral treatment and prophylaxis according to national priority groups	F, P/T, L
		▸ Communicate with bordering jurisdictions to facilitate awareness of any antiviral distribution plans	F, P/T, L
		▸ If antivirals are being used, ensure that stakeholders are aware of how to report adverse drug reactions	F, P/T (Lead: HPFB)
		▸ Monitor for drug resistance	F, P/T, L (Lead: NML)
Health Services	Management of increased demand on health care system	**Mostly Phase 6.2 actions:**	
		▸ Implement protocols and guidelines for prioritization of laboratory services during times of high service demand and staff and supply shortages	P/T, L
		▸ Implement mechanisms for coordinating patient transport and tracking/managing beds e.g. central bed registries, call centre and centralized ambulance dispatch	P/T, L
		▸ Access sources of additional HCWs and volunteers i.e., Emergency Measures Organizations and NGOs (Red Cross, St. John ambulance)	F, P/T, L (Lead: PHAC)

Canadian Phases 6.1 and 6.2	Pandemic virus detected in Canada (Phase 6.1 – single case(s) occurring, Phase 6.2 – localized or widespread activity occurring)		
Component	**Focus**	**Actions**	**Response Level**
		▸ Acquire extra supplies needed to provide medical care in non-traditional sites and open non-traditional sites as needed	P/T, L
		▸ Coordinate clinical care and health services activities with bordering jurisdictions to avoid migration to centres of perceived enhanced services	P/T, L
		▸ Monitor capacity of mortuary and burial services as well as need for social and psychological services for families of victims; Implement and establish alternative sites for provision of services as necessary	P/T, L
		▸ Track national stocks of medications as well as necessary medical equipment and supplies, including ventilators, oxygen, etc. Consider strategies to mitigate shortfalls	P/T, L
		When incidence appears to be decreasing (i.e., end of a pandemic wave)	
		▸ Assess status of stocks, impact of first wave, reorder supplies and ensure circulation of staff to avoid burnout, across all health care services (including mortuary)	P/T, L
Public Health Measures	Implementation of public health response	▸ Case and contact management as per Annex M (Public Health Measures) for Phase 6.1 and 6.2	F, P/T, L
		▸ Discontinue quarantine strategy if previously implemented	F, P/T, L
		▸ Shift-focus to self-care and self-monitoring as case numbers increase, with concurrent increase in public education messaging	F, P/T, L
		▸ Implement national recommendations regarding control strategies (i.e., cancellation of public gatherings, school closures)	P/T, L
Communications		▸ As per Annex K (Communications)	

Canadian Phases 6.1 and 6.2	Pandemic virus detected in Canada (Phase 6.1 – single case(s) occurring, Phase 6.2 – localized or widespread activity occurring)		
Component	**Focus**	**Actions**	**Response Level**
Emergency Management and Coordination		▸ For Phase 6.1 as per Phase 6.0 and;	
		– Consider declaring Public Welfare Emergency (as per Emergencies Act)	F
		– Track National stocks. Consider strategies to mitigate shortfalls	F (Lead : PHAC)
		– Discontinue border strategies	F (Lead : PHAC)
		– Conduct prediction analysis	F (Lead : PHAC)
		– Define clinical spectrum of disease	F
		– Review mass facilities plan	F,P/T,L
		– Review distribution policy of resources allocation	F (Lead : PHAC)
		– Assign medical and other resources	F,P/T,L
		– Access sources of additional HCW`s and volunteers	F,P/T,L
		▸ For Phase 6.2 as per Phase 6.1 and;	
		– Monitor and adjust	F,P/T,L
		– Advise and assist P/T's on establishment and operations of non-traditional health care sites and clinics	F (Lead : PHAC)
		– Deploy HERT strategically for maximum benefit	F (Lead : PHAC)
		– Continue consultation with health sector partners	F,P/T,L
		– Planning for illness in the response team	F,P/T,L
		– Plan for emergency financial resources	F,P/T,L
		– Promote optimal use of emergency resources	F,P/T,L
		– Assess increased demand on health care system	F,P/T,L

6.4 Post-Pandemic Period

The following actions that pertain to the Post-Pandemic Period have been retained in this section of the Plan pending completion of the Recovery Section (anticipated for next edition of the Plan).

Component	Focus	Actions	Response Level
Surveillance	Review, evaluation and return to routine operations	▸ Resume routine ongoing laboratory and disease surveillance	F, P/T, L
		▸ Estimate burden of disease during outbreak periods	F, P/T
		▸ Evaluate surveillance during the pandemic and make recommendations for improvements	F, P/T
Vaccine Programs	Review, evaluation, resumption of routine programs	▸ Provide recommendations for routine prevention and control including recommendations for vaccines	F, P/T (Lead: PIC / NACI)
		If vaccine was available and administered in earlier phase(s)	
		▸ Expand vaccine programs to cover population not yet immunized	P/T, L
		▸ Summarize and report coverage data (with one and/or two doses) and AEFI data	F, P/T, L
		▸ Examine vaccine efficacy	F, P/T (Lead: PIC / NACI)
		▸ Review and if necessary revise guidelines and/or protocols used during the mass campaigns	P/T, L
Antivirals	Review and evaluation	▸ Perform inventory assessment and ongoing monitoring of antiviral availability	F, P/T (Lead: PHAC)
		▸ Evaluate effectiveness of strategic antiviral use (in Canada and/or based on international reports)	F, P/T (Lead: PIC)
		▸ Summarize and report antiviral resistance data	F (Lead: NML)
		▸ Summarize and report adverse drug reaction data	F (Lead: HPFB)
		▸ Provide recommendations for the strategic use of antivirals during a pandemic based on lessons learned within Canada and internationally	F, P/T (Lead: PIC)

Component	Focus	Actions	Response Level
Health Services	Review, evaluation, return to routine operations	▸ Review and activate aftercare and recovery plans and guidelines	P/T, L
		▸ Review and revise (if necessary) clinical management guidelines	F, P/T (Lead: PIC)
		▸ Review and revise (if necessary) infection control guidelines	F, P/T (Lead: PIC)
		▸ Review and revise (if necessary) guidelines for management of mass fatalities (if applicable)	F, P/T (Lead: PIC)
		▸ Close or reduce use of “alternate care" and “over-flow sites”	P/T, L
		▸ Restock laboratory supplies and resume routine laboratory services	F, P/T, L
		▸ Develop projections for future laboratory requirements (i.e., human and physical resources including test kits, etc.)	F, P/T
		▸ Summarize, evaluate and report on the use of social and psychological services for families of victims	P/T, L
		▸ Track national stocks of medications as well as necessary medical equipment and supplies, including ventilators, oxygen, etc. Consider strategies to mitigate shortfalls in next wave or pandemic	F, P/T, L
Public Health Measures	Review, evaluation, resumption of routine programs	▸ Review and revise (if necessary) public health management guidelines	F, P/T (Lead: PIC)
		▸ Document and report lessons learned	F, P/T, L
		▸ Update educational materials	F, P/T, L
		▸ Resume routine public health activities and programs	F, P/T, L
		▸ Promote immunization for influenza and other secondary infections observed during the pandemic (if appropriate and applicable)	P/T, L
		▸ Disseminate all revised guidelines to appropriate stakeholders	F, P/T, L
		▸ Evaluate the effectiveness of public health measures (e.g., closure of schools or other institutions etc.)	F, P/T, L

Component	Focus	Actions	Response Level
		▸ Provide recommendations for routine prevention and control including recommendations for any control measures other than vaccines and antivirals	F, P/T (Lead: PIC)
		▸ Provide lessons learned for ourselves and the public and prepare for the next emerging infectious disease	F, P/T, L
Communications		▸ As per Annex K (Communications)	
Emergency Management and Coordination		▸ Assess lessons learned	F, P/T, L
		▸ Assess impact	F, P/T, L
		▸ Update plans	F, P/T, L
		▸ Restock supplies and equipment	F, P/T, L
		▸ Implement recovery measures as required	F, P/T, L
		▸ Update educational materials	F, P/T, L

Table of Contents

Annexes

Table of Contents

Annex A

Planning Checklists

Date of Latest Version: **October 2006**

Summary of Significant Changes:

- This is a new annex as the content of this document was previously included in the Preparedness Section of the Plan
- No significant changes have been made to the content.

Table of Contents

1.0 Introduction

Planning for a pandemic involves the consideration of what activities are necessary for optimal management of each stage of the pandemic. This annex provides a preliminary list of planning activities developed to facilitate planning at provincial and territorial (P/T) and local levels. These checklists will need to be reviewed on a regular basis and updated as they are completed. These planning activities should take place during the Interpandemic Period (i.e. WHO Phases 1 and 2) with the recognition that, when novel strains are detected or pandemic alerts are issued, they will need to be reviewed and adapted as necessary.

Activities have been listed and grouped in this annex according to the following components of the Plan:

- Surveillance
- Vaccine Programs
- Antivirals
- Health Services Emergency Planning and Response
- Public Health Measures
- Communications

The list for the former "Emergency Services" component of the Plan has been retained for reference purposes and appears following the Communications component in this annex.

Many of these activities and corresponding federal activities and responsibilities have been discussed and addressed by the various pandemic planning working groups. Refer to the Introduction and Background sections of the Plan for further information on these roles and responsibilities.

1.1 Surveillance Checklist

- Improve disease-based surveillance, in collaboration with the Centre for Infectious Disease Prevention and Control (CIDPC), Public Health Agency of Canada PHAC); includes improvements to the current system and consideration of enhancements (e.g. emergency room surveillance and real-time influenza mortality surveillance).
- Improve virologic surveillance capability by ensuring that at least one laboratory in the P/Ts has the capability to isolate and subtype influenza virus.
- Establish links with avian and swine influenza surveillance contacts within P/Ts.
- Develop and/or disseminate protocols and guidelines for the prioritization of laboratory services during times of high-service demand and staff and supply shortages.
- Develop and improve communication mechanisms for the rapid and timely exchange of surveillance information between P/Ts, CIDPC and local stakeholders.

- Consider how special studies, identified in collaboration with CIDPC, may be activated in your jurisdiction.
- Determine what information needs to be collected and how this will be done (to facilitate the evaluation of surveillance activities in the Post-pandemic Period, including socio-economic evaluations).

1.2 Vaccine Programs Checklist

- Enhance annual influenza vaccination coverage rates in NACI-recommended high-risk groups, particularly groups with low coverage levels.
- Increase annual influenza vaccination coverage rates among health care and essential services workers.
- Increase pneumococcal vaccination coverage levels in NACI-recommended high-risk groups (to reduce the incidence and severity of secondary bacterial pneumonia).
- Consider P/T modifications or refinements of nationally defined priority target groups, depending on local circumstances. For example, there may be specific groups of people in selected P/Ts whose absence due to influenza illness could pose serious consequences in terms of public safety or disruption of essential community services (e.g. nuclear power-plant operators, air-traffic controllers at major airports, workers who operate major telecommunications or electrical grids)
- Develop contingency plans for storage, distribution and administration of influenza vaccine through public health and other providers to nationally defined high-priority target groups, including:
    - mass immunization clinic capability in P/Ts,
    - locations of clinics (e.g. central sites, pharmacies, work place),
    - vaccine storage capability (i.e. identify current and potential contingency depots),
    - numbers of staff needed to run immunization clinics,
    - plans to deploy staff from other areas from within and outside public health organizations to assist in immunization,
    - advance discussions with professional organizations and unions regarding tasks outside routine job descriptions during a pandemic,
    - training plans for deployed staff, and
    - how to identify and target individuals belonging to priority groups (recognizing that the strategy will involve immunizing the whole population as soon as possible but that prioritization may be necessary for the first batches of vaccine that become available).
- Explore stockpiling syringes and other immunization clinic supplies
- Determine how receipt of vaccine will be recorded and how a two-dose immunization program will be implemented in terms of necessary recall and record-keeping procedures.
- Determine the number of people in P/Ts who fall within each of the priority groups for vaccination (e.g. high-risk groups, health care workers, emergency service workers, specific age groups).

- Verify the capacity of suppliers for direct shipping to health districts.
- Develop plans for vaccine security:
  - during transport,
  - during storage, and
  - at clinics
- Ensure that appropriate legal authorities are in place to allow for the implementation of major elements of a proposed distribution plan. (For example, will P/T laws allow for non-licensed volunteers to administer influenza vaccine? Do P/T laws allow for "mandatory" vaccination of certain groups if vaccination of such groups is viewed by the P/T public health officials as essential to public service?)
- Coordinate proposed vaccine distribution plans with bordering jurisdictions.
- Enhance the surveillance for adverse events following immunization in collaboration with CIDPC.
- Determine what information needs to be collected and how this will be done (to facilitate the evaluation of pandemic vaccine program activities in the post-pandemic period, including socio-economic evaluations).
- Review and modify plans as needed on a periodic basis.

1.3 Antivirals Checklist

- Estimate the quantity of antiviral drugs that would be required to implement national antiviral strategy in your jurisdiction.
- Inform stakeholders of antiviral strategy implementation plans, (including expected supply and use).
- Modify and refine the guidance provided by the Antivirals Working Group, as needed for P/T and local application (e.g. plan how to distribute available antivirals).
- Determine how stockpiled drugs will be stored, monitored (e.g. stability testing) and distributed.
- Monitor national antiviral stockpile storage conditions and shelf-life status on an ongoing basis.
- Determine what information needs to be collected and how this will be done (to facilitate evaluation of an antiviral response in the post-pandemic period, including socio-economic evaluations).

1.4 Health Services Emergency Planning and Response Checklist

- Develop P/T guidelines (modify federal guidelines) for prioritizing health care needs and service delivery, accessing resources and implementing infection control measures during a pandemic.
- Ensure that liability, insurance and temporary licensing issues for active and retired health care workers (HCWs) and volunteers are addressed with P/T licensing bodies. Define the extent of care that health care workers and volunteers can perform according to P/T laws and union agreements.

- Purchase in bulk and stockpile extra medical supplies. Explore the options for stockpiling extra medical supplies and identify sources for additional supplies.
- Develop mechanisms for coordinating patient transport and tracking and managing beds (e.g. central bed registries, call centre, centralized ambulance dispatch).
- Develop detailed regional and facility-level plans for providing health services during a pandemic, including the type of care to be delivered at different health care settings and the triage across sites. Identify human resource, material and financial resource needs and consider priorities for patient care.
- Assess health care personnel capacity: estimate number of HCWs by type (e.g. physician, nurses, respiratory therapists, radiology technicians, etc), and by work setting (e.g. hospital, community, long-term care facility, paramedical); estimate number of non-active HCWs (retired)
- Determine sources from which additional HCWs and volunteers could be acquired, include Emergency Measures Organizations and NGOs (Red Cross, St. John Ambulance) in pandemic planning.
- Determine the number and type of health care facilities, and estimate their capacity (e.g. hospital beds, intensive care unit beds, swing beds, emergency department, ventilatory capacity, oxygen supply, antibiotic supply).
- Determine potential non-traditional sites and corresponding "parent" organiziations for medical care provided they meet the criteria in Annex F, Infection Control and Occupational Health. Possible sites could include shelters, schools, gymnasiums, nursing homes and daycare centres.
- Identify sources of extra supplies needed to provide medical care in these non-traditional sites.
- Determine the capacity of mortuary and burial services as well as social and psychological services for families of victims.
- Coordinate clinical care and health services plans with bordering jurisdictions to avoid migration to centres of perceived enhanced services.
- Develop aftercare and recovery plans and guidelines.
- Ensure that guidelines are distributed to regional and local jurisdictions.
- Determine what information needs to be collected and how this will be done (to facilitate evaluation of the impact of the pandemic on health services in the post-pandemic period, including socio-economic evaluations).
- Review and modify plans as needed on a periodic basis.

1.5 Public Health Measures Checklist

- Coordinate professional and public education strategy for each phase.
- Identify staffing needs and resource requirements for the management of cases and contacts occurring in your jurisdictions during the Pandemic Alert Period and Pandemic Period.
- Train staff that may need to be re-assigned to work on the pandemic response, and identify what and how other essential and non-deferrable public health programs could be maintained during a pandemic.
- Develop protocols for case and contact management, including the implementation of antiviral strategy, quarantine and community-based measures.
- Develop protocols for school closures and cancelling or restricting public gatherings.
- Determine how changes in case and contact management and community-based control measures will be implemented and communicated to the public and pandemic responders.
- Engage community stakeholders (e.g. school boards, businesses) in the planning process for community-based control measures.
- Assess how border measures may impact your jurisdiction and inform and plan with stakeholders (e.g. airports) how these measures can be coordinated.
- Consider how measures to limit the spread of a novel virus emerging in a community, including "exit screening" (if required) might be implemented at various levels (e.g. town, urban centre, region, P/T) within your jurisdiction.

1.6 Communications Checklist

(Refer to matrix in Annex K, Communications)

2.0 Emergency Response and Coordination Activities: Checklist for Provinces and Territories

- Identify the advantages of declaring a P/T emergency during a pandemic.
- Develop contingency plans to provide food, medical and other essential life-support needs for persons confined to their homes by choice or by direction from P/T and local health officials.
- Ensure communication among P/T Ministries of Health and emergency responders organizations as well as among other P/T ministries or departments that would be impacted by a pandemic.
- Within P/Ts, estimate numbers of emergency services workers including police, fire, correctional, military, funeral services, utilities, telecommunications and F/P/T and local leaders (e.g. political leaders, managers of response teams) essential to pandemic response.
- Identify military personnel and voluntary organizations that would assist during a pandemic.

- Develop a list of essential community services (and corresponding personnel) whose absence would pose a serious threat to public safety or would significantly interfere with ongoing response to the pandemic.
- Develop contingency plans for emergency backup of such services and/or provision of replacement personnel.
    - Replacement personnel could come from lists of retired personnel and/or government or private-sector employees with relevant expertise.
- Conduct environmental assessments of surge capacity of hospitals, non-traditional sites and other facilities including ventilation, water sources, etc.
- Develop aftercare and recovery plans and guidelines.
- Determine what information needs to be collected and how this will be done (to facilitate the evaluation of the emergency response in the post-pandemic period, including socio-economic evaluations).
- Conduct simulation exercise(s)

Annex B

Pandemic Influenza Planning Considerations in On-reserve First Nations Communities

Date of Latest Version: *June 2005*

This Annex is currently under review. A draft revised version is expected in January 2007.

Summary of Significant Changes:

The revised version will reflect the following:

- *clarification from the F/P/T Health Ministers meeting on roles and responsibilities;*
- *progress made by First Nations communities with regards to pandemic influenza planning;*
- *First Nations and Inuit Health Branch involvement in various new fora related to pandemic influenza planning;*
- *National and Provincial Aboriginal Organizations' involvement in pandemic influenza planning.*

Note: *The First Nations and Inuit Health Branch will undertake the necessary consultations for the revision of this annex.*

B Pandemic Influenza Planning Considerations in On-reserve First Nations Communities

1. Introduction

The national pandemic influenza plan provides a framework that will guide planning in all jurisdictions in Canada including on-reserve First Nations (FNs) communities[1]. Annex B of the plan has been developed based on a request to Health Canada's First Nations and Inuit Health Branch (FNIHB) from the Pandemic Influenza Committee (PIC) to describe some of the unique issues related to pandemic planning in FNs communities.

Annex B outlines some of the key activities needed to have sufficient pandemic influenza planning for on-reserve FNs communities and proposes the respective roles and responsibilities of various jurisdictions.

On-reserve FNs pandemic influenza planning needs to be integrated into a seamless system of planning across all Canadian jurisdictions.

This Annex B document is the result of extensive consultation with key stakeholders. Input on the draft document was sought from FNIHB regional public health staff (including medical officers and nurses), members of the federal/provincial/territorial Pandemic Influenza Committee, the Centre for Emergency Preparedness and Response at the Public Health Agency of Canada, the Assembly of First Nations, and the National Aboriginal Health Organization. The document was refined based on comments received from all of these groups.

2. Current Status

Health Canada's First Nations and Inuit Health Branch (FNIHB) delivers public health services to the First Nations who live on non-transferred federal reserves. In transferred communities that have accepted funding and responsibility for public health services, FNIHB provides the funding, but FNs communities are responsible for providing the services. In order to do this, transferred FNs communities can hire their own public health professionals or enter into agreements with provincial or regional health authorities for the provision of these services. It is important to note that FNIHB requires transferred communities to have an emergency preparedness plan as a condition of receiving federal transferred funding for public health. However, those emergency preparedness plans do not address specific public health emergencies, such as pandemic influenza. FNIHB, through its regional offices, will assume an intermediary role between provinces and transferred communities.

1 This document focusses on "on-reserve First Nations communities" living in the provinces for which there are concerns over clarity of roles and responsibilities for public health services (including pandemic influenza planning) among the various jurisdictions.

Provision of public health services, including pandemic influenza planning, to Inuit populations and to FNs communities living in the Territories is primarily the responsibility of the territorial governments[2]. Territorial governments provide public health services in an integrated fashion to all residents regardless of ethnicity.

Currently, the federal, provincial and territorial governments also share the delivery of other health services to the First Nations and Inuit population. Provinces provide universal insured health services (including physician and hospital services) to all citizens, including Aboriginal peoples on/off- reserve, except in remote isolated, isolated and some semi-isolated on-reserve communities where the primary health care is delivered by FNIHB-employed registered nurses.

While most of the FNIHB regions have been participating in the provincial committees for pandemic influenza planning, there are very few formal agreements between Health Canada FNIHB regional offices and the provincial governments on the management of outbreaks of pandemic influenza in FNs communities. Nevertheless, progress has been made in this area.

All FNIHB regions have developed draft or final regional pandemic influenza plans or guiding frameworks to assist FNs communities in developing their community pandemic influenza plans. Other FNIHB regions are in the process of negotiating roles and responsibilities with their respective provinces for dealing with pandemic influenza.

In some regions, meetings between FNIHB and FNs to raise awareness of the need for community-level planning on pandemic influenza have occurred and, as a result, some communities have developed their community plans. In other regions, health directors from FNs communities are engaged directly with their respective provincial/district/regional health authorities on pandemic influenza planning to clarify the issues of acute care and client management in the event of pandemic influenza outbreaks.

In practice, there have always been informal collaborations between provincial governments and FNIHB for management of public health emergencies and disease outbreaks in on-reserve FNs communities. It is important to emphasize, however, that there are some gaps in these collaborations. For example, there have been occasions when FNIHB medical officers have not been notified by provincial/regional counterparts of cases of communicable disease (e.g. meningitis) occurring on a reserve and where FNIHB regional medical officers are the identified lead for the public health response to such cases. Furthermore, this informal collaboration with provinces and FNIHB regions has not been tested during a massive national public health emergency, such as pandemic influenza.

3. Outstanding Issues

Linkages with Provincial/Territorial (P/T) Public Health Authorities

- Formal agreements between provincial public health and FNIHB regional offices on co-ordination of roles and responsibilities during public health emergencies, including pandemic influenza.
- Formal agreements between provincial public health and FNIHB regional offices to include on-reserve FNs numbers into the provincial/regional plans for purchase of antivirals, vaccines (when developed), and other relevant emergency supplies, and to clarify who would be the gatekeeper for these limited supplies/products.

2 Seven Inuit communities and two Innu communities in Labrador fall under FNIHB's public health programming.

- Clear protocols for on-reserve FNs communities to access the anti-virals, vaccines and other emergency supplies in a coordinated fashion with the provinces.
- Communication protocols between FNIHB regional offices, transferred bands and provinces on issues related to communicable diseases and other public health concerns.

Legal Authority

- Clarity among the provinces, regional health authorities, the First Nations, and FNIHB regional offices on the legally recognized medical officer of health for each on-reserve FNs community.

Resources

- Capacity at the FNIHB regional level and at the FNs community levels to deal with outbreaks of pandemic influenza due to limited public health infrastructure for FNs communities and shortage of public health human resources.
- Surveillance, epidemiology and influenza vaccination program data of on-reserve population for proper pandemic planning.

4. Next Steps

While FNIHB is working on assessing and addressing the issue of public health infrastructure and the deficiency of public health human resources in FNs communities and at FNIHB regional levels, it is crucial that planning for management of pandemic influenza in FNs communities be a coordinated effort involving all jurisdictions. The on-reserve FNs communities, with the support of FNIHB and provincial/regional health authorities, are responsible for developing their community pandemic influenza plans. However, the successful implementation of these plans requires a coordinated effort involving all key stakeholders (i.e. the FNs communities, FNIHB and provincial/regional health authorities). FNIHB regional offices would lead in facilitating the process among stakeholders.

Table 1 illustrates some of the key activities required for adequate pandemic planning for on-reserve populations. It includes proposed roles and responsibilities of the various jurisdictions who will be facilitating the planning or be involved in the planning. This table was developed because for public health issues of on-reserve populations, the multiple jurisdictional involvement has often created confusion over roles and responsibilities. To effectively deal with pandemic influenza outbreaks in on-reserve FNs communities, the roles and responsibilities of the various jurisdictions must be clear to all in advance.

Table 1: The Key Activities and Proposed Roles and Responsibilities of Partners on Management of Pandemic Influenza in On-reserve First Nations Communities

1. FNs Communities

1.1 Develop community pandemic influenza plans in collaboration with the respective FNIHB region and/or the local/regional health authority, specifically:

a) identify provincial/regional Medical Officer of Health (MOH) for the community and establish formal arrangements for ongoing MOH services;

b) identify partners and clarify their roles and responsibilities;

c) enhance community awareness;

d) train front line staff[3];

e) enhance community surveillance activities for early detection of influenza-like illness (ILI);

f) enhance triage/screening capacity;

g) develop capacity for patient isolation in health care facilities in FNs communities;

h) implement infection control guidelines and public health measures at the time of pandemic, in consultation with FNIHB regional medical officers, regional health authorities, and in accordance with the national pandemic plan;

i) develop and regularly update communication plan;

j) maintain ongoing stock and inventory of emergency supplies (e.g. masks, gloves, etc.);

k) calculate and regularly update the number of individuals (within FNs communities) in each priority group for vaccines and antivirals;

l) plan for mass immunization, in collaboration with FNIHB regional medical officers, and/or provincially recognized medical officers of health;

m) communicate and discuss with health authorities in neighbouring municipalities the transfer of severe pandemic influenza cases to hospitals and ensure equitable access for such cases;

n) assess the current means of patient transportation to provincial/regional health care system (when required) and examine their appropriateness during pandemic influenza (i.e. identify the gaps and develop strategies to address them);

o) plan ahead of time to ensure maintenance of essential services[4] in the community;

p) develop a contingency plan to enhance the knowledge of FNs people on how to deal with situations when there are severe shortages of health care workers and health care services[5] as a result of pandemic influenza;

q) develop formal partnership agreements between FNs communities to allow for mutual aid;

r) institute emergency response team;

s) participate in simulation exercises with the respective neighbouring municipalities for testing of preparedness and response plan for pandemic influenza at the community level; and

t) actively participate in local pandemic influenza planning (in neighbouring municipalities) to facilitate coordination of efforts and integration with provincial/regional systems in dealing with pandemic influenza.

3 Should include training of front-line health care workers on diagnosis and care, infection control, public health measures, surveillance and communication.

4 Such as maintenance of fire-fighting/policing, maintenance of water/energy/food availability, management of mass fatalities.

5 Should include monitoring of illness, provision of care at home and use of infection control measures and communication.

2. FNIHB Regions

2.1 Develop FNIHB regional pandemic influenza plans, in consultation with FNs communities and FNs regional organizations, and integrate with provincial systems where possible. More specifically:

2.1.1 Develop formal agreements, through negotiation, with provincial health authorities to clarify and co-ordinate mutual roles and responsibilities for:

a) procurement and distribution of vaccine/antivirals/emergency supplies (e.g. supplies for diagnosis, treatment, infection control, immunization);

b) enhanced surveillance capacities, in conjunction with provincial system, with the ability to separate out surveillance data for on-reserve FNs;

c) assistance with public health/medical care services in overwhelming situations;

d) clarity on the legally recognized medical officer of health for each FNs reserve;

e) two-way communication on case reporting;

f) defined roles and responsibilities of provincial/regional vs FNIHB public health authorities on needed activities for pandemic influenza preparedness and response; and

g) establishment of a means of transportation for respiratory specimens to provincial public health laboratories, when necessary.

2.1.2 develop partnership with INAC at the regional level towards integration of health emergencies with the overall emergency preparedness planning;

2.1.3 develop communications plans;

2.1.4 identify partners and clarify their roles and responsibilities;

2.1.5 participate in simulation exercises with province(s) for testing of preparedness and response plan for pandemic influenza at FNIHB regional level;

2.1.6 partner with FNIHB Headquarters to develop educational material;

2.1.7 identify current means of distribution of supplies to FNs communities and examine their appropriateness in health emergencies, such as pandemic influenza (i.e. identify gaps and develop strategies to address them);

2.1.8 identify and address the financial, human resource and legislative gaps in the current system;

2.1.9 plan for mass immunization of priority groups with pandemic influenza vaccine (when available);

2.1.10 support training of front-line staff in communities;

2.1.11 inform community leaders about pandemic influenza and its implications for their communities;

2.1.12 support and facilitate community planning by raising awareness, providing training sessions on planning, and providing educational material to FNs community leaders and regional FNs organizations;

2.1.13 provide public health services/recommendations/advice to FNs communities;

2.1.14 plan for provision of rapid diagnostic tests to health care facilities, if necessary;

2.1.15 provide names and contact information of FNIHB regional leads on pandemic influenza to other partners;

2.1.16 keep track of number of individuals (within FNs communities) in each priority group for vaccination; and

2.1.17 develop regional surveillance capacities (to be integrated with provincial system).

3. FNIHB Headquarters

3.1 Develop an overarching framework for Branch pandemic influenza preparedness and response plan, specifically:

a) combine regional and HQ plans into FNIHB organizational pandemic influenza plan;

b) based on the national pandemic influenza plan, develop generic training modules for community front-line health care workers and community leaders that are clear and culturally appropriate;

c) develop a cross-regional human resource mobilization plan (from HQ to FNIHB Regions);

d) develop communications plan; and

e) develop capacity for central data compilation and analysis to determine the overall burden of disease for FNIHB clientele.

3.2 Support and facilitate FNIHB regional pandemic planning by providing coordination and resources.

3.3 Work with provincial officials to clarify federal and provincial legislation and authorities in the event of pandemic influenza on reserves.

3.4 Identify national partners and work with them to define various roles and responsibilities.

3.5 Link with national FNs leaders/organizations to increase awareness of pandemic influenza and the necessity for community planning.

4. Provincial Public Health Authorities

4.1 Work with First Nations and FNIHB regional offices during the development of provincial pandemic influenza plans to define roles and responsibilities, coordinate efforts, and prevent gaps in the management of pandemic influenza in FNs communities.

4.2 Develop formal agreements, through negotiation, with FNIHB regional offices to incorporate on-reserve FNs people into the provincial planning activities, where possible, and specifically for:

a) procurement and distribution of vaccine/antivirals/emergency supplies (e.g. supplies for diagnosis, treatment, infection control, immunization);

b) enhanced surveillance capacities with the ability to separate out surveillance data specific to on-reserve FNs;

c) two-way communication on case reporting;

d) facilitation of on-reserve FNs communities' access to federal emergency services such as the National Emergency Stockpile System (NESS) and the Health Emergency Response Team (when it is established) when community and FNIHB resources are overwhelmed and where available[6];

e) if PH capacity permits, assistance in the provision of PH services to FN communities when community and FNIHB resources are overwhelmed[7]; and

f) clarity on the legally recognized medical officer of health for each FNs reserve.

4.3 Ensure equitable access to hospital care for transferred, severe pandemic influenza cases.

4.4 Work with federal officials to clarify federal and provincial legislation and authorities in the event of pandemic influenza on reserves.

4.5 Develop communication plan (with FNIHB regional offices and other key players).

6 FNIHB regional offices must make such requests to the provincial public health authorities, which would provide such services through coordination with the Centre for Emergency Preparedness and Response (CEPR).

7 For provinces that do not have a public health service delivery mandate at the provincial level, these responsibilities could be relevant to regional health authorities.

5.	Centre for Emergency Preparedness and Response (CEPR)
5.1	Communicate with FNIHB regularly and effectively on matters related to emergency preparedness and response.
5.2	Provide timely opportunities to FNIHB to input into the federal/provincial/territorial (FPT) Networks on Emergency Preparedness and Response and provide regular and timely feedback to FNIHB on developments at the FPT Networks on Emergency Preparedness and Response that affect FNIHB's progress on emergency planning (including pandemic influenza planning).
5.3	Invite FNIHB to FPT Network on Emergency Preparedness and Response when the focus of discussion has implications for FNIHB HQ, FNIHB regions, and FNs communities with regard to pandemic influenza planning. This will ensure that FNIHB, CEPR and Provincial health/social services authorities work together in an integrated/coordinated manner to prevent gaps and duplications when managing outbreaks of pandemic influenza in FNs communities.
5.4	In situations where FNIHB's regional capacity (including provincial aid) is exhausted, CEPR could deploy available Health Emergency Response Team (HERT), when it is established, to FNs communities (through provincial systems of deployment) to assist FNIHB regional health professionals in responding to public health emergencies, such as pandemic influenza[8].
5.5	Through provincial system for access to the National Emergency Stockpile System (NESS) within a province, provide access to the federally-controlled pharmaceuticals and other emergency supplies/services for FNs communities.
5.6	Facilitate linkages between FNIHB and provincial authorities to discuss and clarify the provincial roles and responsibilities in FNs communities access to NESS and HERT, as per letter of agreement between Centre for Emergency Preparedness and Response, the Public Health Agency of Canada, and the First Nations and Inuit Health Branch, Health Canada.
5.7	Provide courses/training on pandemic planning and setting up clinics for mass immunization.
5.8	Provide technical consultations to FNIHB staff on development of educational modules and courses on pandemic influenza for community health care providers and other first responders in FNs communities and facilitate on-line delivery of courses through existing mechanisms.
5.9	Provide technical assistance to FNIHB HQ for development and testing of preparedness and response plan for pandemic influenza (e.g. taking part in federal/national simulation exercises).

5. Conclusion

The management of a predictable pandemic influenza in FNs communities will require a coordinated effort involving all levels of government. Considerations of the unique needs of FNs communities must be reflected in plans at the local, P/T and federal levels. The goal of pandemic influenza preparedness and response is: "First, to minimize serious illness and overall deaths, and second to minimize societal disruption among Canadians as a result of an influenza pandemic." These goals will only be achieved if strategies and specific plans for FNs communities are integrated within the pandemic plans of all jurisdictions.

8 It is expected that federal assistance would be available to on-reserve FNs communities and the rest of the province in an equitable fashion.

Note: INAC (Indian and Northern Affairs Canada) has responsibility for overall emergency preparedness. In the event of a health emergency, including pandemic influenza, INAC's role is to facilitate communication with First Nations and support Health Canada and the Public Health Agency of Canada when required.

Annex C

Pandemic Influenza Laboratory Preparedness Plan

Date of Latest Version: *October 2006*

Summary of Significant Changes:

- *Provides more details regarding laboratory preparedness*
- *Uses new Pandemic Phase terminology and identifies activities pertaining to each phase.*

Table of Contents

Appendices

The Pandemic Influenza Laboratory Preparedness Network (PILPN) has developed this document in accordance with the defined phases of the new Canadian Pandemic Influenza Plan for the Health Care Sector. Laboratory testing, laboratory-based surveillance and data collection, communication issues and pandemic preparedness are addressed from the perspective of the Canadian phases. The document provides general guidelines and facilitates a consistent approach to laboratory testing for influenza during the Interpandemic Period and Pandemic Period.

Interpandemic Period

Canadian Phases 1.0 and 2.0:

No new influenza A virus subtypes have been detected in humans

1. Testing

Maintain routine laboratory diagnostic services for influenza:

- Virus isolation in cell culture
- Direct antigen detection (immunofluorescent assay [IFA], enzyme immunoassay [EIA], rapid point of care [POC] testing)
- Reverse transcriptase polymerase chain reaction (RT-PCR).

Serology is of limited usefulness in diagnosis of acute influenza. The PIPLN supports the use of rapid detection methods in conjunction with cell culture, viral isolation, as well as nucleic acid amplification tests (NATs), such as RT-PCR, or nucleic acid sequence-based amplification (NASBA) to aid in the timely diagnosis, particularly in outbreak situations.

The nasopharyngeal swab (NPS) is recommended as the preferred specimen because it leads to the best results in most direct antigen tests, such as IFA and rapid POC testing, as well as in cell cultures. Because of their poor sensitivity for antigen and culture-based assays, throat swabs are not recommended. However, throat swabs and nasopharyngeal (NP) washings may be acceptable or recommended by the manufacturers of specific rapid detection kits. Nasal swabs may be an acceptable alternative in children particularly when a NAT, such as RT-PCR, is used as the diagnostic test. This is likely true in adult patients, however there is little published data to support this.

Specimens should be collected as soon as symptoms develop because viral shedding is maximal at the time of onset of illness and generally decreases to undetectable levels by 5 days in immunocompetent adults. Viral shedding may last longer in children and immunocompromised patients; hence, collection after 5 days of illness may still be useful in this setting.

Because the suboptimal positive predictive value during periods of low influenza activity, diagnosis by rapid POC tests must be interpreted with caution and confirmed by IFA, viral culture or RT-PCR. Complete details regarding World Health Organization (WHO)

recommendations on the use of rapid testing for influenza, including a review of the currently available kits can be found at: http://www.who.int/csr/disease/avian_influenza/guidelines/ rapid_testing/en/index.html.

The PILPN encourages provincial public health laboratories (PHLs) and local clinical laboratories to develop an influenza testing strategy for a pandemic situation. This should include the establishment of protocols to process and identify novel influenza subtypes that may be considered Risk Group 3 pathogens. Algorithms should include consideration of conventional culture, IFA, EIA and NAT options, depending on local expertise and anticipated resource availability. Ongoing development of NAT methods for the rapid detection of novel influenza subtypes can be undertaken using conventional or real-time RT-PCR methods. This may include the utilization of a "universal" detection protocol that would identify any influenza A virus using primers to a conserved region within the genome and subsequent subtyping using primers specific for avian subtypes with pandemic potential, i.e. H5, H7, H9, and human subtypes H1, H3. Other novel diagnostic protocols should be explored such as the development of protocols for the simultaneous detection and subtyping of defined influenza A viruses. The National Microbiology Laboratory (NML) and PHLs will share sequence information of newly emerging strains as soon as it is available and exchange details of recommended protocols and primers where appropriate. The NML will also provide the necessary reagents and controls that will be essential in developing these assays and to ensure quality assurance.

Participation in the NML proficiency program for influenza is strongly suggested for all laboratories performing any type of influenza diagnosis. The NML will provide two influenza proficiency panels per year to any Canadian laboratories that wish to participate for the molecular identification of current influenza A strains. These will consist of specimens of ribonucleic acid (RNA) extracted from key strains of interest for RT-PCR quality control testing. The PILPN also encourages participation in other accredited proficiency programs, such as those of the College of American Pathologists.

Up to 10% of all influenza isolates, including at least five early-season, five late-season and any unusual isolates, especially from a person presenting with a severe respiratory infection with an epidemiological link to an area of concern, must be sent to the NML for subtyping. These isolates must be submitted to the NML promptly, along with the results of any subtyping or genotyping performed locally. The NML will give priority to processing such specimens. Virus will be amplified in cell culture for subtyping by HAI and/or neutralization assays. For specimens that cannot be amplified by culture, the genotype will be determined after amplification of selected genes by RT-PCR and sequencing. The NML will undertake to report the subtype to the submitting laboratory within a few days of receipt. All laboratories performing viral isolation are expected to submit isolates for subtyping as described above unless otherwise directed by the NML. In accordance with the response plan outlined by the Pandemic Influenza Committee (PIC), the PILPN encourages each province and territory (P/T) to ensure that at least one laboratory within the P/T has the capability to determine the subtype influenza A virus and, if not, to establish appropriate alternate arrangements. This may include the development of nucleic acid sequencing protocols capable of determining the subtype of novel strains of influenza A. The NML will supply protocols, primers and reagents necessary to develop and evaluate these assays along with controls required for a quality assurance program.

The NML currently performs testing for amantadine resistance on early-season and late-season isolates. Specimens can be submitted for this testing as agreed upon by the NML in conjunction with PHLs. Resistance is monitored by amplification and the sequencing of the gene encoding the M2 protein to identify the mutations associated with resistance, and by viral growth inhibition assay. The NML will undertake investigations related to surveillance for resistance to neuraminidase inhibitor drugs in emerging and currently circulating strains.

The NML and selected PHLs will share subtyping and susceptibility testing technology as well as developments of rapid test(s) for detection of influenza, better subtyping and susceptibility testing methods. They will also serve as sites for training other appropriate laboratories in these methods.

The NML will provide proficiency panels to assess the diagnostic sensitivity and specificity of tests available at PHLs and other viral diagnostic labs. The NML and PHLs will share reagent lots designed to diagnose circulating or evolving influenza agents.

The NML will develop the capacity to produce and evaluate in-house reagents, such as monoclonal antibodies for IFA testing, which could be stockpiled and distributed to PHLs at the time of a pandemic.

Testing protocols for immune response will be developed in cooperation with the Vaccine Development Group to test vaccine recipients for immune response in assessing efficacy of vaccine. Hemagglutination inhibition (HAI) and or EIA tests will be implemented using the antigens that are included in the most current vaccines.

Enhancing the detection of the influenza vaccine immunological response in the population, measuring cross reactivity among strains, and tracking how immune response evolves in a population over time with the succession of circulating influenza strains and existing vaccination programs is expected to help define the longevity of the immune response and to improve approaches to measuring population-based vaccine-induced or natural immunity. The NML will undertake a leading role in this area of research and development.

2. Surveillance and Data Collection

The PILPN encourages all PHLs and other laboratories that routinely test for influenza to submit data on influenza testing during the influenza season to the Public Health Agency of Canada (PHAC) on a weekly basis or more frequently if requested by PHAC. This data is reported on "FluWatch" and accessible through the Health Canada and Canadian Public Health Laboratory Network (CPHLN) surveillance tools, such as those available on the Canadian Laboratory Surveillance Network (CLSN).

Enhanced surveillance using sentinel physicians, including laboratory testing, may be set up by PHAC in collaboration with local public health officials and PHLs.

3. Communication

Each PHL will maintain an up-to-date list of laboratories that routinely test for influenza in their jurisdictions. Information from each laboratory including a contact name, fax and phone numbers, and e-mail address should be maintained in a data base so that up-to-date information regarding novel viral isolates and their diagnostic characteristics can be rapidly disseminated as pandemic phases progress. An up-to-date listing of all influenza testing laboratories will also be maintained by the NML and the CPHLN

secretariat. An up-to-date list will also be accessible to all PIPLN and CPHLN members on their respective secure sites.

The CPHLN secretariat must set up enhanced communications to link the NML, PHLs and other viral diagnostic laboratories that test for influenza with provincial epidemiologists using the CLSN intelligence exchange centre, enabling e-mail, fax, phone and/or teleconference, and Web-casting communication capabilities for infectious disease outbreak and event management. Diagnostic expertise from PILPN will be solicited by CPHLN as is deemed necessary and appropriate.

Each province will have an influenza surveillance committee in place to ensure good communication among the provincial laboratory, provincial epidemiologists and health units. The committee will deal primarily with influenza in the event of a pandemic, but it will deal with other surveillance issues at other times as required. The committee should include, at a minimum, a provincial epidemiologist, the provincial laboratory director or designate and the chief medical officer of health or designate.

4. Pandemic Preparedness

As part of pandemic preparation, the PILPN encourages the NML to consider in-house production of alternate sources of reagents (e.g. antibodies) that could be distributed to diagnostic laboratories across the country during a pandemic when commercial reagents may be in short supply.

As part of pandemic preparation the PILPN encourages PHLs and other local laboratories to assess how the pandemic will impact on other clinical laboratory functions and human resource (HR) issues. Although the true impact is difficult to accurately predict, one can expect that certain tests requests from physicians will increase (e.g. increased respiratory specimens) and others will decrease. Trying to anticipate this in advance may help in developing strategies to maximize workflow and efficiency. Strategies may include but are not limited to:

a. Development of an inventory of currently provided services and the human resources required to maintain this level of service.

b. Development of a list of essential services and the HR required to maintain these essential services.

c. Anticipation of testing demands which will increase (e.g. respiratory culture) and those that may decrease (e.g. HIV viral load testing).

d. Development of a prioritization strategy for lowering conventional workload and other services to determine which services will be restricted and in what order when faced with HR and resource problems. This will need to include the impact of each test and its volume.

e. Development of a staffing strategy. Ideally staffing issues should be addressed prior to the pandemic so potential concerns can be addressed before HR problems develop.

f. Anticipation of staff safety concerns. Staff will need reassurance that the environment they are working in is safe. The processing of specimens in a Biosafety Level (BSL) 2 laboratory should not be a concern because swabs for other BSL 3 pathogens (TB) can be readily processed in a BSL 2 laboratory in a HEPA-filtered biosafety cabinet. The main concern will be biosafety relating to viral amplification

and manipulation of viral cultures. Laboratories that do not have a BSL 3 laboratory will need to implement non-culture methods. Laboratories that do not possess BSL 3 capability will not be able to culture virus safely and will need to shift to non-culture methods such as antigen detection methods (IFA, direct fluorescent-antibody assay [DFA]) or NATs (RT-PCR or NASBA).

g. Consideration of materials and supplies needed during the intrapandemic and interpandemic periods and anticipation of shortages. Both influenza and non-influenza related supplies should be included. Plans should be made to allow for up to 16 weeks of interrupted supply chains.

h. Consideration of use of high throughput instruments to facilitate increasing the test volume (e.g. automated nucleic acid extraction).

i. Consideration of appropriate means of streamlining specimen accessioning.

j. Consideration of possible changes in the testing schedule to maximize workflow and personnel.

k. Education of the laboratory staff about the necessity of annual influenza vaccination (strongly encourage vaccination).

Laboratories will participate in regular disaster drills at the request of the national PIC to test the plan and identify areas that need further attention.

Pandemic Alert Period

Canadian Phase 3.0:

Sporadic human infections with a new subtype outside Canada

Canadian Phase 3.1:

Sporadic human infections with a new subtype in Canada

1. Testing

Phase 3.0

Diagnostic testing services capacity and approach will continue as in Phases 1.0 and 2.0.

The NML will give priority to reagent preparation for the identification of the new strain in readiness for Phase 3.1. The NML will distribute NAT and conventional culture protocols as appropriate. In preparation of Phase 3.1, PHLs and other viral diagnostic laboratories that provide influenza testing are encouraged to review their requirements for reagents and other supplies by the following:

- Completion of an inventory of present capacity
- Determination of the minimum diagnostic requirements needed to make a timely diagnosis of the pandemic strain, e.g. by RT-PCR
- Confirmation and assurance that enough supplies are available to maintain the ability to diagnose influenza and that these supplies will last at least throughout the first wave of the pandemic
- Increasing inventory of swabs, viral transport media kits and other reagents needed for influenza diagnostics

Phase 3.1

The PHLs and other viral diagnostic laboratories will be on high alert and will focus on:

- Enhanced laboratory-based surveillance for the emerging new subtype
- Viral isolation by culture if appropriately equipped
- Implementation or augmentation of RT-PCR assays or other NATs

There is expected to be an increased demand for testing with emphasis on the identification of the hemagglutinin (HA) type of the viruses identified. Viral isolation is encouraged in order to facilitate detection of emergence of new subtypes within Canada. RT-PCR will be particularly useful for rapid detection and HA type determination. All influenza A isolates must be typed and, if not, conventional circulating strains must be forwarded for further testing to the NML. The PHLs will play a critical role in tracking the potential spread of the pandemic strain. Any positive influenza findings obtained from a case with severe respiratory infection and epidemiological links with avian influenza need to be confirmed by the NML and rapidly characterized because the new subtype may be co-circulating with "epidemic" human strains.

The use of commercially available rapid POC tests for the diagnosis of a new subtype is not recommended because of the lack of information on the clinical accuracy of such rapid tests. These tests may be able to rapidly identify and differentiate influenza A and B infections, but currently they do not differentiate different HA subtypes of influenza A and cannot differentiate human from avian influenza virus. Any findings in direct antigen or rapid POC tests obtained on patients suspicious for avian influenza must be confirmed by culture and/or RT-PCR.

The NML will evaluate the efficacy of POC tests to detect any new subtype and share this information with all influenza testing laboratories. The NML will supply proficiency panels to ensure quality assurance.

Although the NPS is the ideal specimen for human influenza, it has been recently reported that the recovery of the current H5N1 viruses infecting humans in Asia is better from throat specimens than from nasal specimens. Because the optimal specimen type and timing of collection are unknown for avian influenza infections in humans, particularly as they continue to evolve, the PILPN encourages laboratories to consider the collection of different types of respiratory specimens, including NP swabs, NP aspirate, nasal washings, throat swabs and sputa, on multiple different days. In addition, cases of H5N1 have been isolated in the stool of infected patients; hence, consideration should be given to testing stool specimens in patients who have significant gastrointestinal symptoms.

The biosafety level required for processing these specimens will be assessed by the Office of Laboratory Security, Centre for Emergency Preparedness and Response (CEPR), in consultation with the CPHLN and international partners, such as WHO and the United States Centers for Disease Control and Prevention (CDC), and the directives disseminated to all influenza testing laboratories.

2. Surveillance and Data Collection

As in Phases 1.0 and 2.0, with heightened laboratory-based surveillance as determined by the NML and PIC.

3. Communication

Information such as subtype, optimal cell lines to use, usefulness of direct antigen testing, antiviral susceptibility, morbidity, mortality, etc., from WHO, CDC, NML or laboratories from areas affected by the new subtype will be rapidly disseminated to PHLs by CPHLN secretariat by various means, i.e. CLSN intelligence exchange centres, fax, e-mail, telephone, etc., depending on the circumstances.

Using the laboratory database compiled in the Interpandemic Period, PHLs will ensure that other influenza testing laboratories in province are kept informed. The CPHLN secretariat will coordinate meetings and/or teleconferences of the PILPN and PHLs as required.

Education sessions to update staff will be held on aspects of testing, safety, HR issues and other changes in laboratory protocols that can be expected, as the pandemic phases progress.

Communications will be prepared in advance of the ensuing pandemic to outline for clients the changes to testing that are anticipated with the onset of the pandemic. This will include alternative strategies that are available to help reduce the workload of the laboratory.

Pandemic Alert Period

Canadian Phases 4.0 and 5.0:

Limited human-to-human transmission confirmed. Small or large localized clusters of cases outside Canada.

Canadian Phases 4.1 and 5.1:

Limited human-to-human transmission. Small or large *sporadic* clusters of cases in Canada

Canadian Phases 4.2 and 5.2: Small or large *localized* cluster(s) with limited human-to-human transmission are occurring in Canada but human-to-human spread is still localized, suggesting that the virus is becoming increasingly better adapted to humans but may not yet be fully transmissible.

1. Testing

During Phases 4.0 and 5.0, the PHLs and other viral diagnostic laboratories will be on high alert and follow the protocol as in Phase 3.1:

- Enhanced laboratory-based surveillance for the emerging new subtype
- Viral isolation by culture
- RT- PCR (or other NAT)

During Phases 4.2 and 5.2, a dramatic increase is expected in the demand for testing, especially in affected areas. Increased testing by culture will be required to detect the pandemic strain in suspected cases. RT-PCR will be particularly useful for rapid detection and HA type determination. Isolates from identified clusters will be tested for HA type and forwarded to the NML for strain characterization. The PHLs will play a critical role in tracking the potential spread of the pandemic strain.

Additional supplies of appropriate cell lines may be required. The NML in consultation with the WHO will review the primers used in molecular testing to ensure they are effective in identifying the pandemic strain. The NML and PHLs will share information and reagents for identification of the pandemic strain, advise on cell lines, use of rapid test methodologies and the biosafety level required, etc.

The PHLs and other laboratories will be encouraged to review inventory of reagents and order necessary reagents and cell lines (e.g. more viral transport swabs and/or media, influenza antigen tests, antisera for IFA testing) as well as to review personal protective equipment, testing algorithms for influenza based upon availability of reagents, cell lines, kits, etc.

The biosafety level required will be reassessed by the Office of Laboratory Security, CEPR, in consultation with the CPHLN and international partners, such as WHO and CDC, and the directives will be disseminated to all influenza testing laboratories.

Rapid subtyping of isolates will be performed by the NML and designated PHLs. Once reference antisera are available, subtyping will be done using HAI and neutralization assays and only by laboratories with the appropriate BSL containment facilities as dictated by the BSL requirements of the novel strain. Other laboratories will rely on RT-PCR for rapid subtyping using previously established protocols.

Note that supplies, including cell lines, test kits and reagents, may be in short supply as other North American laboratories ramp up their testing. The PHLs and other laboratories currently producing their own cells (for example, MDCK) might act as suppliers or provide seed stocks and the protocols for their propagation to other PHLs in need.

Because the supply of antivirals may be limited, diagnostic laboratories will play a central role in their optimal use. The use of rapid diagnostics, such as DFA, NATs or rapid POC tests, may become an integral part of this strategy. The PILPN will provide guidance regarding the effectiveness of rapid POC tests and the implementation of these strategies.

Although the onset of the pandemic is expected to strain the diagnostic capabilities of laboratories, it will be important to continue quality assurance activities, such as the participation in proficiency panels distributed by the NML. The NML will be responsible for providing guidance and materials required.

Agreements will need to be established to outline how the PHLs would best redirect testing capacity to help track the spread of the pandemic and to standardize how laboratories will triage critical from non-critical respiratory testing. This will be necessary so at least some capacity will be available to track the evolution of the outbreak.

2. Surveillance and Data Collection

As in Phases 1.0 to 3.0, with heightened surveillance as determined by the PHAC, the NML and PIC.

3. Communication

The NML will be responsible for rapid communication of relevant information concerning the evolution of the pandemic to the PHLs and other viral diagnostic laboratories. This will include information concerning the occurrence of small or large clusters in different locations through the CLSN intelligence exchange centres, or by fax, e-mail or telephone

as appropriate, and the provision of updates on the activity of new virus, cell lines, direct test methods, etc. The PHLs will rapidly communicate via the NML their first isolate of pandemic strain as well as any other local influenza activity. The PHLs will also ensure other influenza testing laboratories in the province are kept informed.

4. Other

The PHLs and other viral diagnostic laboratories should also review strategies developed to reduce the impact on clinical laboratory. They should:

a. Review the testing prioritization list.

b. Review alternative testing strategies. Ensure supply of reagents available for testing:

   i. E.g. urine dip sticks for screening urines

   ii. E.g. order urine dipsticks for GPs to encourage in-office testing.

c. Prepare any reagents that will be needed for the next several months e.g. media.

d. Begin prioritization exercise.

e. Implement specimen deferral, rejection and test minimization strategies.

f. Readjust testing schedules as appropriate.

Pandemic Period

Canadian Phase 6.0:

Increased and sustained human-to-human transmission in the general population outside Canada

Canadian Phases 6.1 and 6.2:

Widespread, sporadic or localized pandemic in Canada

1. Testing

Depending on the extent and duration of the pandemic, the demand for testing will reach an unprecedented level, which may overwhelm diagnostic abilities, and the PHLs and other viral diagnostic laboratories. The laboratories will continue to function as in Phases 4.2 and 5.2 with focus on:

- Rapid testing
- RT- PCR (or other NATs)
- Reduction of emphasis on viral culture in areas where the pandemic is established

All viral diagnostic laboratories will be under considerable pressure to provide rapid testing service to facilitate rapid case confirmation. The PHLs will need to redirect resources to give priority to influenza testing. However, if at this point the pandemic is established, laboratories within the affected regions may consider scaling down routine testing because clinical diagnosis will prove sufficiently accurate. This will depend on local conditions and available resources, etc. Rapid testing methodologies, including RT-PCR (or other NATs), may be preferred to standard cultures. The PHLs will focus on tracking the spread and trend of the pandemic and monitoring antiviral resistance, depending on available resources.

Agreements will need to be established to outline how the PHLs can best redirect testing capacity to help track the spread of the pandemic and to standardize how laboratories will triage critical from non-critical respiratory testing. This will be necessary so at least some capacity will be available to track the evolution of the outbreak.

Each laboratory will decide how to ensure the priority of influenza testing (e.g. restricted testing of other specimens, additional staffing, etc.). The PHLs and local laboratories are encouraged to review influenza testing protocols, availability of reagents and HR issues, and to implement the pre-developed strategies to reduce the impact of the pandemic on laboratory testing. Laboratories should review inventory of reagents and order necessary reagents and cell lines, more viral transport swabs, influenza antigen tests, antisera for IFA testing and laboratory personnel protective items, etc., as necessary.

The NML in collaboration with the WHO will review the primers used in NATs to ensure that they are effective in identifying the potentially evolving pandemic strain. The NML will provide to the PHLs information or reagents for identification of the pandemic influenza virus, advice on cell lines, use of rapid test methodologies, biosafety level requirements, etc.

Laboratories are encouraged to ensure that the new methods are sensitive and specific through participation in ongoing quality assurance programs. Problems encountered should be reported to the NML for investigation and/or sharing of information with PHLs and other viral diagnostic laboratories.

Rapid subtyping of isolates by the NML and designated PHLs will be undertaken using culture and RT-PCR based methods. Susceptibility testing of strains will be done by the NML and participating PHLs who have the protocols in place for neuraminidase inhibitors and/or amantadine depending on the phenotypic characteristics of the pandemic strain. Specimens received by the NML will be tested periodically throughout the pandemic as part of surveillance and to monitor the development of antiviral resistance. In addition to surveillance testing, testing for antiviral resistance will be performed on specimens isolated from treatment failures in outbreak situations and immunocompromised hosts. Other testing will be done on specimens as determined by the NML in collaboration with PHLs or any submitting diagnostic laboratory.

The biosafety level required will be reassessed by the Office of Laboratory Security, CEPR, in consultation with the CPHLN and international partners (e.g. WHO and CDC), and the directives disseminated to all influenza testing laboratories.

As the pandemic progresses, the PILPN will provide guidelines on testing and updates on antiviral susceptibility of the pandemic strain and other co-circulating strains.

2. Surveillance and Data Collection

Continued heightened surveillance, as in Phases 3.0 to 5.0.

3. Communication

As in Phases 1.0 to 5.0

The NML will be responsible for rapid communication of relevant information concerning the evolution of the pandemic to the PHLs and other viral diagnostic laboratories. This will include information concerning occurrence of small or large clusters in different locations through the CLSN intelligence exchange centres, or by fax, e-mail or telephone as appropriate, and the provision of updates on the activity of new virus, cell lines, direct test methods, etc. The PHLs will rapidly communicate via the NML their first isolates of pandemic strain as well as any other local influenza activity. The PHLs will ensure other influenza testing laboratories in the province are kept informed. The NML will collaborate with the provinces to notify bacteriology testing labs to prepare for an increase in testing for bacterial pneumonia (i.e. strategy for monitoring types of organisms, susceptibility patterns and the best antibiotics to use). Release communications outlining changes to testing anticipated with the onset of the pandemic will be prepared in advance and are to be sent to clients. Alternative strategies available to help reduce the workload of the laboratory may be included.

As the pandemic progresses, the NML will keep the PHLs informed of influenza activity across the country, changes in susceptibility, other circulating strains, morbidity and mortality information, etc. Laboratories are encouraged to provide update education sessions for staff regarding testing, safety, HR issues, etc., and to prepare communications to physicians regarding reductions in service.

Post-Pandemic Period in Canada

This will mark a return to prepandemic activities. Any testing issues that arose during the pandemic will be reviewed to determine if there are any changes that can be implemented to the pandemic plan.

Nasopharyngeal swab procedure

1. Use the swab supplied with the viral transport media.
2. Explain the procedure to patient.
3. When you collect the specimens, wear gloves and a mask. Change gloves and wash your hands between each patient.
4. If the patient has a lot of mucus in the nose, this can interfere with the collection of cells. Either ask the patient to use a tissue to gently clean out visible nasal mucus or clean the nostril yourself with a Q-tip.
5. How to estimate the distance to the nasopharynx: Prior to insertion, measure the distance from the corner of the nose to the front of the ear and insert the shaft **only half this length**.
6. Seat the patient comfortably. Tilt the patient's head back slightly to straighten the passage from the front of the nose to the nasopharynx to make insertion of the swab easier.
7. Insert the swab provided along the medial part of the septum, along the floor of the nose, until it reaches the posterior nares; gentle rotation of the swab may be helpful. (If resistance is encountered, try the other nostril; the patient may have a deviated septum.)

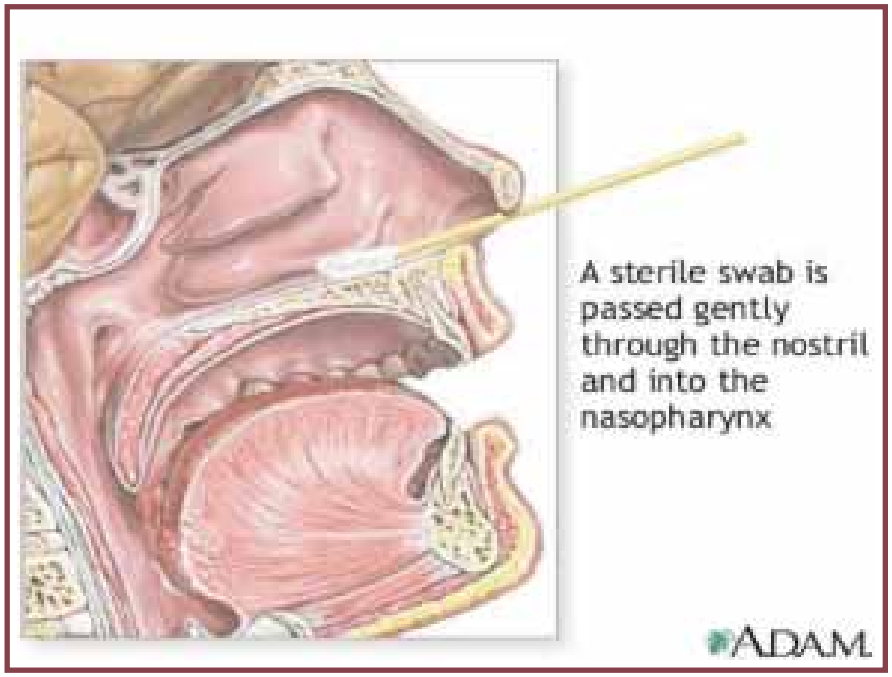

Image obtained from http://www.nlm.nih.gov/medlineplus/ency/imagepages/9687.htm

8. Allow the swab to sit in place for 5–10 seconds.
9. Rotate the swab several times to dislodge the columnar epithelial cells. *Note: Insertion of the swab usually induces a cough.*
10. Withdraw the swab and place it in the collection tube.
11. Refrigerate immediately.
12. Remove gloves.
13. Wash hands.
14. Attach completed requisition.
15. Transport to the laboratory.

Appendix B: Members of the Pandemic Influenza Laboratory Preparedness Network

The Pandemic Influenza Laboratory Preparedness Network (PILPN) operates under the auspices of the Canadian Public Health Laboratory Network , and it is responsible for the preparation of this laboratory annex. PILPN members include:

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Appendix C: List of Acronyms

Organizations

Canadian Laboratory Surveillance Network	CLSN
Canadian Network for Public Health Intelligence	CNPHI
Canadian Public Health Laboratory Network	CPHLN
Centre for Emergency Preparedness and Response	CEPR
Centre for Infectious Disease Prevention and Control	CIDPC
College of American Pathologists	CAP
Federal, provincial and/or territorial	FPT
National Microbiology Laboratory	NML
Pandemic Influenza Committee	PIC
Pandemic Influenza Laboratory Preparedness Network	PILPN
Provincial public health laboratories	PHLs
Province and/or territory	P/T
Public Health Agency of Canada	PHAC
United States Centers for Disease Control and Prevention	CDC
World Health Organization	WHO

Diagnostic and Scientific Terms

Biosafety level	BSL
Direct fluorescent-antibody assay	DFA
Enzyme immunoassay	EIA
General practitioner	GP
Hemagglutinin	HA
Hemagglutination inhibition	HAI
High efficiency particulate air	HEPA
Human resource(s)	HR
Immunofluorescent assay	IFA
Nasopharyngeal	NP
Nasopharyngeal swab	NPS
Nucleic acid sequence-based amplification	NASBA
Nucleic acid test	NAT
Point of care	POC
Polymerase chain reaction	PCR
Reverse transcriptase polymerase chain reaction	RT-PCR
Ribonucleic acid	RNA
Tuberculosis	TB

Annex D

Recommendations for the Prioritized Use of Pandemic Vaccine

Date of Latest Version: October 2006

Summary of Significant Changes:

- *New terminology has been developed to improve clarity and facilitate consistent application of the recommended priority groups.*
- *Definitions for these new occupation-related terms are located in the Glossary for the Plan.*

D Recommendations for the Prioritized Use of Pandemic Vaccine

Table of Contents

1. Priorities for Vaccination

Priorities for vaccination have been established to facilitate planning for the implementation of an efficient and consistent pandemic immunization strategy across Canada. Although enough vaccine will be made to immunize all Canadians, it is anticipated that the new pandemic vaccine will become available in batches, necessitating prioritization within the population as the initial doses become available. In keeping with the goal of pandemic response, the prioritization process must consider the impact that the vaccine will have on (i) reducing morbidity and mortality by maintaining the health services response and the protection of high-risk groups, and (ii) minimizing societal disruption by maintaining the essential services necessary for public health, safety and security. The pandemic vaccine will become available in lots; depending on the size of these lots and overall production capacity, prioritization of vaccine recipients will likely be necessary. Furthermore, it is likely that two doses of vaccine will be required to achieve a protective response in the vaccinee. Therefore when vaccine becomes available, it is essential that it be distributed in a predefined, equitable and consistent manner in all provinces and territories.

The Vaccine Working Group has developed the following recommendations for the prioritized use of a pandemic vaccine in order to provide guidance to Pandemic Influenza Committee (PIC) and those involved in pandemic planning at the federal, provincial, territorial (F/P/T) and local levels. **The priority groups will need to be reassessed and possibly altered to ensure that they are consistent with the overall goal of the pandemic response, as soon as epidemiologic data on the specific pandemic virus becomes available**. When data on the epidemiology of the pandemic becomes available, PIC will be the lead in the final identification and prioritization of groups to receive influenza vaccine. These recommendations will be distributed as national guidelines as soon as possible and with the expectation that they will be followed by all jurisdictions in order to ensure a consistent and equitable program. The lists provided in this document are intended to be illustrative not exhaustive in nature.

2. New Terminology for the Classification of Workers

Since the last edition of the Plan, new terminology has been developed to improve clarity, develop estimates for, and facilitate consistent application of the recommended priority groups. These new terms have been defined and included in the Glossary. Provinces and Territories as well as local public health authorities will need to consider how these terms apply to their own populations.

Vaccine eligibility criteria should be defined on the basis of the work, duties and role that the individual performs rather than the position label. For example, a fire fighter who would be expected to respond to house calls related to illness should probably be considered a “health care worker” rather than a “pandemic societal responder.”

National estimates of the population sizes for most of the priority groups were developed on the basis of census data and data available from professional organizations and other NGOs. These estimates have been distributed to each P/T, and the First Nations and Inuit Health Branch, Health Canada, to facilitate planning. However, each jurisdiction is encouraged to develop more refined estimates of these populations, i.e. estimates that would be more applicable to the pandemic planning activities in their jurisdictions.

3. Recommended Priority Groups for Pandemic Vaccination Program Implementation

Group 1: Health Care Workers, Public Health Responders and Key Health Decision Makers

Rationale: The health care and public health sectors will be the first line of defence in a pandemic. Maintaining the health service response and the vaccine program is central to the implementation of the response plan in order to reduce morbidity and mortality. Members of this group may be considered in the following work settings for vaccine program planning:

- acute care hospitals
- long-term care facilities and nursing homes
- private physician offices
- home care and other community care facilities
- public health offices
- ambulance and paramedic services
- pharmacies
- laboratories
- government offices

Group 2: Pandemic Societal Responders and Key Societal Decision Makers

Rationale: The ability to mount an effective pandemic response may be highly dependent on persons, within the groups listed below, being in place to maintain key community services. Those individuals that are essential to the response or to maintaining key community services may vary among jurisdictions. Local plans will likely reflect these differences, however they are likely to include:

- police
- fire fighters
- armed forces
- key emergency response decision makers (e.g. elected officials, essential government workers, disaster services personnel)
- utility workers (e.g. water, gas, electricity, nuclear power, essential communications systems)
- funeral service and mortuary personnel
- people who work with institutionalized populations (e.g. corrections)
- persons who are employed in public transportation and the transportation of essential goods (e.g. food)
- key government employees/elected officials (e.g. ministers, mayors)

Group 3: Persons at High Risk of Severe or Fatal Outcomes Following Influenza Infection

Rationale: To meet the goal of reducing morbidity and mortality, persons most likely to experience severe outcomes should be vaccinated. For planning purposes, this priority group has been based on the high-risk groups identified by the National Advisory Committee on Immunization (NACI) for annual vaccine recommendations. Additional groups have also been included based on evidence indicating an elevated risk (e.g. during the annual epidemics, young infants experiencing rates of hospitalization similar to the elderly).

If necessary, prioritization of the following subgroups within Group 3 would depend on the epidemiology of influenza disease at the time of a pandemic.

A: Persons living in nursing homes, long-term care facilities, homes for the elderly (e.g. lodges)

B: Persons with high-risk medical conditions living independently in the community

C: Persons over 65 years of age living independently and not included in 3A and 3B

D: Children, 6 to 23 months of age (current vaccines are not recommended for children under 6 months of age)

E: pregnant women

Currently, NACI does not consider pregnant women as a high-risk group in its recommendations for annual influenza vaccination. However, pregnant women have been at elevated risk during past pandemics.

Group 4: Healthy Adults (i.e., all individuals, 18-64 years of age, who do not have a medical condition that would qualify them for inclusion in the "high risk" group and who do not fall into one of the other occupation-based priority groups)

Rationale: This group is at lower risk of developing severe outcomes from influenza during annual epidemics, but this group comprises the major work force and represents the most significant segment of the population from an economic impact perspective. Vaccination of healthy adults would reduce the demand for medical services and allow individuals to continue normal daily activities. Simultaneous absence of large numbers of individuals from their places of employment, even for non-essential personnel, could produce major societal disruption. Medical facilities could also be overwhelmed by health care demands, even for outpatient services. This might compromise the care of those with complications.

Group 5: Children, 24 Months to 18 Years of Age

Rationale: This group is at the lowest risk of developing severe outcomes from influenza during annual epidemics, but this group plays a major role in the spread of the disease. While children's absence from school might not have the direct economic and disruptive impact of illness in adults, it could have an indirect effect because of adults having to care for ill children.

Consideration was given to prioritizing the family members of health care workers, however it was decided that singling out these individuals would not be logistically feasible or ethically justifiable.

Annex E

Planning Recommendations for the Use of Anti-Influenza (Antiviral) Drugs in Canada During a Pandemic

Date of Latest Version: *October 2006*

Summary of Significant Changes:

- *Reflects the establishment of the National Antiviral Stockpile and provides information on the size, use and composition of the stockpile;*
- *Specific references to "priority groups" have been removed since they no longer are consistent with the decisions made to date regarding the use of the stockpile;*
- *Contains updated scientific data, regulatory information, policy decisions and knowledge based on experience, acquired since last version (2004);*
- *Uses new Pandemic Phase terminology.*

E Planning Recommendations for the Use of Anti-Influenza (Antiviral) Drugs in Canada During a Pandemic

Table of Contents

1.0 Introduction

The purpose of this annex is to provide information and recommendations that will assist pandemic planners with the development and refinement of their respective antiviral strategies. Recommendations of the Pandemic Influenza Committee are intended to facilitate consistent use of antivirals across Canada at the time of an influenza pandemic and to form the basis for an effective, equitable, flexible and informed national antiviral strategy. It will be necessary to review all recommendations and implementation plans once a pandemic strain has emerged so that any changes in epidemiology or other data (e.g. antiviral resistance, optimal treatment course) can be accounted for in the implemented strategy.

2.0 Role of Antivirals

Vaccination with an effective vaccine is the primary public health intervention during a pandemic. However, vaccine production requires the acquisition of the seed virus and therefore cannot be initiated until the pandemic virus is already infecting humans. Once a suitable vaccine seed strain is available to manufacturers, it is anticipated that vaccine production will require at least 3 to 4 months and even then the availability of doses will be staggered and limited. Furthermore, each individual may need to receive two doses of vaccine to be protected.

At this time antivirals (anti-influenza drugs) are the only specific medical intervention that targets influenza and that potentially will be available during the initial pandemic response. Antiviral drugs can be used to prevent influenza and, unlike vaccines, can also be used to treat cases that are identified early in their illness. While there is good evidence for reduction of complications of influenza, there is not evidence for reduction in influenza mortality. Protection afforded by antivirals is virtually immediate and does not interfere with the response to inactivated influenza vaccines. The strategic use of these drugs during the Pandemic Period will be critical to achieving the pandemic goals of firstly to minimize serious illness and overall deaths, and secondly to minimize societal disruption among Canadians as a result of an influenza pandemic.

Before the 1997 Hong Kong avian influenza incident, antivirals were not considered as a component of the Canadian pandemic response, in view of the costs and other factors. During the Hong Kong outbreak, several countries rapidly depleted global supplies of anti-influenza drugs. In light of the lessons learnt since 1997 and the approval for sale of new antivirals (the neuraminidase inhibitors), the Antivirals Working Group of PIC was formed to develop options, recommendations and guidelines for the use of antivirals. The key recommendation of this working group, which was subsequently endorsed by PIC, was the need to secure a supply of antiviral drugs in Canada to mitigate the consequences of an influenza pandemic.

The national antiviral stockpile was established in the fall of 2004. Outside of the current stockpiled quantities, the supply of antivirals in Canada is limited. To date there has been relatively little use of these drugs in Canada. During annual influenza seasons, they have been used primarily to control outbreaks in health care and long-term care institutions. During the 2003 domestic avian influenza outbreak in British Columbia, they were also used for prophylaxis of individuals exposed to avian influenza because of their roles in outbreak control (e.g. cullers). As a result of this history of limited demand, there has been little incentive for manufacturers to store significant amounts of these products in Canada, and there is little practitioner and public experience with these drugs.

3.0 Classes of Antiviral (Anti-Influenza) Drugs

Two classes of antiviral drugs are currently approved in Canada for prevention and/or treatment of influenza infection: M2 ion channel inhibitors and neuraminidase inhibitors. There are important differences in pharmacokinetics, side effects and drug resistance between these two classes of antivirals. Such performance characteristics and the costs should be considered in selecting the specific drugs to be used for prophylaxis or treatment. Summary information on these drugs is presented in the following table.

3.1 Neuraminidase Inhibitors

Oseltamivir (Tamiflu) and zanamivir (Relenza) are the two neuraminidase inhibitors that are currently approved for use in Canada. They are currently the only neuraminidase inhibitors in the global market; however, other agents such as peramivir are under development. Oseltamivir and zanamivir interfere with replication of both influenza A and B viruses in three ways: (1) they interfere with the release of virus from infected cells, (2) they cause the aggregation of virus, and (3) they may improve the inactivation of virus by respiratory mucous secretions. The drugs are well tolerated and have been used effectively for the treatment and prophylaxis of influenza A and B infections. They are expected to be effective against pandemic viruses including H5N1. H5N1 viruses are susceptible to neuraminidase inhibitors in vitro and oseltamivir has been shown to protect mice against lethal experimental H5N1 influenza pneumonia, although at higher than usual doses.[2]

Neuraminidase inhibitors are effective when administered within 2 days of onset of illness.[3] When used in this way current estimates of the benefits of oseltamivir therapy include a 25-30% reduction in symptom duration plus a reduction in illness severity, a 59% reduction in hospitalizations (range: 30% to 70%), a 63% reduction in antimicrobial drug use (range: 40% to 80%) and a 1-day reduction in lost work days under treatment (range: 0.5 to 1.5 days).[4] No data on reductions in mortality caused by influenza due to oseltamivir treatment are currently available. In their impact analysis, Gani et al assumed that oseltamivir treatment would provide a 50% protection against death.[5] This estimate was based on the assumption that a 50% protection against the more serious outcomes of influenza would translate to equivalent protection against death.

Evidence is limited on the effects of neuraminidase inhibitors in reducing the complications of influenza in individuals with co-morbid conditions that increase their risk of these complications. The available evidence supporting such a beneficial effect derives from analyses of pooled data from multiple independent studies.[6] Both oseltamivir and zanamivir have similar effectiveness of 70-90% in preventing laboratory-confirmed influenza illness[7].

Both oseltamivir and zanamivir were approved for use in Canada in 1999 for the treatment of infection due to influenza A or B. Since December 2003, oseltamivir has also been approved for influenza prophylaxis in Canada. Zanamivir is not currently approved for prophylaxis. Current evidence suggests that the development of resistance during treatment of influenza is less likely with neuraminidase inhibitors than with amantadine and any resistant viruses that develop are less likely to be transmissible. Neuraminidase inhibitors are more expensive than amantadine at this time.

Drug	Trade name and Manufacturer	Class	Indications	Formulation(s)	Shelf Life/Stability	Expected use(s) during pandemic
Oseltamivir	Tamiflu®, Hoffmann-La Roche Inc.	Neuraminidase Inhibitor	› Treatment of influenza A and B in persons 1 year and older who have been symptomatic for no more than 2 days	Capsules (75 mg/capsule): 10 capsules per blister pack or bottles of 10 and 100 capsules	Shelf life: 5 years	Capsules for those presenting and requiring early treatment.
			› Prevention of influenza A and B in persons 1 year of age and older following close contact with an infected individual	Powder for oral suspension (12 mg/ml when reconstituted): 900 mg per bottle (volume of 75 ml in a 100-ml glass bottle)	Shelf life: 2 years Stability: Once reconstituted, 10 days in refrigerator (at 2 to 8 degrees Celcius)	Oral suspension for treatment of children weighing less than 40 kg and/or those who cannot swallow the capsules. No decision has been made at this time to use the drugs in the national stockpile for prophylaxis indications. It is recognized that outside of the national stockpile, stockpilling with the intent to use this drug for prophylaxis may have occured
Zanamivir	Relenza®, GlaxoSmithKline	Neuraminidase Inhibitor	› Treatment of influenza A and B in persons 7 years of age and older who have been symptomatic for no more than 2 days	ROTADISK® consisting of a circular foil disk with four blisters each contianing 5mg of zanamivir. A DISKHALER® inhalation device is provided to administer the medication (through inhalation). One box contains 5 disks, which is equivalent to one treatment course.	Shelf life:currently 3 years (expected to be extended to 5 years on new product)	Treatment for those presenting and requiring early treatment with specific focus on pregnant and nursing woemn.
Amantadine	Symmetrel® and Endantadine® -Bristol Myers Squibb, *Generic amantadine manufacturers:* Dominion Pharmacal, GenPharm, Medican Pharma, Pharmel, Pharmascience	M2 Ion Channel Inhibitors (Cyclic Amines or Adamantanes)	› Treatment of influenza A in persons 1 year of age and older › Prevention of influenza A in persons 1 year of age and older	Capsules (100 mg/capsule): bottles of 100 capsules Syrup (10 mg/ml): bottles of 500 ml	Shelf life: 3 years* Shelf life: 2 years	This drug has not been included in the national stockpile. It is recognized that it may be available at the time of a pandemic but should be used for prophylaxis only and only if the strain is known to be susceptible to amantadine..

* Note: In one study amantadine was found to be stable after 25 years of uncontrolled storage on the shelf [1]. Stability of other antiviral drugs may also extend beyond the currently stated expiry date. If the currently stockpiled antivirals are not used by their respective expiry dates, stability testing will likely be implemented to determine whether the drugs are still expected to be effective and should be retained in the stockpile.

3.2 M2 Ion Channel Inhibitors (Cyclic Amines or Adamantanes)

M2 ion channel inhibitors (amantadine and rimantadine) interfere with the replication cycle of influenza A but are not effective against influenza B. Rimantadine is not currently approved for use in Canada.

Amantadine is approximately 70% to 90% effective in preventing illness from influenza A infection. When administered within 2 days of onset of illness, it can reduce the duration of uncomplicated influenza A illness by approximately 1 day, but it has not been studied as to its ability to reduce the complications of influenza. Resistance to amantadine has been shown to develop rapidly (in up to 30% of recipients) when this drug is used for treatment purposes and these resistant viruses are readily transmissible[8].

The Antivirals Working Group has considered a potential role for amantadine or rimantadine. Their role in treatment is not supported. They could be used for prophylaxis during a domestic outbreak of avian influenza or during a pandemic if the novel virus is susceptible. However, in order to use rimantadine, which has fewer side effects than amantadine, special permission would need to be sought as it is not currently approved for use in Canada. Most of the H5N1 viruses have been found to be resistant to these drugs.

4.0 The National Antiviral Stockpile

4.1 Size of the National Antiviral Stockpile

Creation of a national stockpile helps ensure equitable access across Canada to a secure supply of antivirals for pandemic influenza, along with equitable access to these drugs through governmental control. The national antiviral stockpile was created in the fall of 2004 as a result of a joint federal and provincial and territorial (P/T) purchase of oseltamivir capsules. The initial quantity in the stockpile was 16 million doses, which was originally estimated to be sufficient to cover:

1) the early treatment of hospitalized patients, health care workers, public health and pandemic societal responders, key health decision makers, high-risk individuals in the community and residents of long-term care facilities experiencing outbreaks; and

2) 6 weeks of prophylaxis of one-third of all health care professionals in Canada (to cover front-line workers).

In the fall of 2005, the PIC Antivirals Working Group reviewed the assumptions used to derive the initial estimates and recommended changes to these assumptions*. The "modified scenario" that resulted from these adjusted assumptions (including a clinical attack rate of 25%, more severe impact in terms of morbidity, higher uptake of the drugs, and 50% for the proportion of "front-line" health care workers), would require substantially more drug to cover the groups previously expected to be covered by the 16M dose stockpile. These estimates led the working group to recommend to the Pandemic Influenza Committee (PIC) that the size of the stockpile be substantially increased. The working group also recommended expansion of treatment to everyone ill enough to need care, in line with the approach being taken in many other developed countries.

* Original assumptions used for antivirals needs estimate: Mild-moderate severity, 20% clinical attack rate, 6 weeks pandemic wave, 33% of health care workers are "front-line".

At a joint meeting of the Council of Chief Medical Officers of Health (CCMOH) and the Public Health Network in February 2006, recommendations for the size, composition and use of the National Antiviral Stockpile were formalized. It was determined that the size (and diversity) of the stockpile should be increased to 55 million doses or 5.5 million treatment courses of neuraminidase inhibitors. Based on past pandemics, and reflected in the Flu-aid model developed in the U.S. by Meltzer et al, during mild-moderate pandemics approximately half of those who develop a clinical illness present for medical attention. With a clinical attack rate of 35% over the course of the pandemic, and half of the clinically ill seeking medical care, 55 million doses would be required (based on the current standard treatment course), assuming that all persons presenting for care require antivirals.

The national stockpile was distributed on a per capita basis to each of the P/Ts. Some P/Ts have chosen to purchase additional quantities of antivirals. At the time of publication, it is estimated that approximately 39 million doses (including the 16 million in the national stockpile) of oseltamivir have been stockpiled by the federal and P/T governments in Canada. If the government stockpiles that currently exist outside of the national stockpile are incorporated into the national stockpile, the target of 55 million doses could be achieved as early as spring 2007.

The content of the stockpile (i.e. number of doses and drugs) will be assessed on an ongoing basis as planning activities continue and additional science and resources (including drug supply) become available to further inform the antiviral strategy. The latest set of recommendations, specifically regarding the size of the National Antiviral Stockpile, are intended to assist planning and should not be interpreted as establishing the absolute requirements for an influenza pandemic.

4.2 Use of the National Antiviral Stockpile

Use of the initial 16 million dose national stockpile was originally anticipated to be a combination of treatment and prophylaxis indications which would have covered a limited number of the nationally agreed upon priority groups. With the expansion of the stockpile to 55 million doses, the strategy has been revised and is described below.

Early Treatment (i.e., treatment within 48 hours of symptom onset)

The National Antiviral Stockpile should be used at the time of a pandemic for early treatment of all persons with influenza-like illness (presumed pandemic influenza) who are ill enough to need care, and who are assessed within 48 hours of the onset of symptoms. At the time of implementation of the antiviral strategy prioritization may still be necessary, for example if treatment is found to require more than 10 doses or the stockpile is not yet completely built up. If prioritization for treatment is recommended at that time then the doses from the national stockpile would be used for those with ILI who are deemed to be most at risk of serious morbidity and mortality based on the available data.

There has been an accumulation of literature and modeling studies, particularly in the past year, to support a focus on early treatment (in contrast to prophylaxis) as the most efficient way to prevent hospitalizations and death in both high risk individuals and the general public. Based on the estimated impact of a pandemic, treatment with antivirals is expected to be cost-saving to the economy under several treatment strategies. One recent international study has shown therapeutic treatment and post-exposure prophylaxis both to be cost-saving, with a cost-benefit ratio of 2.44-3.68[4]. Canadian modeling is underway and early indications are that a treatment-focused strategy is the most cost-effective strategy.

There are ethical obligations to provide effective treatment to persons who can benefit, through the timely administration of a safe and effective treatment that keeps harm (in this situation, the risk of complications of influenza), if not fully avoidable, at the lowest possible level. The principle challenge of a treatment-focused strategy is ability to deliver drugs in a timely manner to ill individuals. To be effective, neuraminidase inhibitors must be administered as early as possible, ideally within 12 hours after the start of illness but definitely within 48 hours. Delivery of the drugs is primarily the responsibility of the respective P/T and local governments. Since the current antiviral supplies have been allocated on a per capita basis, treatment courses should be provided through the local distribution point regardless of whether the individual has any ties to the federal system (e.g., lives on a First Nations reserve or is a federal government employee).

Prophylaxis

Both the Antivirals Working Group and PIC recognize that prophylaxis of health care workers, key decision makers and public health and societal responders (see Glossary for definitions) could contribute to the Canadian pandemic goals of minimizing serious illness and death, and societal disruption. Prophylaxis of health care workers could help keep the health care work force in place at a time of greatly increased need and help maintain an effective early treatment strategy for the general public. Unlike the situation during SARS, it is unclear whether health care workers will be at increased risk in the health care setting because of their use of infection control precautions and personal protective equipment. Health care workers are as likely as anyone else to be exposed in the community. Should their onset of illness occur while at work in the health care setting, they could expose vulnerable patients and residents in closed units, which could in turn lead to outbreaks. Control of influenza outbreaks in health care facilities is usually (during the annual influenza season) swiftly accomplished by antiviral prophylaxis of all residents and unvaccinated staff. During a pandemic similar availability of antivirals for outbreak control in these facilities would also be of value, likely providing significant benefits in terms of hospitalizations averted and lives saved.

It also must be recognized that beyond the goal of the Plan, there is also the goal of business continuity and optimal personal protection. Coupled with the efforts of governments and the private sector to build appropriate business continuity plans, the issue of supplying antivirals for prophylaxis has also been raised in this context.

Antiviral prophylaxis requires considerably more drug than early treatment. Four to five individuals could be treated with the amount of drug required to provide prophylaxis for one individual for a 6 week period. Implementation of a prophylaxis strategy has several challenges, including identification of eligible personnel, the need to adjust timing to local epidemiology, compliance, potential for drug diversion (e.g., to family members), and the requirement for off-label use of the drug (in the case of zanamivir).

At this time the recommended use of the National Antiviral Stockpile is for treatment only. However, a national process including citizen and stakeholder dialogue, is underway in order to inform future policy decisions regarding whether antivirals provided through the National Antiviral Stockpile should be used for prophylaxis and to whom, during tyhe pandemic period. There are health care system, scientific, economic, societal/ethical, legal and policy considerations that must be explored. Any decision to include prophylaxis indications would require F/P/T consensus on whether the existing stockpile should be expanded for this purpose.

Containment

The role and impact of antivirals in preventing transmission and slowing down the spread of a novel influenza virus is unknown. The use of antivirals for this purpose is under discussion as part of containment measures during the Pandemic Alert Period.

4.3 Composition of the National Antiviral Stockpile

It is expected that when the 55 million dose stockpile is completed, it will be composed of approximately:

- 90% oseltamivir (2 million doses as oseltamivir solution)
- 10% zanamivir

Adding zanamivir to the stockpile provides an option against oseltamivir-resistant strains, allows for a more optimal treatment option for pregnant and nursing women and enhances security against supply disruptions by supporting two manufacturers. Oral oseltamivir suspension would be used for the treatment of children and adults or intubated patients that cannot swallow capsules. Although oral oseltamivir suspension has a relatively limited shelf-life (2 years from date of manufacture), at this time data are lacking on the effectiveness of oseltamivir capsules that have been opened and mixed with another substance (e.g., applesauce) to facilitate administration to children or adults that cannot swallow capsules. The decision to stock oral oseltamivir suspension on an ongoing basis will be reviewed pending the availability of data on alternative antiviral treatment options for children or individuals that cannot swallow capsules.

At this time there are no plans to include adamantanes in the national stockpile. Compared to the neuraminidase inhibitors, there is an increased likelihood of resistance to adamantanes from the outset. Ongoing monitoring of antiviral drug resistance suggests that there is no role for M2 inhibitors in the stockpile but that diversification within the NAI drug class would be beneficial.

5.0 Planning Principles and Key Recommendations

The Antivirals Working Group and PIC have made a number of recommendations regarding the antiviral strategy. The following list summarizes principles and key recommendations for planning purposes.

a) **The use of antivirals should be consistent with the goal or objective of the pandemic period (e.g., Interpandemic Period, Pandemic Alert Period, Pandemic Period).**

   Recommendations regarding the use of antiviral drugs during the different Canadian pandemic phases are included in the Public Health Measures annex (Annex M) and in the Response Section of the Plan. Use of these drugs during the Pandemic Alert Period is to support the objective of containment during this period. This includes treatment of cases and prophylaxis of close contacts when human to human transmission is occurring. During the pandemic period, antiviral use is intended to support the overall pandemic goals of minimizing serious illness and overall deaths, and secondly minimizing societal disruption among Canadians. Therefore antiviral drug use during the Pandemic Period is expected to follow the nationally-agreed strategy which currently focuses on early treatment.

b) **Neuraminidase inhibitors can be used for either treatment or prophylaxis of influenza. M2 ion channel inhibitors (e.g. amantadine) should be used only for prophylaxis and only if the strain is known to be susceptible.**

The antiviral strategy focuses on the use of neuraminidase inhibitors as the drugs of choice for the treatment and prophylaxis of novel influenza viruses with pandemic potential and for the pandemic virus. When used for treatment, the neuraminidase inhibitors have been shown to be effective in preventing complications and hospitalization. They are also effective in preventing influenza. The emergence of drug resistance during treatment is less likely to occur than with amantadine where emergence of resistance occurs rapidly (and is already widespread among the H5N1 viruses). In addition, neuraminidase inhibitors are associated with fewer side effects than amantadine, thus facilitating compliance.

Zanamivir may be used as an alternative to oseltamivir, although it is not yet approved for prophylaxis in Canada. As the drug is inhaled, little is systemically absorbed; thus it may be preferred for pregnant and nursing mothers in order to minimize exposure of the fetus or young infant. Zanamivir may also remain effective should resistance develop to oseltamivir. One limitation, however, is that not all persons will be able to use the inhalation device successfully. Another limitation is that inhaled zanamivir would not be expected to be effective for treatment if the pandemic virus replicates systemically instead of just in the respiratory tract.

c) **Treatment with neuraminidase inhibitors should be initiated within 48 hours of symptom onset.**

Since replication of influenza virus in the respiratory tract peaks between 24 and 72 hours after the onset of the illness, neuraminidase inhibitors (which act at the stage of viral replication) must be administered as early as possible. This is ideally within 12 hours after the start of illness but definitely within 48 hours. Because of the lack of evidence for benefit when antiviral drugs are started more than 48 hours from onset of illness, treatment should generally be restricted to those presenting within that time frame unless experience with the pandemic virus suggests otherwise. Due to the importance of early antiviral treatment in Canada's pandemic plan, clinical planning groups should consider ways to implement this strategy at a time of high numbers of clinically symptomatic individuals.

d) **The susceptibility of the novel strain to antiviral drugs (both during the Pandemic Alert Period and the Pandemic Period) should be monitored.**

Monitoring for drug resistance is essential to ensuring that the antiviral drugs will have the desired effect and that resources are optimized. This will be carried out at the National Microbiology Laboratory. Detailed protocols are under development.

6.0 Outstanding Issues

There are a number of antiviral issues still to be addressed including:

- F/P/T consensus on inclusion or exclusion of prophylactic indications.
- Updating the clinical guidelines for the use of antivirals
- Development of communication materials for health care providers and the public on the appropriate use of antiviral drugs, for circulation prior to a pandemic
- Guidelines for delivery and administration of antivirals including security, monitoring of drug distribution, uptake and wastage (mainly a P/T level activity)
- Use of diagnostic tests in guiding antiviral treatment
- Protocol for monitoring antiviral drug resistance
- Review of the adverse reaction reporting and monitoring system to identify the need for any pandemic enhancements, such as timeliness and capacity for rapid analysis, investigation and dissemination of information
- Modeling the impact and cost benefit of different strategies for the use of antiviral drugs
- Ongoing considerations of the optimal antiviral strategy and deployment based on new scientific developments (including modeling studies)
- Protocols for monitoring the shelf life of the antiviral stockpiles
- Considerations of potential off-label use of antivirals

There are also outstanding research issues including:

- Safety and effectiveness of antivirals for the treatment and prophylaxis of children under the age of 1 year and select high-risk groups, such as pregnant women, immunocompromised persons, elderly with underlying disease
- Safety and effectiveness of prolonged prophylaxis
- More robust data for effectiveness of neuraminidase inhibitors in reducing complications, hospitalization and mortality
- Minimum effective dose and duration of treatment for complicated and uncomplicated influenza caused by the pandemic strain
- Use of combination therapy in different populations
- Improved diagnostic tests
- Effect of antiviral administration on the response to live attenuated influenza vaccines
- Mechanism for resistance to both classes of antivirals and assessment of the biological consequences (e.g. infectiousness, virulence) of resistance
- Development of new antiviral drugs

At a national Influenza Research Priorities Workshop held in the summer of 2005, research aimed at the development and use of antivirals in the treatment of individuals with influenza and in the prevention of infection was identified as a priority. This included studies of novel approaches with existing antiviral medications as well as research aimed at the development and evaluation of new antiviral agents. The Public Health Agency of Canada and the Canadian Institutes of Health Research will be holding follow-up consultations on how best to coordinate and fund this research. Other countries have held similar influenza research priority meetings and recently the World Health Organization has indicated its intent to map out a global strategy and work plan for coordinating antiviral and vaccine research.

Some of the important questions about effective treatment protocols can only be answered when the pandemic strain emerges. Rapid clinical trials will be critical to guide the most appropriate use of antiviral drugs. In Canada, an Emerging Infectious Diseases Research Network has been established to bring together government and University researchers ahead of a mass emergency so that research studies can be launched rapidly during a pandemic. As its work progresses, the advance development of research protocols and mechanisms for rapid ethical approval will help address these concerns.

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Annex F

Infection Control and Occupational Health Guidelines During Pandemic Influenza in Traditional and Non-Traditional Health Care Settings

Date of Latest Version: *June 2006*

Summary of Significant Changes:

- *Updated to include recommendations (and related references) regarding ventilation standards for health care facilities, and information regarding the spatial separation of patients in different settings;*
- *Uses new Pandemic Phase terminology;*
- *Recommendations regarding monitoring vaccinated visitors for ILI have been clarified;*
- *Section on Public Health Measures has been deleted from Annex F as there is now a separate Annex on this topic.*

Note: *Section on the mode of transmission of influenza and required control measures will be updated. Further review of existing literature is ongoing, and a consensus conference of experts in influenza transmission and control and respiratory protection is planned to assist in resolution of these two controversial issues.*

f Infection Control and Occupational Health Guidelines During Pandemic Influenza In Traditional and Non-Traditional Health Care Settings

Notification

Canadian Pandemic Plan
October 5th, 2006

The February 2004 Infection Control and Occupational Health Guidelines During Pandemic Influenza in Traditional and Non-Traditional Health Care Settings, Annex F of the Canadian Pandemic Plan is under revision.

Stakeholders should be advised that the document has been updated to include recommendations (and related references) regarding ventilation standards for health care facilities and information has been provided regarding the spatial separation of patients in different settings. In addition, terminology and statements regarding antiviral availability have been revised to be consistent with other sections of the Plan. Some terms in the glossary have been clarified and the phases were updated according to the revised World Health Organization phases. Recommendations regarding monitoring vaccinated visitors for ILI (as opposed to not monitoring staff or visitors who have recovered from pandemic influenza) have been clarified. The Section on Public Health Measures has been deleted from Annex F as there is now a separate Annex on this topic.

The section on the mode of transmission of influenza and required control measures has not been finalized. Annex F states that the primary modes of transmission of influenza virus are large respiratory droplets and contact, direct and indirect. The contribution of airborne transmission to the spread of influenza virus is controversial. The Infection Control Guidelines Steering Committee of the Public Health Agency of Canada therefore recommends that, in addition to hand hygiene, the appropriate personal protective equipment to be worn while caring for patients with influenza is a mask (good quality surgical type), eye protection, gloves and gown. The requirement for N95 respirators during aerosol generating procedures on patients with influenza is controversial. Further review of existing literature is ongoing, and a consensus conference of experts in influenza transmission and control and respiratory protection is planned to assist in resolution of these two controversial issues.

The new version of Annex F is expected to be completed following the Influenza Infection Prevention and Control Consensus meeting to be held on October 26th and 27th 2006.

Executive Summary

The Infection Control and Occupational Health Guidelines During Pandemic Influenza in Traditional and Non-Traditional Health Care Settings have been prepared by Health Canada's Nosocomial and Occupational Infections Section from the Centre for Infectious Disease Prevention and Control. These guidelines are one of the annexes of the Canadian Pandemic Influenza Plan

These guidelines are designed to assist those responsible for managing pandemic influenza in traditional and non-traditional health care settings. Traditional health care settings include acute, long term, ambulatory and community care. Non-traditional health care settings are those settings that are designated for operation prior to an influenza pandemic and become operational only when an influenza pandemic is declared by the World Health Organization (WHO). Non-traditional settings include triage settings, self care settings and temporary influenza hospitals. Organizations that assume responsibility for non-traditional settings are referred to as "parent organizations" in this document. If there is no "parent" organization to plan or operate the non-traditional setting, it is expected another organization would assume this role. Public Health may be in the best position to plan or operate such facilities, although this would need to be negotiated and corroborated.

This document presents an overview of infection prevention and control policies and procedures that will be critical to minimize the transmission of pandemic influenza, with or without the availability of immunization or chemoprophylaxis, and for preventing other infectious diseases. Therefore, the *Infection Control and Occupational Health Guidelines During Pandemic Influenza in Traditional and Non - Traditional Health Care Settings* are based on previously published Health Canada infection control guidelines. It is recognized that certain recommendations may be feasible only in the early phases of the pandemic as they may not be achievable as the pandemic spreads and resources become scarce.

Part A describes a foundation to develop an infection control/occupational health (IC/OH) plan for the management of pandemic influenza with particular focus on influenza transmission, routine practices, pandemic influenza education and public health restrictions. Major attention is given to the management of health care workers during an influenza pandemic. Recommendations for the use of influenza vaccine and antivirals for health care workers (HCWs) and patients are not included in these guidelines because they are fully outlined in the vaccine and antiviral annexes (Annexes D and E) of the Canadian Pandemic Influenza Plan.

Part A also explains the lack of evidence to support the use of masks to prevent transmission of influenza during previous pandemics. The evidence shows that, in the early phase of an influenza pandemic, it may be prudent for HCWs to wear masks when interacting in close face-to-face contact with coughing individuals to minimize influenza transmission. This use of masks is advised when immunization and antivirals are not yet available but is not practical or

helpful when transmission has entered the community. Masks may be worn by HCWs to prevent transmission of other organisms from patients with an undiagnosed cough. For the purpose of this document, the term mask refers to surgical masks, not to special masks such as high efficiency dust/mist masks or respirators.

Hand Hygiene is emphasized throughout the guidelines because strict adherence to handwashing/hand antisepsis recommendations is the cornerstone of infection prevention. Proper hand hygiene may be the only preventative measure available during a pandemic.

Part B describes the Management of Pandemic Influenza in traditional settings. Acute care, long term care, ambulatory care and individual community settings are stand-alone sections and are designed to be used in conjunction with Part A to develop an IC/OH plan for the management of pandemic influenza. References to published guidelines are frequent because it is expected that personnel in traditional health care settings are well acquainted with the series of infection control guidelines published by Health Canada.

Part C outlines the Management of Pandemic Influenza in non-traditional settings. Triage, self care setting and temporary influenza hospitals are stand alone sections and are designed to be used in conjunction with Part A to develop an IC/OH plan for the management of pandemic influenza. Detailed recommendations, adapted from published infection control guidelines, are provided for non-traditional settings as the planning and operation of such settings will be a novel situation.

Appendix I. The "Guideline Rating System" describes the system of ranking the strength of the evidence used to support the recommendations made in these guidelines.

Appendix II. The "World Health Organization Pandemic Influenza Phases" is the outline of the staged plan for responding to a pandemic threat and is based on the WHO influenza surveillance program.

Appendix III. The "Hand Hygiene Procedures", A. How to Wash Hands and B. Decontaminating Hands with an Alcohol-based Hand Rub provide specific details related to hand hygiene.

Appendix IV. An "Influenza-Like-Illness (ILI) Assessment Tool" is provided to assist with immediate triage of patients or staff and accommodation/cohort of patients, prior to further OH or clinical management. This ILI triage tool should not be used for clinical management. Clinical management is specified in the "Clinical Care Guideline and Tools" annex of the Canadian Pandemic Influenza Plan.

Appendix V. Table A, "Cleaning Procedures for Common Items" provides examples of how common items are cleaned. Table B, "Directions for Preparing and Using Chlorine Bleach" describes recommendations for dilutions of specific products and their intended use.

These guidelines **do not** discuss **interpandemic** influenza. Infection control and occupational health recommendations for interpandemic influenza are addressed in other Health Canada guidelines, specifically in the *Infection Control Guidelines for the Prevention of Health Care-Associated Pneumonia.*, currently being developed.

Glossary of Terms

Antiseptic hand rub	A waterless, antiseptic hand rub product that is applied to all surfaces of the hands to reduce the number of microorganisms present[1].
Biomedical waste	Defined by the Canadian Standards Association[2] as waste that is generated by human or animal health care facilities, medical or veterinary settings, health care teaching establishments, laboratories, and facilities involved in the production of vaccines[3].
Cleaning	The physical removal of foreign material, e.g., dust, soil, organic material such as blood, secretions, excretions and microorganisms. Cleaning physically removes rather than kills microorganisms. It is accomplished with water, detergents and mechanical action. In certain settings, (e.g., central service or dietetics), the terms decontamination and sanitation may be used for this process. Cleaning reduces or eliminates the reservoirs of potential pathogenic organisms. Cleaning agents are the most common chemicals used in housekeeping activity[3].
Cohort	Two or more patients exposed to, or infected with, the same organism who are separated physically (e.g., in a separate room or ward) from other patients who have not been exposed to, or infected with, that organism[4].
Cohort staffing	The practice of assigning specific personnel to care only for patients/residents known be exposed to, or infected with, the same organism. Such personnel would not participate in the care of patients/residents who have not been exposed to, or infected with, that organism[4].
Contact transmission	Includes direct contact, indirect contact and droplet transmission as described below[5]: ▸ **Direct contact** occurs when the transfer of microorganisms results from direct physical contact between an infected or colonized individual and a susceptible host (body surface to body surface). ▸ **Indirect contact** involves the passive transfer of microorganisms to a susceptible host via an intermediate object such as contaminated hands that are not washed between patients, contaminated instruments or other inanimate objects in the patient's immediate environment.
Critical items	Instruments and devices that enter sterile tissues, including the vascular system. Critical items present a high risk of infection if the item is contaminated with any microorganism, including bacterial spores. Reprocessing critical items, such as surgical equipment or intravascular devices, involves meticulous cleaning followed by sterilization[3].
Droplet	Refers to large droplets, greater than or equal to 5 µm in diameter, generated from the respiratory tract of the source patient during coughing or sneezing, or during procedures such as suctioning or bronchoscopy. These droplets are propelled a short distance, less than 1 meter, through the air and deposited on the nasal or oral mucosa of the new host.

Decontaminate hands	The reduction of bacterial counts on hands is accomplished by performing an antiseptic hand rub or antiseptic hand wash[1].
Decontamination	The removal of disease-producing microorganisms to leave an item safe for further handling[3].
Disinfection	The inactivation of disease-producing microorganisms. Disinfectants are used on inanimate objects; antiseptics are used on living tissue. Disinfection does not destroy bacterial spores. Disinfection usually involves chemicals, heat or ultraviolet light. Levels of chemical disinfection vary with the type of product used[3].
Exposure	The condition of being subjected to a microorganism or an infectious disease in a manner that enables transmission to occur[6].
Fit for Work	Terminology used in occupational health to communicate a worker's ability to remain at or return to work. This ability includes three categories: fit for work, unfit for work, fit with restrictions. This categorization allows the occupational health nurse to maintain confidentiality about a worker's diagnosis, symptoms, immune status, etc.[6] ▸ **Fit for Work** - Fit to work with no restrictions ▸ **Unfit for Work** – Defined as a restriction from patient care tasks, co-worker contact and restriction from the workplace. ▸ **Fit for work with restrictions** - Allows for the re-assignment of duties or re-integration into the workplace in a manner that will not pose an infection risk to the HCW or to the patients and or other individuals in the workplace.
Hand antisepsis	This term refers to either antiseptic handwash or antiseptic handrub[1]. A process for the removal or reduction of resident and transient microorganisms[3].
Hand hygiene	A general term that applies either to handwashing, an antiseptic handwash, an antiseptic hand rub, or a surgical hand antisepsis[1].
Handwashing	Washing hands with plain (i.e., non-antimicrobial) soap and water[1]. A process for the removal of soil and transient microorganisms from the hands[3].
Health Care Worker (HCW)	HCWs are professionals, including trainees, and retirees, nonprofessionals and volunteers, involved in direct patient care; and/or those working/volunteering in designated health care facilities or services. For the purposes of this definition, HCWs are those whose functions are essential to the provision of patient care, and who may have the potential for acquiring or transmitting infectious agents during the course of their work.
High level disinfection	This term refers to the level of disinfection required when processing semicritical items. High level disinfection processes destroy vegetative bacteria, mycobacteria, fungi and enveloped (lipid) and non-enveloped (non-lipid) viruses, but not necessarily bacterial spores. High level disinfectant chemicals (also called chemisterilants) must be capable of sterilization when contact time is extended. Items must be thoroughly cleaned prior to high level disinfection[3].

Infectious waste	The portion of biomedical waste that is capable of producing infectious disease.
Influenza	**Clinical Case Definition of Influenza** When influenza is circulating in the community, the presence of fever and cough of acute onset are good predictors of influenza. The positive predictive value increases when fever is higher than 38°C and when the time of onset of the clinical illness is acute (less than 48 hours after the prodromes). Other symptoms, such as sore throat, rhinorrhea, malaise, rigors or chills, myalgia and headache, although unspecific, may also be present[1]. **Confirmed Case of Influenza** Confirmed cases of influenza are those with laboratory confirmation (i.e., virus isolation from respiratory tract secretions, identification of viral antigens or nucleic acid in the respiratory tract, or a significant rise in serum antibodies) or clinical cases with an epidemiological link to a laboratory-confirmed case[7]. **Influenza-Like-Illness (ILI)** For surveillance purposes, the ILI definition currently used in Canada says: ▸ Acute onset of respiratory illness with fever (>38°C) and cough and with one or more of the following: sore throat, arthralgia, myalgia or postration, which could be due to influenza virus as used by the National Influenza Surveillance Program (FluWatch) for the 2002-2003 season[8].
Intermediate level disinfection	The level of disinfection required for some semicritical items. Intermediate level disinfectants kill vegetative bacteria, most viruses and most fungi but not resistant bacterial spores[3].
Low level disinfection	The level of disinfection required when processing noncritical items or some environmental surfaces. Low level disinfectants kill most vegetative bacteria and some fungi as well as enveloped (lipid) viruses (e.g., hepatitis B, C, Hantavirus, and HIV). Low level disinfectants do not kill mycobacteria or bacterial spores. Low level disinfectants-detergents are used to clean environmental surfaces[3].
Mask	A barrier covering the nose and mouth to protect the mucous membranes from microorganisms contained in large droplet particles (> 5 µm in size) generated from a source person during coughing, sneezing, or talking and during the performance of certain procedures that generate droplets (e.g., suctioning) or are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions. Masks may also be used to contain large droplet particles generated by coughing or sneezing persons. The term mask in this document refers to surgical masks, not to special masks, such as high efficiency dust/mist masks or respirators.
Noncritical items	Items that either touch only intact skin but not mucous membranes or do not directly touch the patient/resident/client. Reprocessing of noncritical items involves cleaning and or low level disinfection[3].

Non traditional health care settings	Non-traditional health care settings are those settings that are predetermined for operation prior to an influenza pandemic and operational only when an influenza pandemic is declared by the World Health Organization (WHO).
Plain soap	Products that do not contain antimicrobial agents, or contain very low concentrations of antimicrobial agents that are effective solely as preservatives[1].
Parent organization	The organization responsible for the planning of a non-traditional setting operational only in the event of the declaration of an influenza pandemic. When there is no specific organization, another organization must be identified to assume the role of the parent organization.
Personal protective equipment	Attire used by the worker to protect against airborne or droplet exposure and exposure to blood and bloody body fluids, i.e., masks, eye goggles, face shields, gloves and gowns[5].
Precautions	Interventions implemented to reduce the risk of transmission of microorganisms from patient to patient, patient to health care worker, and health care worker to patient[5].
Semicritical items	Devices that come in contact with nonintact skin or mucous membranes but ordinarily do not penetrate them. Reprocessing semicritical items involves meticulous cleaning followed preferably by high-level disinfection[3].
Sterilization	The destruction of all forms of microbial life including bacteria, viruses, spores and fungi. Items must be cleaned thoroughly before effective sterilization can take place[3].
Traditional health care settings	Traditional settings include acute, long term, ambulatory and community care.

Table of Contents

Part B: Pandemic Influenza in Traditional Settings

Part C: Pandemic Influenza in Non-Traditional Settings

Appendices

1.0 Background Information

The following document provides infection prevention and control guidance for the management of **pandemic influenza** in traditional and non-traditional health care settings. Non-traditional health care settings are those that are pre determined for operation prior to an influenza pandemic and operational only when an influenza pandemic is declared by the World Health Organization (WHO).

Infection prevention and control guidelines for **interpandemic influenza** in traditional health care settings, (i.e., acute care, long-term care, ambulatory care and community care), will be addressed in other Health Canada infection control guidelines, specifically the Guideline for the Prevention of Health Care-Associated Pneumonia.

Infection prevention and control guidelines for the management of pandemic influenza in traditional and non-traditional health care settings are based on previously published Health Canada Infection Control Guidelines[3,5,6,9]. Although recommendations to prevent the transmission of infection during the delivery of health care, including during a pandemic are important, it is recognized that certain recommendations may be feasible only in the early phases of the pandemic as they may not be achievable when the pandemic spreads and resources become scarce. For the purpose of this document the term mask refers to surgical masks, not to procedure masks, special masks or respirators.

Throughout this document, the term "parent organization" refers to the organization that assumes responsibility for non - traditional settings. Where there is no "parent" organization to plan or operate the non - traditional settings, it is expected that another organization would assume this role. Public Health may be in the best position to plan or operate such facilities although this would need to be negotiated and corroborated.

In this document, individuals who have recovered from or have been vaccinated against the pandemic strain of influenza are considered immune with one important caveat regarding the immune status of the vaccinated individual. Because influenza vaccines are not 100% efficacious, if vaccinated individuals come in contact with influenza patients, the vaccinated individual should be monitored for ILI using the ILI Assessment Tool found in Appendix IV. Health Canada will coordinate studies on vaccine effectiveness (see the vaccine annex [Annex D] in the Canadian Pandemic Influenza Plan for further details).

During a pandemic, it may be necessary to recruit trainees and volunteers to take on specific responsibilities, for example, basic patient care, that is usually reserved for health care workers. The implication is that these workers will need to be considered, for infection control purposes, as being equivalent to health care workers (see glossary) in terms of risk of exposure and ability to transmit disease.

1.1 World Health Organization Phases for Pandemic Influenza

The World Health Organization has developed a staged plan, based on its surveillance program, for responding to a pandemic threat. Recognition of a novel influenza strain in humans triggers a series of responses, identified as phases and levels within phases that can ultimately lead to the declaration of a pandemic. Interpandemic activities are designated as Phase 0. Isolation of a novel virus subtype from a single human case, without evidence of spread, will result in WHO declaring pandemic influenza Phase 0: Preparedness Level 1. Phase 1 is the confirmation of a pandemic, Phase 3 is the end of the first pandemic wave and Phase 4 is the second or subsequent waves of the pandemic[10].

More than one wave of infection can occur in a pandemic[11] possibly due to seasonal influences and the existence of a large pool of susceptible individuals in the population[12].

Key stages of the WHO response are outlined in Appendix II.

2.0 Principles of Influenza Transmission

The following section has been adapted from the Health Canada Infection Control Guidelines *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*, 1999[5].

Modes or routes of transmission of infectious agents have been classified as contact, droplet, airborne, common vehicle and vectorborne. Routes pertinent to influenza are contact, droplet and airborne.

2.1 Contact Transmission

Includes direct contact, indirect contact and droplet (large droplet transmission). Routine practices should prevent most transmissions by the contact route. Although droplet transmission is a type of contact transmission, it is considered separately as it requires additional precautions.

- **Direct Contact Transmission** occurs when the transfer of microorganisms results from direct physical contact between an infected or colonized individual and a susceptible host.
- **Indirect Contact** involves the passive transfer of microorganisms to a susceptible host via an intermediate object such as contaminated hands that are not washed between patients or contaminated instruments or other inanimate objects in the patient's immediate environment.

2.2 Droplet Transmission

Refers to large droplets, greater than or equal to 5 µm in diameter, generated from the respiratory tract of the source (infected individual) during coughing or sneezing, or during procedures such as suctioning or bronchoscopy. These droplets are propelled a distance of less than one meter through the air and are deposited on the nasal or oral mucosa of the new host (newly infected individual) or in the immediate environment. These large droplets do not remain suspended in the air, therefore, special ventilation is not required since true aerosolization (see below) does not occur.

2.3 Airborne Transmission

Refers to the dissemination of microorganisms by aerosolization. Organisms are contained in droplet nuclei, airborne particles less than 5 µm that result from the evaporation of large droplets, or in dust particles containing skin squames and other debris that remain suspended in the air for long periods of time[13]. Such microorganisms are widely dispersed by air currents and inhaled by susceptible hosts who may be some distance away from the source patients or individuals, even in different rooms or hospital wards. Control of airborne transmission is the most difficult as it requires control of air flow through special ventilation systems.

2.4 Evidence for the Mode of Influenza Transmission

The following section has been adapted from the Health Canada Infection Control Guidelines *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*, 1999[5].

Organisms, especially respiratory viruses expelled in large droplets, remain viable in droplets that settle on objects in the immediate environment of the patient. Both influenza A and B viruses have been shown to survive on hard, non-porous surfaces for 24-48 hours, on cloth paper and tissue for 8-12 hours and on hands for 5 minutes[14]. The virus survives better at the low relative humidity encountered during winter in temperate zones.

Contact with respiratory secretions and large droplets, appears to account for most transmissions of influenza. In a report of an outbreak in a nursing home, the pattern of spread was suggestive of contact rather than airborne transmission because patients who were tube fed or required frequent suctioning had higher infection rates than those who did not require such care[15].

Whether or not influenza is naturally transmitted by the airborne route is controversial[16,17]. An outbreak of influenza on an airliner has been attributed to airborne spread; however, large droplet spread could have been responsible because the passengers were crowded together and moved about for several hours in a small, grounded airplane[18]. Although experimental airborne transmission of influenza A virus to mice has been reported, there is no evidence of such transmission in humans[19].

2.4.1 Mode of Influenza Transmission

Influenza is directly transmitted primarily by droplet contact of the oral, nasal, or possibly conjunctival mucous membranes with the oropharyngeal secretions of an infected individual. Influenza is indirectly transmitted from hands and objects freshly soiled with discharges of the nose and throat of an acutely ill and coughing individual[6].

2.5 Routine Practices and Additional Precautions to Prevent the Transmission of Influenza

The following section has been adapted from the Health Canada Infection Control Guidelines *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*, 1999[5].

Routine practices outline the importance of handwashing before and after caring for patients; the need to use gloves, masks/eye protection/face shields, and gowns when splashes or sprays of blood, body fluids, secretions or excretions are possible; the cleaning of patient-care equipment, the patient's physical environment and soiled linen; the precautions to reduce the possibility of HCW exposure to bloodborne pathogens and patient placement. Routine

practices are the infection prevention and control practices for use in the routine care of all patients at all times in all health care settings.

Additional precautions are required when routine practices are not sufficient to prevent transmission. In interpandemic years, the Health Canada guidelines recommend that in addition to routine practices, which should be taken for the care of all patients, additional precautions (droplet and contact precautions) should be taken for pediatric[5] and adult patients with influenza (personal communication, Consensus Meeting for infection control measures with patients presenting with acute, respiratory illness, Gatineau, Quebec, November 24, 2003). This recommendation represents a change because, in the past, it was unclear as to whether or not additional precautions were indicated for adults with influenza.

Children and adults who have the physical and cognitive abilities, should be encouraged to practice good hygiene: i.e., use disposable, one-use tissues for wiping noses; cover nose and mouth when sneezing and coughing; hand washing/hand antisepsis after coughing, sneezing or using tissues; and, keep hands away from the mucous membranes of the eyes and nose. Therefore, preventing the transmission of influenza is best achieved through strict compliance with routine practices, (i.e., good hygiene) and the use of additional precautions[5].

Routine practices and additional precautions to prevent the transmission of infection during the delivery of health care in all health care settings during a pandemic are important. Certain routine practice and additional precaution recommendations may be feasible only in the early phases of the pandemic as they may not be achievable as the pandemic spreads and resources (equipment, supplies and workers) become scarce. Because the complexity of managing high risk patients will be greatest in acute care hospitals, it seems reasonable that the highest priority for infection control resources should be given to the acute care settings.

Strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventive measure available during a pandemic. Hand hygiene procedures should be reinforced according to Appendix III.

2.6 Use of Masks During a Pandemic

Although there is a lack of evidence that the use of masks prevented transmission of influenza during previous pandemics; in the early phase of an influenza pandemic, it may be prudent for HCWs to wear masks when interacting in close face-to-face contact with coughing individuals to minimize influenza transmission. This use of masks is advised when immunization and antivirals are not yet available but is not practical or helpful when pandemic influenza has entered the community. There is no evidence that the use of masks in general public settings will be protective when the virus is circulating widely in the community.

Masks may be worn by HCWs to prevent transmission of other organisms from patients with undiagnosed cough. For the purpose of this document the term mask refers to surgical masks, not to special masks or respirators. Special masks, i.e., high-efficiency dust/mist masks are required for patients with infectious tuberculosis and for non-immune HCWs entering the room of a patient with measles or disseminated varicella.

When using surgical masks[5]:

- They should be used only once and changed if wet (because masks become ineffective when wet).
- They should cover both the nose and the mouth.
- Avoid touching it while it is being worn

- Discard them into an appropriate receptacle.
- They must not be allowed to dangle around the neck.

2.7 Infectivity of the Influenza Virus

The **incubation period** for influenza is from 1-3 days. The **period of communicability** (duration of viral shedding) continues for up to 7 days after the onset of illness[5], probably from 3-5 days from clinical onset in adults and up to 7 days in children[20].

Individuals infected with influenza tend to shed more virus in their respiratory secretions in the early stages of the illness[21,22] and patients are most infectious during the 24 hours before the onset of symptoms and during the most symptomatic period[23]. Viral shedding may be longer in infants[5], and prolonged in young children and immunodeficient patients[20]. It has not been well established whether elderly long term care residents shed viruses longer than other adult populations[24].

There is no information to determine if the period of communicability will be different with pandemic influenza. The duration of shedding of a novel virus (pandemic strain) is unknown. It is possible that prolonged shedding could occur with pandemic influenza because the immune system would not have had prior experience with related strains[25].

Hands can be contaminated with influenza virus by contact with inanimate surfaces or objects in the immediate environment of a patient with influenza infection. Influenza A and B viruses have been shown to survive for 24-48 hours on hard, nonporous surfaces; for up to 8 to 12 hours on cloth, paper and tissues; and on hands for up to 5 minutes after transfer from environmental surfaces[14].

"The influenza virus is readily inactivated by hospital germicides, household cleaning products, soap, hand wash or hand hygiene products." Therefore, neither antiseptic hand wash products in health care settings nor antibacterial hand wash products in home setting are required because routine products, along with proper hand washing procedures, will inactivate the influenza virus.

Infectivity of the Influenza Virus

1. Incubation period:	1-3 days.
2. Period of communicability:	Infectious 1 day before onset of symptoms and may be longer than 7 days after the onset of symptoms.

3.0 Occupational Health and Infection Control Management of Pandemic Influenza in Traditional and Non-traditional Health Care Settings

3.1 Occupational Health and Infection Control Pandemic Influenza Planning

A broad consensus has emerged regarding plans for pandemic influenza: the plans should be aimed at reducing influenza-related morbidity, mortality and social disruption. It is widely recognized that preparation for the next pandemic requires that an infrastructure be in place during the interpandemic period for the following reasons:

(a) the rapid detection of novel variants and disease caused by them,

(b) the production and delivery of influenza vaccines and antiviral agents to high priority target groups,

(c) the rapid dissemination and exchange of information; and

(d) emergency preparedness.

Pandemic plans should outline the responsibilities of the institutions that will be involved in the pandemic response. The plan should be divided into phases that describe, in detail, a step-wise response to the identification and subsequent spread of a novel virus, as well as the ability to cut back the response if a novel virus fails to spread as occurred in 1976 and 1977[10].

Planning for and the management of pandemic influenza is directly related to the strength of the strategy in place for the management of interpandemic influenza; a strong interpandemic plan will affect the outcome of the pandemic plan[12].

"The trends of modern society, including the increasing availability of rapid human transportation and the urbanization of the rapidly expanding human population, tend to facilitate the spread of influenza and increase morbidity. Modern medicine can reduce the mortality that resulted from complications of infection with influenza virus during earlier epidemics, but the cost of medical interventions has increased to the point that effective methods of epidemic control should be considered. **This challenge provides an opportunity to develop, test, and have in place a strategy for control of interpandemic influenza before the next pandemic"[12].**

During an influenza pandemic, adherence to infection prevention and control policies and procedures is critical to minimize the transmission of influenza and other infectious diseases. It is anticipated that neither influenza immunization nor chemoprophylaxis will be available in the early stages of a pandemic and perhaps not even available in later stages, necessitating an emphasis on infection prevention and control practices.

3.1.1 Recommendations

1. All organizations responsible for traditional health care settings (i.e., acute, long term, ambulatory, home and community care) and organizations (i.e., parent organizations) responsible for the planning of non-traditional settings (i.e., triage settings, self care settings and temporary influenza hospitals) operational only during an influenza pandemic, should develop an Infection Control and Occupational Health (IC/OH) plan for the management of pandemic influenza. The plan should be developed according to previously published Health Canada Infection Control Guidelines[3,5,6,9] and federal/provincial/territorial/municipal/regional contingency plans with a multi-disciplinary group that includes, but is not limited to:

   (a) representatives from traditional and non traditional organizations including:

   - medical administration
   - nursing administration
   - physicians
   - nursing services
   - physical plant and housekeeping
   - occupational health
   - infection prevention and control
   - pharmacy services
   - emergency services
   - respiratory services
   - public affairs
   - educational services
   - laboratory services;

   (b) public health personnel;

   (c) community care providers;

   (d) local pandemic planners;

   (e) funeral service workers;

   (f) local disaster planners.

↑AIII

2. Non traditional settings that are not associated with a "parent" organization must develop their IC/OH plan for the management of pandemic influenza with an organization that would assume this role of "parent" organization. Public Health may be in the best position to plan or operate such facilities although this would need to be negotiated and corroborated.

↑AIII

3. The IC/OH plan for the management of pandemic influenza for traditional and non-traditional settings should be reviewed every 3 years and updated according to current legislation and relevant publications.

↑AIII

4. The IC/OH plan for the management of pandemic influenza for traditional and non-traditional settings should include the preparation of educational information for

health care workers (see glossary for HCW definition, see section 4.1 for HCW education and see section 3.5 for management of HCWs during a pandemic).

↑**AIII**

5. The IC/OH plan for the management of pandemic influenza should include recommendations for the use of influenza vaccine and chemoprophylaxis for health care workers according to the vaccine (Annex D) of the Canadian Pandemic Influenza Plan.

↑**AIII**

6. Pandemic influenza planning should include support for programs to meet Canadian target coverage rates for pneumococcal immunization[26-28].

↑**AIII**

7. **Strict adherence to hand washing/hand antisepsis recommendations (see Appendix III) is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic.**

   Planning should include ensuring that adequate supplies of hand hygiene products are a priority for all health care settings as there may be an interruption to the supply or shortages of hand antisepsis products, soap and hand towels

↑**AII**

8. Planning should include the priority of maintaining adequate resources for infection control in acute care hospitals (soap, antiseptic products, masks/eye protection/face shields, gloves, gowns) due to the increased complexity and management issues of hospitalized patients.

↑**AII**

9. Planning should include ensuring all HCWs (see glossary for HCW definition) are offered hepatitis B immunization[6,9]. As resources permit, HCWs should also receive TB skin testing, should have proof of measles, mumps, rubella (MMR) immunity and receive a tetanus booster if appropriate[6].

↑**AII**

3.2 Definitions for Infection Control/Occupational Health Management of Patients/Staff with Influenza-Like Illness (ILI)

3.2.1 Influenza-Like-Illness

See glossary term “influenza”.

Refer to Appendix IV for an ILI Assessment Tool. An ILI Assessment Tool is to be used for immediate triage of patients or staff and accommodation/cohort of patients, prior to further OH or clinical management.

3.2.2 Clinical Case Definition

See glossary term “influenza”.

3.2.3 Confirmed Case of Influenza

See glossary term “influenza”.

3.2.4 Immunity to Influenza

During a pandemic, it is likely that most cases of influenza will be caused by the pandemic strain. Data from the 1957 and 1968 pandemics show that the previously circulating influenza strain disappeared from human circulation when the pandemic strain of influenza virus emerged[25]. Therefore, HCWs who have recovered from an ILI during an earlier pandemic phase, may be assumed to be immune to the pandemic influenza strain.

Individuals who have been immunized against the pandemic strain of influenza will also be considered immune, recognizing that the influenza vaccine may not be fully protective. Therefore, unlike individuals who have recovered from pandemic influenza or ILI, vaccinated individuals should be monitored for ILI using the ILI Assessment Tool found in Appendix IV.

3.3 Use of Influenza Immunization During an Influenza Pandemic

See the vaccine annex (Annex D) of the Canadian Pandemic Influenza Plan. Influenza vaccine availability in the early phase(s) of the pandemic is uncertain. When available, vaccine will be provided according to priority groups set by recommendations from the Vaccine Working Group. Health Care Workers and those trainees, volunteers, etc. who are recruited to perform the duties of a HCW are considered to be a high priority.

3.4 Use of Antivirals During an Influenza Pandemic

See the antivirals annex (Annex E) of the Canadian Pandemic Influenza Plan. Antiviral availability in the early phase(s) of the pandemic is uncertain. When available, antivirals will be provided according to priority groups set by recommendations from the Antiviral Working Group. Health care workers and those trainees, volunteers, etc. who are recruited to perform the duties of a HCW are considered to be a high priority.

3.5 Occupational Health Management of Health Care Workers During an Influenza Pandemic

The phrases “fit for work”, “unfit for work”, and “fit to work with restrictions” are used by Occupational Health to communicate a worker’s ability to remain at or return to work depending upon their susceptibility to influenza, immunization status and agreement to use antivirals[6]. During the early phases of a pandemic, vaccine and antiviral availability will be limited and will be provided to priority groups. Health Care Workers, and those trainees, volunteers, etc. who are recruited to perform the duties of a HCW, are to be one of the priority groups. (See Annexes D and E of the Canadian Pandemic Influenza Plan.)

3.5.1 Recommendations

1. Fit for Work

(a) Ideally, HCWs are fit to work when one of the following conditions apply:

  (i) they have recovered from ILI (see glossary for definition and ILI Assessment Tool, Appendix IV) illness during earlier phases of the pandemic;

(ii) they have been immunized against the pandemic strain of influenza as outlined in Annex D of the Canadian Pandemic Influenza Plan; or,

(iii) they are on appropriate antivirals as outlined in Annex E of the Canadian Pandemic Influenza Plan.

Such HCWs may work with all patients and may be selected to work in units where there are patients who, if infected with influenza, would be at high risk for complications.

↑**AIII**

(b) Whenever possible, well, unexposed HCWs should work in non-influenza areas.

↑**AIII**

(c) Asymptomatic HCWs may work even if influenza vaccine and antivirals are unavailable. Meticulous attention should be paid to hand hygiene and HCWs should avoid touching mucous membranes of the eye and mouth to prevent exposure to the influenza virus and other infective organisms.

↑**AIII**

2. Unfit for Work

Ideally, staff with ILI should be considered "unfit for work" and should not work; nonetheless, due to limited resources, these HCWs may be asked to work if they are well enough to do so (see 3(b) below).

↑**AIII**

3. Fit to Work with Restrictions

(a) Ideally, symptomatic staff who are considered "fit to work with restrictions" should only work with patients with ILI. Health Care Workers who must work with non-exposed patients (non-influenza areas) should be required to wear a mask if they are coughing and must pay meticulous attention to hand hygiene.

↑**AIII**

(b) Symptomatic HCWs who are well enough to work should not be redeployed to intensive care areas, nurseries[29-31] or units with severely immunocompromised patients, i.e., transplant recipients[32], hematology/oncology patients[33-35], patients with chronic heart or lung disease, or patients with HIV/AIDS and dialysis patients.

↑**AII**

4.0 Pandemic Influenza Education

4.1 Pandemic Influenza Education for Health Care Workers (Including Emergency Medical Services, mortuary workers, and HCWs in correctional settings)

Recommendations

1. Educational information for workers should be provided as soon as WHO Pandemic Phase 0 Level 1 is declared (see Appendix II) and repeated at frequent intervals to all staff levels and during all shifts.

↑AIII

2. The pandemic influenza information should be appropriate to the audience and be provided using a variety of methods, e.g., postings in elevators, at facility entrances, brochures, newsletters and web sites.

↑AIII

3. The educational information prepared and provided for workers should include:
   (a) an explanation that pandemic influenza is a novel strain of influenza and what a pandemic is;
   (b) the facility-specific pandemic influenza plan;
   (c) information regarding triage settings (see Section 7.1), self care (see Section 7.2) and temporary influenza hospitals (see Section 7.3).
   (d) the difference between an upper respiratory infection and influenza (see the introduction to the Preparedness Section of the Canadian Pandemic Influenza Plan);
   (e) the mode of influenza transmission (see Section 2.4);
   (f) the criteria for determining, influenza-like-illness (ILI) (see glossary for definition and Appendix IV for an ILI Assessment Tool) and influenza (see glossary for definition);
   (g) the risk of infection and subsequent complications in high-risk groups;
   (h) the message that **strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during early phases of the pandemic** (see Appendix III);
   (i) information about the importance of hygienic measures (see Section 2.5) to minimize influenza transmission because influenza immunization and/or prophylaxis may not be available until later in the pandemic;
   (j) information indicating that, during the early phase of an influenza pandemic, it may be feasible for HCWs to wear masks when face-to-face with coughing individuals to minimize influenza transmission (particularly when immunization and antivirals are not yet available) but not practical or helpful when transmission has entered the community (see Section 2.6). Masks may be worn by HCWs to prevent transmission of other organisms from patients with undiagnosed cough;
   (k) who will be given the highest priority for immunization when vaccine is available,

(l) the importance of being immunized and safety of immunization (see Annexes D and E of the Canadian Pandemic Influenza Plan);

(m) who will be given what priority for prophylaxis when antivirals are available, the importance of prophylaxis and safety of prophylaxis (see Annexes D and E of the Canadian Pandemic Influenza Plan).

↑**BIII**

4. Information about the importance of routine practices and additional precautions to prevent the transmission of infection during the delivery of health care in all health care settings during a pandemic. This information should include the caveat that some routine practice and additional precaution recommendations may be achievable only in the early phases of the pandemic and other recommendations may not be achievable as the pandemic spreads and resources (equipment, supplies and workers) become scarce.

↑**BIII**

5. Priority for infection control resources should be assigned to acute care settings because of the complexity of managing high risk patients in acute care settings.

↑**BIII**

6. Education about routine practices for those expected to work in non-traditional settings, as outlined in this document, should be available. Refer to Section 7.1 for Triage Settings, Section 7.2 for Self Care Settings and Section 7.3 for Temporary Influenza Hospitals.

↑**BIII**

7. Education about Routine Practices in traditional health care settings, as outlined in Health Canada Infection Control Guidelines *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*, 1999, should be ongoing.

↑**BIII**

8. HCWs should be provided with the recommendations for Occupational Health Management of workers during a pandemic (See Section 3.5).

↑**BIII**

4.2 Pandemic Influenza Education for the Public (including child care workers, teachers, shelter workers, correctional workers, etc.)

Recommendations

1. Provide education appropriate to the recipient, as soon as WHO Pandemic Phase 0 Level 1 is declared (see Appendix II). Include information about the epidemiology and mode of transmission of influenza using a variety of methods, e.g., postings at facility entrances, brochures, newsletters, web sites, television and radio stations.

↑**AIII**

2. Educational information prepared and provided for the public should include:

(a) an explanation that pandemic influenza is a novel strain of influenza and what a pandemic is;

(b) information regarding Self Care (see Section 7.2 and Annex G of the Canadian Pandemic Influenza Plan) and for the purpose of Triage Settings and Temporary Influenza Hospitals (see Annex G of the Canadian Pandemic Influenza Plan);

(c) the difference between an upper respiratory infection and influenza (see the introduction to the Preparedness Section of the Canadian Pandemic Influenza Plan;

(d) the mode of transmission of influenza (see Section 2.4);

(e) the criteria for determining, influenza-like-illness (ILI) (see glossary for definition and Appendix IV for an ILI Assessment Tool) and influenza (see Glossary for definition);

(f) the risk of infection and subsequent complications in high-risk groups;

(g) the message that **strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during the pandemic;**

(h) information about the importance of hygienic measures, i.e., using disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; hand washing/hand antisepsis after coughing, sneezing or using tissues; and the importance of keeping hands away from the mucous membranes of the eyes and nose to minimize potential influenza transmission because influenza immunization and/or prophylaxis may not be available until later in the pandemic;

(i) information that the influenza virus is readily inactivated by plain soap and common household cleaning products;

(j) information indicating that during the early phase of an influenza pandemic, it may be feasible for HCWs to wear masks when coming face-to-face with coughing individuals to minimize influenza transmission (particularly when immunization and antivirals are not yet available) but not practical or helpful when transmission has entered the community. In health care settings, HCWs should wear masks to prevent transmission of other organisms from patients with undiagnosed cough (see Section 2.6);

(k) who will be given the highest priority for immunization when a vaccine is available, importance of being immunized and safety of immunization (See the Preparedness Section of the Canadian Pandemic Influenza Plan);

(l) who will be given what priority for prophylaxis when antivirals are available, the importance of prophylaxis and safety of prophylaxis (see Annex E of the Canadian Pandemic Influenza Plan).

↑**AIII**

3. Provide information to encourage those who are symptomatic with ILI (see Appendix IV for an ILI Assessment Tool) but do not require formal health care, to remain at home until their symptoms have resolved.

↑**BIII**

4. Provide information to encourage those with ILI (see Appendix IV for an ILI Assessment Tool) to avoid visiting those who are at high risk for complications if they developed influenza in institutional settings (acute care and long term care) until their symptoms have resolved.

↑**BIII**

5. Inform the public to avoid public gatherings, as discussed in the following section, to minimize exposure.

BIII

5.0 Public Health Restrictions on Public Gatherings

Medical Officers of Health, through their provincial/territorial Public Health Acts, have the authority to quarantine individuals or groups, as deemed necessary, to control infectious diseases. During the 1918 influenza pandemic in Alberta, drastic control measures were taken; masks were required when going out in public; all schools, churches and theatres were closed, public meetings banned and towns were quarantined (Alberta Pandemic Influenza Planning overhead presentation given by Dr. K Grismsrud at the Canadian Pandemic Planning, meeting held in Montreal, May, 2001).

In an historical review of the 1918 pandemic in the United States, Keen-Payne[36] noted that many other centres used similar measures to attempt to curb transmission. In Chicago, persons who sneezed openly or who spit were threatened with arrests and fines. Churches were not closed, but parishioners were requested to stay home if ill, and windows were opened for ventilation during services. By the third week in October 1918, (the peak of the second wave) closing had extended to theaters, banquets, lecture halls, restaurants and movie shows.

In Newark, the state simply banned all public gatherings on October 10. Confusion developed when liquor stores were allowed to remain open for sales but churches were not open for congregating. The churches protested and the ban was lifted on October 21. In San Diego, all public facilities were closed (libraries, pool halls, women's weekly club meeting halls) as were all outdoor meetings except those convened to sell liberty bonds. The ban was lifted and then imposed again as new cases of influenza increased. Citizens were never strongly supportive of these measures[36].

The suggestion that the spread of influenza from US military camps in the summer of 1918 did not occur until school returned in the fall, has been noted[37]. In the United States, illness rates of nearly 40% were reported among schoolchildren during the autumn wave[38].

Following the 1957 epidemic in Japan, the policy on influenza immunization was changed as it was determined that school attendance played an important part in spreading that epidemic. There were wide-spread school closures, with attack rates as high as 60% in some areas and approximately 8,000 deaths. The new policy stated that "because schoolchildren are the major disseminators of the disease, they should be immunized". In a study to review whether the policy of vaccination of school children in Japan (over a 25-year period) reduced the incidence and mortality attributed to influenza among older persons, the authors concluded that the vaccination of schoolchildren in Japan disrupted the spread of influenza to older persons[39].

There is evidence that closing schools may change the course of transmission[12,40,41]. Studies conducted both during pandemic years and interpandemic years demonstrate that age-specific attack rates are highest among school children[12]. Additional studies noted that the age distribution of culture-positive patients changed during the course of epidemics. Initially, school children were culture positive, followed by a shift to preschool children and adults during the latter part of the epidemic[42]. The authors observed that school absenteeism was often followed by employee absenteeism during the influenza epidemics studied.

It is thought that management of exposure, as an approach to the prevention of a pandemic, is not possible because of the current high levels of international travel and the expansion of populations into many regions of the world. Options for slowing the spread of pandemic influenza have been suggested and include the use of antiviral prophylaxis, limiting congregations of people and, possibly, quarantine[43].

In preparation of an influenza pandemic and in an attempt to curtail community transmission, there are neither data nor guidelines to determine which public gatherings to close and when to close them. What constitutes a public gathering and whether some gatherings may be defined as essential versus non-essential needs to be clarified. Examples of public gatherings from the above included: transportation (ground, rail and air), childcare, schools, retail settings, workplaces, places of worship, funerals and community events (cultural/sporting).

The principles to determine when, how, and which public gatherings will be restricted in order to curtail community transmission ought to be based on common sense strategies, and should be consistently applied within, and across, jurisdictions. The severity of the pandemic strain and the stage of the pandemic, as it unfolds globally, should be considered when making this determination. Refer the to Public Health Measures document of the Preparedness Section of the Canadian Pandemic Influenza Plan for more comprehensive public health recommendations than those listed below.

5.1 Recommendations

1. Medical Officers of Health should develop a predetermined strategy for closing public gatherings. If public gatherings are restricted they should be restricted early enough to affect transmission. The strategy should include but is not limited to:
   (a) the definition of what constitutes a public gathering;
   (b) specifying the time period within the pandemic phases to implement the strategy;
   (c) applicability and consistency across jurisdictions;
   (d) availability of and priority use of vaccine and antivirals as outlined in Annexes D and E of the Canadian Pandemic Influenza Plan;
   (e) consideration as to whether or not school age children are to be considered a high priority for immunization or antivirals in the early phase of the pandemic.

↑BIII

1.0 Management of Pandemic Influenza in Acute Care Settings

Acute care settings group patients together who have a high risk of developing serious, sometimes fatal, complications related to influenza. In addition, morbidity and mortality related to hospital-acquired (i.e., nosocomial) infections is much greater in acute care populations than in other populations.

A comprehensive infection prevention and control program forms the basis for a successful pandemic influenza plan. Adherence to infection prevention and control policies and procedures is imperative to minimize the transmission of influenza and other infectious diseases in the acute care setting with or without availability of immunization or chemoprophylaxis.

Recommendations

1.1 Prevention of Pandemic Influenza

A. Immunization and Antivirals

Adherence to recommendations for vaccine and antivirals for patients and HCWs, as outlined in Annexes D and E of the Canadian Pandemic Influenza Plan, is of paramount importance.

1.2 Control of Pandemic Influenza

A. Physical Setting

1. When Pandemic Phase 2 is declared (see Appendix II), open Triage Settings in acute care hospitals as predetermined in the Preparedness Section of the Canadian Pandemic Influenza Plan.

   ↑**AIII**

2. When Pandemic Phase 2 is declared (see Appendix II) open cohort areas/units[4] in the hospital (See Sections F. and G. below) as predetermined in the IC/OH Pandemic Plan.

   ↑**AIII**

B. Management of Staff

1. Provide education, as outlined in Section 4.1.
2. Adhere to Occupational Health Management, as outlined in Section 3.5.

C. Infection Control Practices

1. Routine Practices

Using a program to prevent hospital-acquired (i.e., nosocomial) infections, acute care facilities should adhere to published guidelines including Health Canada Infection Control Guidelines. *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*[5].

2. Additional Precautions

Although droplet and contact precautions are recommended in preventing the transmission of influenza during an interpandemic period, these precautions will not be achievable during a pandemic. In contrast, adherence to routine practices is achievable during a pandemic.

Routine Practices are summarized below:

(a) Hand Hygiene

Staff, patients and visitors should **recognize that strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic.**

i. Hand hygiene procedures should be reinforced according to Appendix III.

↑AII

ii. Hands should be washed or hand antisepsis performed after direct contact with patients/workers with ILI and after contact with their personal articles or their immediate environment.

↑AII

(b) Hygiene Measures to Minimize Influenza Transmission

i. Patients, staff and visitors should be encouraged to minimize potential influenza transmission through good hygienic measures, e.g., use disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; hand washing/hand antisepsis after coughing, sneezing or using tissues; and the importance of keeping hands away from the mucous membranes of the eyes and nose.

↑AIII

(c) Personal Protective Equipment (PPE)

i. Masks

1. **Masks to minimize the transmission of influenza may be worn** when face-to-face with coughing individuals during the early phases of the pandemic but are not practical or helpful when influenza transmission has entered the community.

↑BIII

2. **Masks should be worn to prevent the transmission of other organisms** when HCWs are face-to-face with undiagnosed coughing patients.

↑BIII

3. Masks and eye protection, or face shields **should be worn** to prevent HCW exposure to sprays of blood, body secretions or excretions. Surgical masks are considered adequate for this purpose[9,44,45].

BIII

4. HCWs should avoid touching their eyes with their hands to prevent self-contamination with pathogens.
5. Use masks, as outlined in Section 2.6

ii. Gloves

1. Gloves are not required for the routine care of patients suspected or confirmed to have influenza. Meticulous hand washing with soap and water or performing hand antisepsis will inactivate the virus.

AIII

2. Gloves **should be worn** to provide an additional protective barrier between the HCWs hands and blood, body fluids, secretions, excretions and mucous membranes to reduce the potential transfer of microorganisms from infected patients to HCWs and from patient-to-patient via HCWs' hands.

AII

3. Gloves **are necessary** for HCWs with open lesions on their hands when providing direct patient care.

AII

4. Gloves **should be** used as an additional measure, not as a substitute for hand hygiene[46,47].

BII

5. Gloves should not be reused or washed[47].

AII

iii. Gowns

1. Gowns are not required for the routine care of patients suspected or confirmed to have influenza.

AI

2. **Long sleeved gowns should only be used** to protect uncovered skin and prevent soiling of clothing during procedures and patient care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions[9,45].

BIII

3. HCWs should ensure any open skin areas/lesions on forearms or exposed skin is covered with a dry dressing at all times. Intact skin that has been contaminated with blood, body fluids, secretions or excretions should be washed as soon as possible, thoroughly, but gently with soap and warm running water.

BIII

(d) Cleaning, Disinfection, and Sterilization of Patient Care Equipment

i. Acute care settings should adhere to the recommendations for cleaning, disinfection and sterilization of patient care equipment, as outlined in the Health Canada Infection Control Guidelines *Handwashing, Cleaning Disinfection and*

Sterilization in Health Care[3] and *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*[5].

↑**AIII**

(e) Environmental Control (Housekeeping, Laundry, Waste)

i. Acute care settings should adhere to the recommendations for housekeeping, laundry and waste management as outlined in the Health Canada Infection Control Guidelines *Handwashing, Cleaning Disinfection and Sterilization in Health Care*[3] and *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*[5].

↑**AIII**

ii. Equipment and surfaces contaminated with secretions from patients suspected or confirmed to have influenza should be cleaned before use with another patient.

↑**BIII**

iii. Special handling of linen or waste contaminated with secretions from patients suspected or confirmed to have influenza is not required.

↑**AII**

D. Accommodation

1. Single rooms in acute care settings[5] are limited and should be for those suspected of having or confirmed to have airborne infections, e.g., tuberculosis, measles, varicella and disseminated zoster and those who visibly soil the environment for whom appropriate hygiene cannot be maintained.

↑**AII**

2. Minimize crowding (i.e., maintain a one metre spatial separation) between patients, visitors and workers whenever possible.

↑**AIII**

E. Patient Triage/Cohorting

1. When Pandemic Phase 2 is declared (see Appendix II) open the following specified *cohort areas/units*[4] in the hospital, as predetermined in the IC/OH Pandemic Plan:

(a) **Influenza-Like-Illness (ILI), Assessment Area** (see Glossary for definition and Appendix IV for an ILI Assessment tool).

(b) **Non ILI Assessment Area** (patients require acute care assessment for other conditions).

(c) **Suspected/Exposed to ILI, In-patient Units.**

(d) **Confirmed Influenza** (see Glossary for definition), In-patient Units.

(e) **Not Exposed/Immune* to Influenza, In-patient Units**;

(f) **Not Exposed to ILI but at very high risk of complications, In-patient Units** (e.g., intensive care areas; nurseries[29-31] or units with severely immunocompromised patients, e.g., transplant recipients[32] hematology/oncology patients[33-35], patients with chronic heart or lung disease or patients with HIV/AIDS and dialysis patients).

↑**AIII**

Note: *Immune are those recovered from the pandemic strain of influenza or those immunized against the pandemic strain of influenza (see Section 3.2.4). As noted, the influenza vaccine may not be 100% efficacious in providing immunity.

2. In acute care settings, (hospitals), triage ILI patients promptly to a separate designated influenza assessment area onsite, to minimize transmission to others in the waiting room.

↑**AIII**

3. In acute care settings,(hospitals), triage non ILI patients (but requiring acute care assessment) promptly to specific non ILI waiting and examining areas physically separate from the ILI assessment area to prevent their exposure to ILI.

↑**AIII**

F. Patient Admission

1. When Pandemic Phase 2 is declared (see Appendix II), eliminate or curtail elective medical and surgical acute care (hospital) admissions and restrict cardiovascular and pulmonary surgery to emergency cases[17].

↑**AIII**

2. Patients who have recovered from influenza can be moved into the "Non Influenza" cohort areas after the period of communicability of the pandemic strain has passed.

↑**AIII**

3. As the pandemic progresses, the "Suspect/Exposed" Cohort and the "Confirmed Influenza" cohort may be merged.

↑**AIII**

4. Maintain cohort principles until the pandemic wave has been declared over.

↑**AIII**

G. Patient Activity Restrictions

1. Limit movement/activities of patients including transfers within the hospital, unless the patient has recovered from pandemic influenza.

↑**AIII**

2. Patients with ILI who are coughing should only leave their room for urgent/necessary procedures.

↑**AIII**

3. Patients with ILI who are coughing should wear a surgical mask whenever they need to be out of their room until the period of communicability of the pandemic strain has passed.

↑**AIII**

H. Visitor Restrictions

1. There are no restrictions for asymptomatic visitors who have recovered from pandemic influenza or who have been immunized against the pandemic strain of influenza.

↑**AIII**

2. Visitors with ILI should not visit until they are asymptomatic. Close relatives of terminally ill patients can be exempt, but should put a mask on upon entry into the facility and their visit shall be restricted to that patient only.

↑**AIII**

3. Visitors should be informed when the acute care facility has influenza activity. Those who have not yet had the pandemic strain of influenza or who have not been immunized against the pandemic strain, should be discouraged from visiting. Close relatives of terminally ill patients can be exempt, but they should restrict their visit to that individual only and they should wash their hands on exit from the patient's room. Wearing a mask upon entry to the facility is only useful if there is no influenza in the community.

↑AIII

2.0 Management of Pandemic Influenza in Long Term Care Settings

Interpandemic influenza is a major cause of illness and death in residents of long term care facilities for the elderly, in part, because the resident's age and underlying illness increase the risk of serious complications and, in part, because institutional living increases the risk of influenza outbreaks[24,48,49]. It is reasonable to anticipate that pandemic influenza would have the same impact in long term care settings.

A comprehensive infection prevention and control program forms the basis for a successful pandemic influenza plan. Adherence to infection prevention and control policies and procedures is imperative to minimize the transmission of influenza and other infectious diseases in the long term care setting with or without the availability of immunization or chemoprophylaxis.

Recommendations

2.1 Prevention of Pandemic Influenza

A. Immunization and Antivirals

Adherence to the recommendations for vaccine and antivirals for residents and HCWs, as outlined in Annexes D and E of the Canadian Pandemic Influenza Plan, is necessary.

2.2 Control of Pandemic Influenza

A. Physical Setting

When Pandemic Phase 2 is declared (see Appendix II), open the area for the care of residents who will require "acute influenza care" as predetermined in the Infection Control/Occupational Health (IC/OH) Pandemic Plan to minimize transfer to acute care hospitals (also See Section F below and the Preparedness Section of the Canadian Pandemic Influenza Plan).

↑AIII

B. Management of Staff

1. Provide education, as outlined in Section 4.1.
2. Adhere to Occupational Health Management, as outlined in Section 3.5.

C. Infection Control Practices

1. Using a program to prevent health care-acquired (i.e.nosocomial) infections, long term care facilities should adhere to published guidelines[50,51], including Health Canada Infection Control Guidelines *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*[5].

2. Additional Precautions

   Although droplet and contact precautions are recommended in preventing the transmission of influenza during an interpandemic period, these precautions will not be achievable during a pandemic. In contrast, adherence to routine practices is achievable during a pandemic.

   Routine Practices are summarized below:

   (a) Hand Hygiene

      i. Staff, residents and visitors should **recognize that strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic.**

         Hand Hygiene procedures should be reinforced according to Appendix III.

         ↑AII

      ii. Hands should be washed or hand antisepsis performed after direct contact with residents/workers with ILI (see Appendix IV for ILI an Assessment Tool) and after contact with their personal articles or their immediate environment.

         ↑AII

   (b) Hygiene Measures to Minimize Influenza Transmission

      i. Staff, residents and visitors should be encouraged to minimize potential influenza transmission through good hygienic measures, i.e., use disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; handwashing/hand antisepsis after coughing, sneezing or using tissues; and the importance of keeping hands away from the mucous membranes of the eyes and nose.

         ↑AIII

   (c) Personal Protective Equipment

      i. Masks

         1. **Masks to minimize the transmission of influenza may be worn** when face-to-face with coughing individuals during the early phases of the pandemic but are not practical or helpful when transmission has entered the community.

            ↑BIII

         2. **Masks should be worn to prevent the transmission of other organisms** when HCWs are face-to-face with undiagnosed coughing patients.

            ↑BIII

3. **Masks and eye protection, or face shields should be worn** to prevent HCW exposure to sprays of blood, body secretions or excretions. Surgical masks are considered adequate for this purpose[9,44,45].

↑BIII

4. HCWs should avoid touching their eyes with their hands to prevent self-contamination with pathogens.
5. Masks should be worn, as outlined in Section 2.6.

ii. Gloves

1. **Gloves are not required for the routine care of residents suspected of having or confirmed to have influenza**. Meticulous handwashing with soap and water or performing hand antisepsis will inactivate the virus.

↑AIII

2 **Gloves should be worn** to provide an additional protective barrier between the HCWs hands and blood, body fluids, secretions, excretions and mucous membranes to reduce the potential transfer of microorganisms from infected residents to HCWs and from resident to resident via HCW hands.

↑AII

3. **Gloves are necessary** for HCWs with open lesions on their hands when providing direct resident care.

↑AII

4. **Gloves should** be used as an additional measure, not as a substitute for hand hygiene[46,47].

↑BII

5. **Gloves** should not be reused or washed[47].

↑AII

iii. Gowns

1. **Gowns are not required for the routine care of residents suspected of having or confirmed to have influenza.**

↑AI

2. **Long sleeved gowns should only be used** to protect uncovered skin and prevent soiling of clothing during procedures and resident care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions[9,45].

↑BIII

3. HCWs should ensure any open skin areas/lesions on forearms or exposed skin is covered with a dry dressing at all times. Intact skin that has been contaminated with blood, body fluids, secretions or excretions should be washed as soon as possible, thoroughly but gently with soap and warm running water.

↑BIII

(d) Cleaning Disinfection Sterilization of Resident Care Equipment

i. Long term care settings should adhere to the recommendations for cleaning, disinfection and sterilization of resident care equipment as outlined in the Health Canada Infection Control Guidelines *Handwashing, Cleaning Disinfection and*

Sterilization in Health Care[3] and *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*[5].

↑**AIII**

(e) Environmental Control (Housekeeping, Laundry, Waste)

i. Long term care settings should adhere to recommendations for housekeeping, laundry and waste management as outlined in the Health Canada Infection Control Guidelines *Handwashing, Cleaning Disinfection and Sterilization in Health Care*[3] and *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*[5].

↑**AIII**

ii. Equipment and surfaces contaminated with secretions from residents suspected of having or confirmed to have influenza should be cleaned before use with another patient.

↑**BIII**

iii. Special handling of linen or waste contaminated with secretions from residents suspected of having or confirmed to have influenza is not required.

↑**AII**

D. Transfer to Acute Care

1. Residents with influenza (see Glossary for definition) or Influenza-Like Illness (ILI)(see Glossary for definition and Appendix IV for an ILI Assessment Tool) requiring more acute care should *not* be transferred to acute care settings. Such residents should be cared for in "acute influenza care" areas within the LTC facility as described in the IC/OH Pandemic Influenza Plan.

↑**BIII**

E. Admission/Re-Admission

1. Patients from acute care who have recovered from pandemic influenza or who are immunized against the pandemic influenza strain may be admitted into the LTC facility without restrictions.

↑**AIII**

2. Residents who were transferred to acute care and who have recovered from pandemic influenza or who have been immunized against the pandemic influenza strain may be re-admitted into the LTC facility without restrictions.

↑**AIII**

3. LTC facilities that have already had pandemic influenza through their facility may admit individuals from the community or acute care without restrictions.

↑**AIII**

4. LTC facilities that have remained "influenza free" may admit patients from acute care or the community who have been potentially exposed to influenza. However, such residents must be managed using influenza precautions (maintain one metre of spatial separation, mask if within one metre of the resident and emphasize hand hygiene) for 3 days until past the incubation period if no influenza symptoms occur and until 7 days after the onset of symptoms if influenza develops.

↑**AIII**

F. *Cohorting*

1. Cohorting resident groups (i.e., confirmed/suspected influenza, exposed/not exposed to influenza) is not a feasible measure to control pandemic influenza in a LTC facility. When influenza has been identified in one area of the LTC facility (via residents, staff or visitors) it can be assumed that the facility has been exposed and the following measures should occur:

   (a) Cancel or postpone inside and outside facility procedures, appointments and activities until influenza activity has stopped.

   (b) Encourage coughing residents to remain in their own rooms to prevent the spread of influenza in common areas.

↑AIII

G. *Visitor Restrictions*

1. There are no restrictions for asymptomatic visitors who have recovered from pandemic influenza or have received immunization against the pandemic strain of influenza.

↑AIII

2. If the LTC facility has remained "influenza free", visitors with ILI (see Glossary for definition and Appendix IV for an ILI Assessment Tool) should not visit until they have recovered. Visitors for terminally ill residents may be exempt, but should put a mask on upon entering the facility and restrict their visit to that resident only.

↑AIII

3. Visitors should be informed when the LTC facility has experienced influenza activity. Those visitors who have not yet had the pandemic strain of influenza and are not immunized against the pandemic strain, should be discouraged from visiting. Visitors for terminally ill residents can be exempt, but should restrict their visit to that resident only and wash their hands on exit from the resident's room. Wearing a mask upon entering the facility is only useful if there is no influenza in the community.

↑AIII

3.0 Management of Pandemic Influenza in Ambulatory Care Settings

A comprehensive infection prevention and control program forms the basis for a successful pandemic plan. Adherence to infection prevention and control policies and procedures is imperative to minimize the transmission of influenza and other infectious diseases in the ambulatory care setting with or without availability of immunization or chemoprophylaxis.

Recommendations

3.1 Prevention of Pandemic Influenza

A. Immunization and Antivirals

Adherence to the recommendations for vaccine and antivirals for patients and HCWs, as outlined in Annexes D and E of the Canadian Pandemic Influenza Plan is required.

3.2 Control of Pandemic Influenza

A. Administration

1. When Pandemic Phase 2 is declared (see appendix II), non-urgent and routine ambulatory care visits should be cancelled.

↑BIII

2. Consider creating a dedicated "hot line" to provide consistent pandemic influenza information explaining symptoms of Influenza-like-illness (ILI) (see Glossary for definition and Appendix IV for an ILI Assessment Tool), the purpose of Triage Settings (see Annex G of the Canadian Pandemic Influenza Plan) and Self-care guidelines (See 7.2 and Annex G of the Canadian Pandemic Influenza Plan).

↑AIII

3. When Pandemic Phase 2 is declared (see Appendix II), open Triage Settings in Ambulatory Care, as described in the Preparedness Section of the Canadian Pandemic Influenza Plan).

↑AIII

4. Patients attending ambulatory settings for concerns related to ILI should be assessed according to an ILI Assessment Tool, (see Appendix IV).

↑AIII

B. *Physical Setting*

1. If possible, separate well patients from those with ILI by considering the following strategies: (a) minimizing time spent in waiting rooms; (b) providing separate entrance/waiting areas for patients with ILI; (c) placing patients with ILI directly into a single room; or, (d) separating patients as quickly as possible by placing ILI patients in an area of the waiting room separated from non ILI patients by at least 1 metre.

↑AIII

2. Remove magazines and toys from the waiting rooms.

↑AIII

3. Clean equipment and environmental surfaces, potentially contaminated by coughing patients, as frequently as possible, preferably after each patient.

↑AII

C. *Management of Staff*

1. Provide education as outlined in Section 4.1.
2. Adhere to Occupational Health Management of staff as outlined in Section 3.5.

D. *Infection Control Practices*

1. Ambulatory care settings should adhere to published infection control guidelines[52-58] to prevent infections, including Health Canada Infection Control Guidelines *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*[5].
2. Additional Precautions

   Although droplet and contact precautions are recommended in preventing the transmission of influenza during an interpandemic period, these precautions will not be achievable during a pandemic. In contrast, adherence to routine practices is achievable during a pandemic.

   Routine Practices are summarized below:

   (a) Hand Hygiene

      i. Staff, patients and those attending to a patient should recognize that **strict adherence to hand washing/ hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic.** Hand hygiene procedures should be reinforced according to Appendix III.

      ↑AII

      ii. Hands should be washed or hand antisepsis performed after direct contact with ILI patients, after contact with their personal articles or their immediate environment.

      ↑AII

   (b) Hygiene Measures to Minimize Influenza Transmission

      i. Ambulatory care workers and their patients should be encouraged to minimize potential influenza transmission through good hygienic measures, i.e., use disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; hand washing/hand antisepsis after coughing, sneezing

or using tissues; and the importance of keeping hands away from the mucous membranes of the eyes and nose.

↑**AIII**

(d) Personal Protective Equipment

i. Masks, Eye Protection and Face Shields

1. **Masks to minimize the transmission of influenza may be worn** when face-to-face with coughing individuals in the early phase(s) of the pandemic but are not practical or helpful when influenza transmission has entered the community.

↑**BIII**

2. **Masks should be worn to prevent the transmission of other organisms** when HCWs are face-to-face with undiagnosed coughing patients.

↑**BIII**

3. **Masks and eye protection, or face shields should be worn** to prevent HCW exposure to sprays of blood, body secretions or excretions. Surgical masks are considered adequate for this purpose[9,44,45].

↑**BIII**

4. HCWs should avoid touching their eyes with their hands to prevent self-contamination with pathogens.

5. Masks should be worn, as outlined in Section 2.6

ii. Gloves

1. **Gloves are not required for the routine care of patients suspected of having or confirmed to have influenza**. Meticulous hand washing with soap and water or performing hand antisepsis will inactivate the virus.

↑**AIII**

2. **Gloves should be worn** to provide an additional protective barrier between the HCWs hands and blood, body fluids, secretions, excretions and mucous membranes to reduce the potential transfer of microorganisms from infected patients to HCWs and from patient to patient via HCWs' hands.

↑**AII**

3. **Gloves are necessary** for HCWs with open lesions on their hands when providing direct patient care.

↑**AII**

4. **Gloves should be** used as an additional measure, not as a substitute for hand hygiene[46,47].

↑**BII**

5. **Gloves** should not be reused or washed[47].

↑**AII**

iii. Gowns

1. **Gowns are not required for the routine care of patients with suspected of having or confirmed to have influenza.**

↑AI

2. **Long sleeved gowns should only be used** to protect uncovered skin and prevent soiling of clothing during procedures and resident care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions[9,45].

↑BIII

3. HCWs should ensure any open skin areas/lesions on forearms or exposed skin is covered with a dry dressing at all times. Intact skin that has been contaminated with blood, body fluids, secretions or excretions should be washed as soon as possible, thoroughly, but gently with soap and warm running water.

↑BII

E. Patient Activity/Transport

Patients with ILI should not leave the ambulatory care area, except for essential procedures.

↑AIII

4.0 Management of Pandemic Influenza in Home Care Settings
(Care Provided by Regulated and Unregulated HCWs)

A comprehensive infection prevention and control program forms the basis for a successful pandemic influenza plan. Adherence to infection prevention and control policies and procedures is imperative to minimize the transmission of influenza and other infectious diseases in the home care setting with or without availability of immunization or chemoprophylaxis.

Recommendations

4.1 Prevention of Pandemic Influenza

A. Immunization and Antivirals

1. Adherence to the recommendations for vaccine and antivirals for patients and HCWs, as outlined in Annexes D and E of the Canadian Pandemic Influenza Plan, is necessary.

4.2 Control of Pandemic Influenza

A. Physical Setting

1. When Pandemic phase 2 (see Appendix II) is declared, cancel home care visits that are not absolutely necessary.

↑BIII

B. *Management of Staff*

1. Provide education, as outlined in Section 4.1.
2. Adhere to Occupational Health Management of staff as outlined in Section 3.5.

C. *Infection Control Practices*

1. Home care settings should adhere to published infection control guidelines[59-62] including Health Canada Infection Control Guidelines *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*[5].
2. Additional Precautions

   Although droplet and contact precautions are recommended in preventing the transmission of influenza during an interpandemic period, these precautions will not be achievable during a pandemic. In contrast, adherence to routine practices is achievable during a pandemic.

   Routine Practices are summarized below:

   (a) Hand Hygiene

   i. HCWs, clients and household members should **recognize that strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic.** Hand hygiene procedures should be reinforced according to Appendix III.

   ↑AII

   ii. Hands should be washed or hand antisepsis performed following direct contact with a client with ILI, articles contaminated by the client and the client's immediate environment.

   ↑AII

   iii. If running water is not available or when hand-washing facilities are inaccessible, use the following steps for effective hand antisepsis:

   Apply an alcohol-based hand hygiene product to dry hands (moisture dilutes the alcohol) and rub vigorously for the period of time specified by the manufacturer, or until dry.

   If there is heavy microbial soiling, first wipe hands with a towelette to remove visible soiling.

   ↑AI

   (b) Hygiene Measures to Minimize Influenza Transmission

   Home care workers and their clients should be encouraged to minimize potential influenza transmission through good hygienic measures, i.e., use disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; handwashing/hand antisepsis after coughing, sneezing or using tissues; and the importance of keeping hands away from the mucous membranes of the eyes and nose.

   ↑AIII

(c) Personal Protective Equipment

i. Masks, Eye Protection and Face Shields

1. **Masks to minimize the transmission of influenza may be worn** when face-to-face with coughing individuals in the early phase(s) of the pandemic but are not practical or helpful when influenza transmission has entered the community.

↑**BIII**

2. **Masks should be worn to prevent the transmission of other organisms** when HCWs are face-to-face with undiagnosed coughing clients.

↑**BIII**

3. **Masks and eye protection, or face shields should be worn** to prevent HCW exposure to sprays of blood, body secretions or excretions. Surgical masks are considered adequate for this purpose[9,44,45].

↑**BIII**

4. HCWs should avoid touching their eyes with their hands to prevent self-contamination with pathogens.

5. Masks should be worn, as outlined in Section 2.6.

ii. Gloves

1. **Gloves are not required for the routine care of clients suspected of having or confirmed to have influenza**. Meticulous handwashing with soap and water or performing hand antisepsis will inactivate the virus.

↑**AIII**

2. **Gloves should be worn** to provide an additional protective barrier between the HCWs hands and blood, body fluids, secretions, excretions and mucous membranes to reduce the potential transfer of microorganisms from infected clients to HCWs.

↑**AII**

3. **Gloves are necessary** for HCWs with open lesions on their hands when providing direct client care.

↑**AII**

4. **Gloves should be used as an additional measure,** not as a substitute for handwashing[46,47].

↑**BII**

5. **Gloves** should not be reused or washed[47].

↑**AII**

iii. Gowns

1. Gowns are not required for the routine care of clients suspected of having or confirmed to have influenza.

↑**AI**

2. **Long sleeved gowns should only be used** to protect uncovered skin and prevent soiling of clothing during procedures and patient care activities likely

to generate splashes or sprays of blood, body fluids, secretions or excretions[9,45].

↑**BIII**

3. HCWs should ensure any open skin areas/lesions on forearms or exposed skin is covered with a dry dressing at all times. Intact skin that has been contaminated with blood, body fluids, secretion or excretions should be washed as soon as possible, thoroughly but gently with soap and warm running water.

↑**BIII**

D. Triage

1. Perform an ILI assessment (see appendix IV for an ILI Assessment Tool and glossary for definition of ILI) of the client and their household contacts by phone (if possible) prior to the appointment or before going into the home. Assess the risk of influenza in the client or household contacts

↑**AIII**

2. Provide clients and family members with information regarding symptoms of ILI and Self Care Guidelines and the purpose of Triage Settings (see Annex G of the Canadian Pandemic Influenza Plan).

↑**AIII**

3. Counsel clients and household contacts to avoid public gatherings to minimize exposure.

E. Visitors

1. Only well (asymptomatic/unexposed) visitors should visit severely immunocompromised patients in the home, e.g., transplant recipients[32], hematology/oncology patients[33-35], patients with chronic heart or lung disease or patients with HIV/AIDS and dialysis patients as these patients are at risk of serious complications if infected with influenza.

↑**AIII**

2. Visitors for the terminally ill can be exempt.

↑**AIII**

5.0 Management of Pandemic Influenza in Community Settings

5.1 Management of Pandemic Influenza in Emergency Responder Settings

A comprehensive infection prevention and control program forms the basis for a successful pandemic influenza plan. Emergency Responders (see Glossary for definition) are to be a priority group to receive influenza vaccination and chemoprophylaxis when, and if, it is available during a pandemic. Adherence to infection prevention and control policies and procedures is imperative to minimize the transmission of influenza and other infectious diseases with or without the availability of immunization or chemoprophylaxis.

Recommendations

A. Pandemic Planning

1. Management should ensure the responsibility for Infection Control (IC) and Occupational Health (OH) in the emergency responder setting is assigned to a specific individual.

   ↑**AIII**

2. Management should develop an interpandemic influenza plan and review it yearly. In addition, an IC/OH Pandemic Influenza Plan should be developed as outlined in Section 3.1 and reviewed every 3 years.

   ↑**AIII**

3. Provide education, as outlined in Section 4.1.

4. Occupational Health management of emergency responder workers should be in keeping with OH Section 3.5.

B. Control of Pandemic Influenza

1. **Immunization/Chemoprophylaxis**

   In the early phases of the pandemic, vaccine and antivirals may not be readily available. Essential workers (including EMS) will be given high priority for immunization when vaccine is available (see Annexes D and E of the Canadian Pandemic Influenza Plan).

2. **Infection Control Practices**

   Emergency Service Workers should adhere to routine infection control practices[5,63,64]. All patients' blood and body secretions should be considered infectious, thus personal protective equipment and barrier techniques should be used accordingly.

   Additional Precautions

   Although droplet and contact precautions are recommended in preventing the transmission of influenza during an interpandemic period, these precautions will not be achievable during a pandemic. In contrast, adherence to routine practices is achievable during a pandemic.

   Routine Practices are summarized below:

   (a) Hand Hygiene

   i. Strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic.

      Hand hygiene procedures should be reinforced according to Appendix III.

      ↑**AII**

   ii. Hands should be washed or hand antisepsis performed after direct contact with individuals with suspected or confirmed influenza and after contact with their personal articles or their immediate environment.

      ↑**AII**

   iii. Waterless antiseptic hand rinses are superior to soap and water for reducing hand contamination[65-68] and should be made available as an alternative to hand

washing. Antiseptic hand rinses are especially useful when time for hand washing or access to sinks is limited.

↑BIII

iv. When there is visible soiling, hands should be washed with soap and water before using waterless antiseptic hand rinses. If soap and water are unavailable, cleanse hands first with detergent-containing towelettes.

↑BIII

v. Wearing gloves does not eliminate the need for proper hand hygiene after care is rendered. As soon as feasible, hands must be washed after the removal of gloves.

↑AI

(b) Hygiene Measures to Minimize Influenza Transmission

i. Emergency Responders should be encouraged to minimize potential influenza transmission through good hygienic measures, i.e., use disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; handwashing/hand antisepsis after coughing, sneezing or using tissues; and the importance of keeping hands away from the mucous membranes of the eyes and nose.

↑AIII

(c) Personal Protective Equipment

i. Masks

1. **Masks may be worn to minimize the transmission of influenza** when face-to-face with coughing individuals in the early phase(s) of the pandemic but are not practical or helpful when influenza transmission has entered the community.

↑BIII

2. Masks should be worn to prevent the transmission of other organisms when HCWs are face-to-face with undiagnosed coughing patients.

↑BIII

3. **Masks and eye protection, or face shields should be worn** to prevent HCW exposure to sprays of blood, body secretions or excretions. Surgical masks are considered adequate for this purpose[9,44,45].

↑BIII

4. HCWs should avoid touching their eyes with their hands to prevent self-contamination with pathogens.

5. Masks should be worn, as outlined in Section 2.6.

ii. Gloves

1. **Gloves are not required for the routine care of patients suspected or confirmed to have influenza**. Meticulous handwashing with soap and water or performing hand antisepsis will inactivate the virus.

↑AIII

2. **Gloves should be worn** to provide an additional protective barrier between the HCWs hands and blood, body fluids, secretions, excretions and mucous

membranes to reduce the potential transfer of microorganisms from infected clients to HCWs.

↑**AII**

3. **Gloves are necessary** for HCWs with open lesions on their hands when providing direct patient care.

↑**AII**

4. **Gloves should be used as an additional measure,** not as a substitute for hand hygiene[46,47].

↑**AII**

5. **Gloves** should not be reused or washed[47].

↑**AII**

iii. Gowns

1. Gowns are not required for the routine care of patients with ILI.

↑**AI**

2. **Long sleeved gowns should only be used** to protect uncovered skin and prevent soiling of clothing during procedures and patient care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions[9,45].

↑**BIII**

3. HCWs should ensure any open skin areas/lesions on forearms or exposed skin is covered with a dry dressing at all times. Intact skin that has been contaminated with blood, body fluids, secretion or excretions should be washed as soon as possible, thoroughly, but gently, with soap and warm running water.

↑**BIII**

(d) Patient Triage

Whenever feasible, personnel responsible for answering emergency calls related to influenza-like-illness (ILI) should triage patients according to an ILI Assessment Tool (see Appendix IV).

↑**AIII**

(e) Environmental Control (Housekeeping, Laundry, Waste)

i. Emergency Responders should adhere to the recommendations for housekeeping, laundry and waste management, as outlined in the Health Canada Infection Control Guidelines *Handwashing, Cleaning Disinfection and Sterilization in Health Care*[3] and *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*[5].

↑**AIII**

ii. Equipment and surfaces contaminated with secretions from patients suspected or confirmed to have influenza should be cleaned before use with another patient.

↑**BIII**

iii. Special handling of linen or waste contaminated with secretions from patients suspected of having or confirmed to have influenza is not required.

↑**AII**

(f) Patient Care Equipment (Cleaning Disinfection Sterilization)

i. Emergency Responders should adhere to the recommendations for cleaning, disinfection and sterilization of patient care equipment, as outlined in the Health Canada Infection Control Guidelines *Handwashing, Cleaning Disinfection and Sterilization in Health Care*[3] and *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*[5].

↑**AIII**

5.2 Management of Pandemic Influenza in Mortuary Care Settings

The risk of influenza transmission to Funeral Service Workers will be through their contact with families and friends of the deceased, not the deceased. There is no additional risk of transmission of influenza to funeral home workers related to handling of bodies of persons suspected of having or confirmed to have died from influenza. Deceased bodies (confirmed of having or suspected to have influenza during interpandemic or pandemic years) require routine handling only. Infection control recommendations for Funeral Services Profession have been published[9,69].

A comprehensive infection prevention and control program forms the basis for a successful pandemic influenza plan. Adherence to infection prevention and control policies and procedures is imperative to minimize the transmission of influenza and other infectious diseases with or without the availability of immunization or chemoprophylaxis.

Recommendations

A. Planning for Pandemic Influenza

1. Management should ensure the responsibility for Infection Control (IC) and Occupational Health (OH) in a funeral home setting is assigned to a specific individual; preferably an individual who has had professional training.

↑**AIII**

2. Management should develop an interpandemic influenza plan and review it yearly. In addition, an IC/OH Pandemic Influenza Plan should be developed as outlined in Section 3.1 and reviewed every 3 years.
3. Management should provide education as outlined, in Section 4.1.

B. Control of Pandemic Influenza

Immunization/Chemoprophylaxis

1. In the early phases of the pandemic, vaccine and antivirals may not be readily available. Essential workers (including funeral service workers) will be given high priority for immunization when vaccine is available (see Annexes D and E of the Canadian Pandemic Influenza Plan).

Infection Control Practices

1. Funeral Service Workers should adhere to routine infection control practices[9,69] in the handling of all deceased bodies regardless of the confirmed or suspected cause of death.

All patients' blood and body secretions should be considered infectious, thus personal protective equipment and barrier techniques should be used accordingly.

↑**AIII**

(a) Hand Hygiene

i. Strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic.

Hand hygiene procedures should be reinforced according to Appendix III.

↑**AII**

ii. Hands should be washed or hand antisepsis performed after direct contact with individuals with suspected or confirmed influenza and after contact with their personal articles or their immediate environment.

↑**AII**

(b) Hygiene Measures to Minimize Influenza Transmission

i. Funeral Service Workers should be encouraged to minimize potential influenza transmission through good hygienic measures, i.e., use disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; handwashing/hand antisepsis after coughing, sneezing or using tissues; and the importance of keeping hands away from the mucous membranes of the eyes and nose.

↑**AIII**

(c) Personal Protective Equipment

i. Masks

1. Wearing masks when handling bodies suspected of having or confirmed to have influenza during a pandemic to minimize the transmission of influenza is not required.

↑**BIII**

2. Wearing masks when face-to-face with coughing individuals to minimize influenza transmission during a pandemic will not be practical or helpful when transmission has entered the community.

↑**BIII**

5.3 Management of Pandemic Influenza in Child Care Settings

Infectious diseases occur with increased frequency in child care settings. The incidence is affected by the age and immune status of children, the number of children and group size, the degree of close contact between children and attendants and the hygienic habits of children and attendants. Infections acquired in the child care setting may spread to attendants, family members and the community.

Influenza in child care settings can be significant because viral shedding in the nasal secretions usually continues for about 7 days from the onset of illness and can be more prolonged in young children[23]. Attack rates of influenza in healthy children have been estimated at 10%-40% each year, with approximately 1% resulting in hospitalization.

A comprehensive infection prevention and control program forms the basis for a successful pandemic influenza plan. Adherence to infection prevention and control policies and

procedures is imperative to minimize the transmission of influenza and other infectious diseases in the child care setting with or without availability of immunization or chemoprophylaxis.

Recommendations

Planning for Pandemic Influenza

1. One person in the program must be designated as the individual responsible for the Infection Control (IC)[70] and Occupational Health (OH) program.

↑AIII

2. Management should develop an interpandemic influenza plan and review it annually. In addition, an IC/OH Pandemic Influenza Plan should be developed, as outlined in Section 3.1 and reviewed every 3 years.
3. Education should be provided, as outlined in Section 4.2.

Control of Pandemic Influenza

A. Immunization/Chemoprophylaxis

1. In the early phases of the pandemic, vaccine and antivirals may not be readily available. (See Annexes D and E of the Canadian Pandemic Influenza Plan).

B. Infection Control Practices

1. Child Care Workers should adhere to routine infection control practices[71-77] including procedures for washing toys.
   (a) Hand Hygiene
      1. Workers, children and their families should recognize that strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic. Hand hygiene procedures should be reinforced according to Appendix III.

↑AII

      2. Hands should be washed or hand antisepsis performed after direct contact with individuals with ILI (see glossary for definition and Appendix IV for an ILI Assessment Tool) and after contact with their personal articles or their immediate environment.

↑AII

   (b) Hygiene Measures to Minimize Influenza Transmission
      1. Child care workers, children and their families should be encouraged to minimize potential influenza transmission through good hygienic measures, ie. use disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; handwashing/hand antisepsis after coughing, sneezing or using tissues; and the importance of keeping hands away from the mucous membranes of the eyes and nose.

↑AIII

(c) Masks

1. Wearing masks, when face-to-face with coughing children/individuals, to minimize influenza transmission during a pandemic will not be practical or helpful when transmission has entered the community.

↑**BIII**

(d) Staff/Child Management

Child care settings may be closed depending on the epidemiology of the pandemic strain, e.g., severity of infection, high attack rates and severe complications (see Section 5.).

1. Children:

   a. When pandemic phase 2 has been declared (see Appendix II), do not send children to day care if at all possible until the pandemic phase has ended; the child has recovered from ILI (see Glossary for definition, Appendix IV for an ILI Assessment Tool) or the pandemic has gone through the child care centre.

   b. Do not send children with signs of ILI to day care and notify the day care of the reason for their absence (unless the pandemic has gone through the centre).

   c. Do not send children who have been exposed in the past 3 days to an individual with ILI, (unless the pandemic has gone through the centre), to day care.

↑**AIII**

2. Staff

(a) Inform Public Health authorities of staff absence(s) due to ILI.

Ideally, staff with ILI should not go to work until their symptoms have resolved.

↑**AIII**

5.4 Management of Pandemic Influenza in Schools and Student Residences

Risk of influenza transmission in schools can increase with crowded classrooms, poor ventilation and limited emphasis on hygienic practices. Dormitory living enhances this risk due to increased numbers of those considered to be household contacts.

Recommendations

(a) Planning for Pandemic Influenza

1. Health Services in residence settings should develop an interpandemic influenza plan and review it annually. In addition, an Infection Control (IC) and Occupational Health (OH) Pandemic Influenza Plan should be developed as outlined in Section 3.1 and reviewed every 3 years.

   Education should be provided, as outlined in Section 4.2.

(b) Control of Pandemic Influenza

1. Immunization/Chemoprophylaxis

   In the early phases of the pandemic, vaccine and antivirals may not be readily available. (See Annexes D and E of the Canadian Pandemic Influenza Plan).

2. Infection Control Practices

   a. Hygiene Measures to Minimize Influenza Transmission

      i. Staff, students and their household members should recognize that strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic.

         Hand hygiene procedures should be reinforced according to Appendix III.

         ↑AII

      ii. Hands should be washed or hand antisepsis performed after direct contact with individuals with ILI (see Glossary for definition, see Appendix IV for an ILI Assessment Tool) and after contact with their personal articles or their immediate environment.

         ↑AII

      iii. Staff, students and their household members should be encouraged to minimize potential influenza transmission through good hygienic measures, i.e., use disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; handwashing/hand antisepsis after coughing, sneezing or using tissues; and the importance of keeping hands away from the mucous membranes of the eyes and nose.

         ↑AI

   b. Masks

      i. Wearing masks when face-to-face with coughing individuals to minimize influenza transmission during a pandemic will not be practical or helpful when transmission has entered the community.

         ↑BIII

   c. Staff/Student Management

      i. Schools may be closed depending upon the epidemiology of the pandemic strain, e.g., severity of infection, high attack rates and severe complications (See Section 5.0).

         ↑AIII

      ii. When pandemic phase 2 is declared (see Appendix II) consider the following:

      Students

      i. When pandemic phase 2 has been declared do not send students to school if at all possible until the pandemic phase has ended; the student has recovered from ILI (see Glossary for definition and Appendix IV for an ILI Assessment Tool) or, the pandemic has gone through the school.

ii. Do not send students who have been exposed in the past 3 days to an individual with ILI to school unless the pandemic has already been through the school/residence.

iii. Do not send children with signs of ILI to school (unless the pandemic has gone through the school) and notify the school of the reason for their absence.

iv. Well students should avoid contact with students who have ILI (e.g., not visit in rooms of symptomatic students).

↑**AIII**

Staff

i. Inform Public Health authorities of absence(s) due to ILI.

ii. Ideally, staff with ILI should not go to work until their symptoms have resolved.

↑**AIII**

Resident Health Services

i. Assess symptomatic students according to an ILI Assessment Tool, see Appendix IV.

ii. Encourage students with ILI who are well enough to remain in residence to remain in their room while symptomatic (e.g., not congregate in common areas).

↑**AIII**

5.5 Management of Pandemic Influenza in Workplaces

Planning for Pandemic Influenza

1. Provide education, as outlined in section 4.2 of Part A.

Control of Pandemic Influenza

A. Immunization/Chemoprophylaxis

1. Immunization will not be available to the general public in the early phases of the pandemic. See Annex D of the Canadian Pandemic Influenza Plan.

B. Hygiene Measures to Minimize Influenza Transmission

1. Workers and their household contacts should recognize that strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic.

   Hand hygiene procedures should be reinforced according to Appendix III.

   ↑**AII**

2. Hands should be washed or hand antisepsis performed after direct contact with individuals suspected of having or to have confirmed influenza and after contact with their personal articles or their immediate environment.

   ↑**AII**

3. Workers and their household members should be encouraged to minimize potential influenza transmission through good hygienic measures, i.e., using disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; handwashing/hand antisepsis after coughing, sneezing or using tissues; and understanding the importance of keeping hands away from the mucous membranes of the eyes and nose.

↑AIII

Masks

1. When face-to-face with coughing individuals, wearing masks to minimize influenza transmission during a pandemic will not be practical or helpful when transmission has entered the community.

↑BIII

Education

1. Provide education, as outlined in Section 4.2 of Part A.

5.6 Management of Pandemic Influenza in Shelters

The risk of influenza transmission in a shelter setting during a pandemic will be high because of the crowded physical conditions, inadequate health and hygiene of clients and the reduced priority for immunization or chemoprophylaxis in this population.

A comprehensive infection prevention and control program forms the basis for a successful pandemic influenza plan. The promotion of hand washing and hygienic practices is imperative to minimize the transmission of influenza and other infectious diseases in the shelter with or without availability of immunization or chemoprophylaxis during a pandemic. Guidelines for Infection Control in shelters have been published[78-81].

Recommendations

Planning for Pandemic Influenza

1. Designate one person responsible for the infection control program[78,80] and liaise with local public health. The program should prevent or minimize the occurrence and transmission of communicable diseases such as influenza[79,81].

↑AIII

2. An interpandemic influenza plan should be developed and reviewed annually. In addition, an Infection Control and Occupational Health Pandemic Influenza Plan should be developed as outlined in Section 3.1 and reviewed every 3 years.
3. Shelters that are in the process of being planned should pay special attention to the number and placement of hand washing sinks and methods to reduce overcrowding[80,81].

↑AIII

4. Provide education, as outlined in Section 4.2.

Control of Pandemic Influenza

A. Immunization/Chemoprophylaxis

1. Immunization may not be readily available to this setting in the early phases of the pandemic (See Annexes D and E of the Canadian Pandemic Influenza Plan).

B. Infection Control Practices

Hygiene Measures to Minimize Influenza Transmission

1. Workers and clients should recognize that strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic.

   When planning for a pandemic, operators should ensure that adequate supplies of hand hygiene products is a high priority as there may be an interruption to the supply or shortages of soap and hand towels.

   Hand hygiene procedures should be reinforced according to Appendix III.

   ↑AII

2. Hands should be washed or hand antisepsis performed after direct contact with individuals with ILI (see Glossary for definition, see Appendix IV for an ILI Assessment Tool) and after contact with their personal articles or their immediate environment.

   ↑AII

3. Workers and clients should be encouraged to minimize potential influenza transmission through good hygienic measures, i.e., use disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; handwashing/hand antisepsis after coughing, sneezing or using tissues; and the importance of keeping hands away from the mucous membranes of the eyes and nose.

   ↑AII

Masks

1. When face-to-face with coughing individuals, wearing masks to minimize influenza transmission during a pandemic will not be practical or helpful when transmission has entered the community (also see Section 2.6).

   ↑BIII

Triage

1. Clients and workers with influenza-like illness should be assessed using an ILI Assessment Tool, (see Appendix IV).

   ↑AIII

5.7 Management of Pandemic Influenza in Correctional Facilities

A comprehensive infection prevention and control program forms the basis for a successful pandemic influenza plan. Adherence to infection prevention and control policies and procedures is imperative to minimize the transmission of influenza and other infectious diseases with or without the availability of immunization or chemoprophylaxis.

Planning for Pandemic Influenza

1. Designate one person responsible for the infection control program and liaise with local public health authorities. The program should prevent or minimize occurrence and transmission of communicable diseases such as influenza.

   ↑**AIII**

2. Develop an interpandemic influenza plan and review it annually. In addition, an Infection Control and Occupational Health Pandemic Influenza Plan should be developed, as outlined in Section 3.1 and reviewed every 3 years.

   ↑**AIII**

3. See Section 3.5 for Occupational Health management of correctional workers.

   ↑**AIII**

4. When Pandemic Phase 2 is declared (see Appendix II), provide additional education to health care workers and inmates, as outlined in Section 4.0.

   ↑**AIII**

Control of Pandemic Influenza

A. Immunization/Chemoprophylaxis

1. In the early phases of the pandemic, vaccine and antivirals may not be readily available. Essential service workers (including correctional officers) will be given high priority for immunization when vaccine is available. See Annexes D and E of the Canadian Pandemic Influenza Plan.

B. Infection Control Practices

1. Adhere to published infection control recommendations for correctional settings.

   ↑**AIII**

Hygiene Measures to Minimize Influenza Transmission

1. Workers and inmates should recognize that strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic.

   When planning for a pandemic, administrators should make ensuring adequate supplies of hand hygiene products a priority as there may be an interruption to the supply or shortages of soap and hand towels. Hand hygiene procedures should be reinforced according to Appendix III.

   ↑**AII**

2. Hands should be washed or hand antisepsis performed after direct contact with individuals with suspected or confirmed influenza and after contact with their personal articles or their immediate environment.

   ↑**AII**

3. Workers and inmates should be encouraged to minimize potential influenza transmission through good hygienic measures, i.e., use disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; hand washing/hand antisepsis after coughing, sneezing or using tissues; and the importance of keeping hands away from the mucous membranes of the eyes and nose.

   ↑**AIII**

Masks

1. Wearing masks when face-to-face with coughing individuals to minimize influenza transmission during a pandemic will not be practical or helpful when transmission has entered the community (also see Section 2.6).

↑BIII

Triage/Cohorting

1. Provide a separate triage area to assess inmates and workers with ILI (see Glossary) according to an ILI Assessment Tool, (see Appendix IV).

↑BIII

2. Place inmates with ILI in cohort units/areas whenever possible. Good hygiene should be emphasized.

↑BIII

Visitors

1. Visitors with febrile respiratory illness should be discouraged from visiting if there is no pandemic activity in the facility.

↑AIII

2. Visitors should be made aware of pandemic activity in the facility and discouraged from visiting unless they have recovered from ILI or been immunized against the pandemic strain of influenza.

↑AIII

1.0 Infection Control and Occupational Health in Triage Settings

Upon declaration of WHO pandemic phase 2 (see Appendix II), triage settings will be established in locations as predetermined in the Canadian Pandemic Influenza Plan. The purpose of triage settings is to facilitate efficient and consistent assessment for those with influenza-like illness (ILI) (see Glossary for definition and see Appendix IV for an ILI Assessment Tool).

It is important to note that the influenza virus can survive on hands for 5 minutes following the transfer from environmental surfaces[14].**The importance of hand washing/hand antisepsis during a pandemic cannot be overemphasized. See Appendix III.** Hand washing/hand antisepsis is the single most important method to prevent the transmission of infection including influenza and will be even more important because of the unavailability of influenza vaccine and antiviral prophylaxis early, during or even late in the pandemic.

There is evidence that overcrowding has contributed to the transmission of respiratory-transmitted infections[82]. Crowding and breathing recycled air was identified as risk factors for influenza transmission in a grounded airplane[18] and in a long term care facility[83].

Recommendations

1.1 Prevention of Pandemic Influenza

A. Immunization and Antivirals

Adherence to the recommendations for vaccine and antivirals for patients and HCWs, as outlined in Annexes D and E of the Canadian Pandemic Influenza Plan, is required.

1.2. Control of Pandemic Influenza

A. Physical Setting

1. When Pandemic Phase 2 is declared (see Appendix II), open triage settings in hospitals and community locations as predetermined in the Preparedness Section of the Canadian Pandemic Influenza Plan.

↑**AIII**

2. When planning for the location of a triage setting, emphasize the need for spatial separation between patients, those accompanying them and care givers/triage workers.

↑**AII**

   a. Ideally, triage settings should only be placed in an area that has a well maintained ventilation system.

↑**AII**

   b. Prevent crowding in triage settings by ensuring ample room is available in waiting and assessment areas in order to maintain spatial separation of at least 1 metre.

↑**AII**

   c. Consider the need for a separate area for temporary storage of deceased bodies.

↑**AIII**

B. Management of Staff

1. Adhere to Occupational Health Management, as outlined in Section 3.5.
2. Provide education, according to Section 4.1 of Part A.

C. Infection Control Practices

1. Hygiene Measures to Minimize Influenza Transmission

   a. Patients, staff and visitors should minimize potential influenza transmission through good hygienic measures, i.e., use disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; handwashing/hand antisepsis after coughing, sneezing or using tissues; and the importance of keeping hands away from the mucous membranes of the eyes and nose.

↑**AIII**

   b. To prevent nosocomial infections, triage settings should adhere to published guidelines[6,9,84]. Infection Control Practices adapted from Health Canada Infection Control Guidelines *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*[5] and *Hand Washing, Cleaning, Disinfection and Sterilization in Health Care*[3] are summarized below:

2. Hand Hygiene

   a. Staff, patients and visitors should recognize that strict adherence to hand hygiene recommendations is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic.

      Hand hygiene procedures should be reinforced according to Appendix III.

↑**AII**

   b. Hands should be washed or hand antisepsis performed after direct contact with ILI patients and after contact with their personal articles or their immediate environment.

↑**AII**

   c. Ideally, hand washing facilities should be conveniently located throughout the triage setting. Sinks for hand washing should be used only for hand washing and not for any other purpose, e.g., as a utility sink. There should be access to adequate

supplies and soap and towel dispensers in good working order, or liberal use of waterless hand antiseptic agents[85-87].

↑**BII**

d. Plain soap may be used for routine hand washing[88,89].

↑**BII**

e. Hand antisepsis with an antiseptic soap or antiseptic hand rinse is indicated[88,90] before performing invasive procedures such as starting an intravenous (maximal barrier technique in addition to hand antisepsis is required for insertion of central lines).

↑**BIII**

f. When access to sinks is limited, antiseptic hand rinses should be used. Waterless antiseptic hand rinses are superior to soap and water in reducing hand contamination[66-68,91] and should be made available.

↑**AIII**

g. When there is visible soiling, hands should be washed with soap and water before using waterless antiseptic hand rinses. If soap and water are unavailable, cleanse hands first with detergent-containing towelettes[92].

↑**BIII**

h. Health Care Workers can reduce the frequency of hand washing required by minimizing unnecessary direct contact with patients and their immediate environments.

↑**BIII**

i. Hands must be washed[93,94]:

   i. between patients,

   ii. after contact with blood, body fluids, secretions (e.g., respiratory secretions),

   iii. after contact with items known or considered likely to be contaminated with blood, body fluids, secretions (e.g., respiratory secretions), or excretions,

   iv. immediately after removing gloves[46],

   v. between certain procedures on the same patient in which soiling of hands is likely, to avoid cross-contamination of body sites[91,95],

   vi. when hands are visibly soiled.

↑**AII**

j. Hand lotion may be used to prevent skin damage from frequent hand washing[96]. Lotion should be supplied in disposable bags in wall containers by sinks or in small, non-refillable containers to avoid product contamination. Inappropriate handling and management of skin lotions for patient's and care giver's use have been reported as sources of outbreaks[97-101].

↑**BII**

k. Liquid hand wash products should be stored in closed containers and dispensed from either disposable containers or containers that are washed and dried thoroughly before refilling.

↑**AII**

3. Personal Protective Equipment

a. Masks, Eye Protection and Face Shields

i. Masks and eye protection, or face shields should to prevent the transmission of influenza should be worn by triage personnel when face-to-face with individuals for ILI assessment.

↑**BIII**

ii. Masks and eye protection, or face shields should be worn by triage personnel to prevent exposure to sprays of blood, body secretions or excretions. Surgical masks are considered adequate for this purpose[9,44,45].

↑**BIII**

iii. HCWs should avoid touching their eyes with their hands to prevent self-contamination with pathogens.

iv. Masks should be worn by triage personnel to prevent the transmission of other organisms when HCWs are face-to-face with undiagnosed coughing patients.

↑**BIII**

v. Wear masks, as outlined in Section 2.6

b. Gloves

i. Gloves are not required for the routine care of patients suspected of having confirmed to have influenza. Meticulous hand washing with soap and water or performing hand antisepsis will inactivate the virus.

↑**AIII**

ii. Appropriate use of clean, non-sterile gloves includes[9,44,102-105]:

a. for contact with blood, body fluids, secretions (e.g., respiratory secretions) and excretions, mucous membranes, draining wounds or non-intact skin (open skin lesions or exudative rash);

b. when handling items visibly soiled with blood, body fluids, secretions (e.g., respiratory secretions) and excretions;

c. when the health care worker has open skin lesions on the hands.

↑**AII**

iii. Gloves should be used as an additional measure, not as a substitute for hand washing[46,47].

↑**BII**

iv. When indicated, gloves should be put on directly before contact with the patient or before the procedure requiring gloves[95,106,107].

↑**AII**

v. Potentially contaminated gloves should be removed and disposed of immediately after completion of care, procedure or specific task, at the point of use prior to touching clean environmental surfaces (e.g., blood glucose or temperature machines, blood pressure cuffs)[46,95,106-108].

↑**AII**

vi. Hands should be washed immediately after removing gloves[46,47].

↑**AII**

vii. Single-use disposable gloves should not be reused or washed[46].

↑AII

c. Gowns

i. Gowns are not required for the routine care of patients with suspected of having or confirmed to have influenza.

↑AI

ii. Long sleeved gowns should only be used to protect uncovered skin and prevent soiling of clothing during procedures and patient care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions[9,45].

↑BIII

iii. HCWs should ensure any open skin areas/lesions on forearms or exposed skin is covered with a dry dressing at all times. Intact skin that has been contaminated with blood, body fluids, secretions or excretions should be washed as soon as possible, thoroughly but gently with soap and warm running water.

↑BIII

4. Environmental Control
(Patient Care Equipment, Housekeeping, Laundry and Waste)

The influenza virus survives well in the environment and patients may contaminate their environment with respiratory secretions. On hard porous surfaces the virus can survive for 24-48 hours, can then be transferred to hands and survive for up to 5 minutes[14].

Equipment and surfaces (i.e., desks, arm rests, etc.) contaminated with secretions from patients suspected of having or confirmed to have influenza should be cleaned before use with another patient.

Recommendations

a. Process

i. "Parent" organizations must provide a specially trained, knowledgeable person to be responsible for the reprocessing patient care equipment, housekeeping, laundry and waste services. Where there is no "parent" organization to plan or operate the triage settings, it is expected another organization would assume this role.

↑AIII

ii. Reprocessing (i.e., disinfection or sterilization) equipment is not recommended in the Triage Setting but if considered, the "parent" organization must provide a specially trained, knowledgeable person to be responsible for the processes. If soiled equipment is to be transported for disinfection or sterilization, the parent organization must develop processes for the separation of soiled and clean/sterile equipment and the safe handling/transport of contaminated equipment.

↑AIII

iii. Procedures should be established for assigning responsibility and accountability for the routine cleaning of all patient care equipment[109-112] and housekeeping services.

↑BIII

iv. Reuse of single use items is strongly discouraged.

↑AII

b. Patient Care Equipment (Cleaning, Disinfection and Storage)

i. Equipment that touches the patient's intact skin should be clean. Equipment that is shared should be cleaned between patients. A hospital grade germicide should be used for routine cleaning. Pleases refer to Appendix V, Table A Cleaning Procedures for Common Items.

↑BIII

ii. Equipment that is visibly soiled should be cleaned promptly.

↑BIII

iii. Soiled equipment should be handled in a manner that prevents exposure of the skin and mucous membranes and contamination of clothing and the environment.

↑BIII

iv. Reuseable equipment touching mucous membranes, e.g., respiratory therapy equipment or equipment contacting non-intact skin, should be discarded or it should be treated appropriately using high level disinfectant between patients[3,113-116].

↑AIII

v. Reuseable equipment must be thoroughly cleaned (washed with hot soapy water, using an enzymatic cleaner), rinsed and dried before disinfection or sterilization[117] and dried before storage.

↑AII

vi. Manufacturers' written recommendations for use of chemical disinfectant should be strictly followed.

vii. Only disinfectants with a DIN (disinfectants approved for use in Canada) should be used.

viii. Sterile items must remain sterile until they are used[118-120].

↑AII

ix. Sterile and clean supplies should be stored in a clean dry area.

↑AII

c. Housekeeping

i. Surfaces that are frequently touched by the hands (i.e., contaminated) of health care providers and patients/residents/clients, such as the surfaces of medical equipment and knobs for adjustment or opening, should be cleaned at least twice daily and when known to be contaminated, i.e., after use[121-123].

↑BIII

ii. Careful vigorous cleaning of environmental surfaces is effective in removing many contaminants from surfaces.

↑AII

iii. A barrier (sheet or paper) should be placed on the examining or procedure table and changed between patients. Alternatively, the table should be cleaned between patients.

↑BIII

d. Laundry (linen)

i. When reusable linen is used, it should be changed between patients. Special handling of linen contaminated with secretions from patients suspected of having or confirmed to have influenza is not required.

↑**AII**

e. Waste

i. Special handling of waste contaminated with secretions from patients with suspected or confirmed influenza is not required.

↑**AII**

ii. Used needles and other sharp instruments should be handled with care to avoid injuries during disposal or reprocessing. Used sharp items should be disposed of in designated puncture-resistant containers located in the area where the items were used[9,124,125].

↑**AIII**

5. Care of the Deceased

Attention to routine infection prevention and control practices is sufficient for handling bodies of individuals who have died from influenza. There is no additional risk of transmission of influenza infection.

Recommendations

i. Adherence to routine infection control practices for hand washing/hand hygiene, mask/eye protection/face shields, glove and gown use, as outlined above for handling a deceased body, is highly recommended.

↑**AIII**

ii. The body of the deceased should be placed in a body bag or wrapped in a sheet when a body bag is unavailable and, preferably, kept in a cool, dry location until picked up by funeral services.

↑**AIII**

2.0 Infection Prevention and Control in Self Care Settings
(Care provided by Self, Family or Friends/Volunteers)

Providing care to an individual with influenza like-illness (ILI) who are well enough to be cared for at home will be common during an influenza pandemic. Care may be provided by family members, neighbors, volunteers or individuals themselves. Therefore, adapting Routine Practices to the home setting to prevent transmission of other infections (including blood borne pathogens) to those providing care is necessary.

It is important to note that the influenza virus can survive on hands for 5 minutes following the transfer from environmental surfaces[14]. **The importance of hand washing/hand antisepsis during a pandemic cannot be overemphasized. See Appendix III.** Hand washing/hand antisepsis the single most important method to prevent the transmission of infection including influenza and will be even more important because of the unavailability of influenza vaccine and antiviral prophylaxis early, during or even late in the pandemic.

Recommendations

2.1 Prevention of Pandemic Influenza

A. Immunization and Antivirals

Adherence to recommendations for vaccine and antivirals for patients and individuals providing self care as outlined in Annexes D and E of the Canadian Pandemic Influenza Plan.

2.2 Control of Pandemic Influenza

A. Physical Setting

1. When Pandemic Phase 2 is declared (see Appendix II), Triage Settings will be opened as indicated in the Preparedness Section of the Canadian Pandemic Influenza Plan. Patients with influenza-like-illness (ILI) (see an ILI Assessment Tool, Appendix IV) not directed to hospital or temporary influenza settings and will be provided with Self Care guidelines.

   ↑AIII

2. In the home setting, it is recommended that an attempt be made to maintain spatial separation of one metre unless providing direct care. Where feasible, the individuals with ILI (see glossary) should stay in their room.

   ↑BII

3. In a household where well (non-ILI) individuals (e.g., an elderly or immunocompromised person, or an infant) require care, it is important to provide their care prior to caring for individuals with ILI.

   ↑AIII

B. Management of Individuals Involved in Self Care

1. Provide education as outlined in Section 4.2 of Part A .

C. Infection Control Practices

To prevent the transmission of infections, individuals providing care should adhere to the following recommendations adapted from *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*[5] and *Hand Washing, Cleaning, Disinfection and Sterilization in Health Care*[3].

1. Hand Hygiene
    a. Wash hands before, and after, the care of the individual who has ILI. See Appendix III.

    ↑AII

    b. Plain soap may be used for hand washing[88,89]. Soaps containing antiseptics are not required.

    ↑BII

    c. Bar soap should be stored in such a manner as to allow for drying after use. Liquid hand wash products should be stored in clean closed containers and dispensed from either disposable containers or containers that are washed and dried thoroughly before refilling.

    ↑AII

    d. A waterless antiseptic hand rinse for hand hygiene should be used if hand washing facilities (sink and running water) are inaccessible[66-68,91]. If there is visible soiling of the hands, first wipe with detergent containing towelettes, then use the antiseptic hand rinse[92].

    ↑AI

2. Personal Protective Equipment
    a. Masks, Eye Protection and Face Shields
        i. Masks to prevent the transmission of influenza are not helpful when transmission has entered the community.

        ↑BIII

        ii. Wear masks and eye protection, or face shields to protect the mucous membranes of the eyes, nose and mouth during procedures and care activities that are likely to generate splashes or sprays of blood, body fluids, secretions or excretions[9,44,45].

        ↑BIII

        iii. Avoid touching the eyes with the hands to prevent self-contamination with pathogens.

        iv. Wear masks, as outlined in Section 2.6.

    b. Gloves
        i. Gloves are not routinely necessary in the care of an individual with ILI. Hand washing is sufficient.

        ↑AIII

        ii. Gloves are an additional measure to protect hands from soiling with secretions and excretions but are not a substitute for hand washing.

        ↑AIII

iii. Individuals should avoid touching the mucous membranes of their eyes and mouth with their hands; especially when providing care to individuals with ILI.

↑AIII

iv. Dishwashing or utility household gloves may be worn in place of single-disposable medical gloves. They should be used by one individual only and washed and dried between use.

↑AIII

v. Single-use disposable medical gloves should not be reused or washed[47].

↑AII

vi. Single use plastic bags can also be used as gloves to protect hands from gross soiling.

↑AIII

vii. Appropriate use of clean non-sterile gloves includes the following[9,44,102,103,105]:

a. for contact with blood, body fluids, secretions and excretions, mucous membranes, draining wounds or non-intact skin (open lesion or oozing rash),

b. when handling items visibly soiled with blood, body fluids, secretions and excretions,

c. when the care provider has open skin lesions on the hands.

↑AII

viii. Gloves should be removed immediately after completion of the procedure for which they were worn and before touching clean environmental surfaces[95,106,107].

↑AII

viv. Hands should be washed immediately after removing gloves[46,47]. If not gloves are available, plastic bags may be worn as gloves.

↑AI

c. Gowns

i. Over-garments such as aprons, or gowns are not required for the care of an individual with ILI.

↑AI

ii. Over-garments should be used to protect uncovered skin and prevent soiling of clothing during procedures and patient care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions[9,45] (also see laundry instructions below).

↑BIII

iii. Caregivers should ensure any open skin areas/lesions on forearms or exposed skin is covered with a dry dressing at all times. Intact skin that has been contaminated with blood, body fluids, secretions or excretions should be washed as soon as possible, thoroughly, but gently, with soap and warm running water.

↑BIII

3. Environmental Control (Housekeeping, Laundry and Waste)

The influenza virus survives well in the environment and patients may contaminate their environment with respiratory secretions. On hard porous surfaces the virus can survive for 24-48 hours, can then be transferred to hands and survive for up to 5 minutes[14]. Equipment and surfaces contaminated with secretions from patients suspected of having or confirmed to have influenza should be cleaned before use with another individual.

a. Housekeeping

i. Environmental surfaces and objects that have been touched by an individual with ILI or the caregiver should be cleaned daily with a regular household cleaning agent.

↑AII

ii. Products that are labeled "antibacterial" are not necessary.

↑AIII

b. Laundry

i. Special handling of clothing or linen used during the care of an individual with ILI is not necessary.

↑BIII

ii. Heavily soiled linen should be rolled or folded to contain the heaviest soil in the centre of the bundle[126,127]. Large amounts of solid soil, feces, or blood clots should be removed from linen with a gloved hand and toilet tissue then placed into a bed pan or toilet for flushing. In order to prevent splashing, excrement (e.g., from clothing, reusable incontinence pads) should not be removed by spraying with water.

↑BIII

iii. Use of a commercial laundry detergent with household bleach (according to product instructions and where suitable for fabrics) and a normal machine wash and machine dry are sufficient to clean soiled linen in a home care setting[50,128-131].

↑BIII

iv. Machine drying or hanging clothing and linens on a clothes line at the home care site is a suitable method for drying.

↑BIII

c. Waste

i. Garbage generated during the care of an individual with ILI does not require special handling and may be placed with household waste for disposal.

↑AIII

ii. Medical sharps, i.e hypodermic needles used in the care of an individual with ILI should be placed in an impervious container (e.g., coffee can) with household waste prior to disposal

↑AII

4. Care of the Deceased

Attention to routine infection prevention and control practices is sufficient for handling bodies of individuals who have died from influenza. There is no additional risk of transmission of influenza infection.

Recommendations

a. Adherence to the routine infection control practices for hand washing/hand hygiene, mask/eye protection/face shields, glove and gown use as outlined above during the care of the deceased body is recommended.

↑**AIII**

b. Individuals who die in a home setting should be wrapped in a sheet (ideally using a plastic bag to protect the mattress) and preferably kept in a cool, dry location until pick up by funeral services.

↑**AIII**

3.0 Infection Control and Occupational Health in Temporary Influenza Hospitals

Patients triaged as unable to be cared for at home and not ill enough for an acute care hospital will be sent to Temporary Influenza Hospitals as predetermined in the Canadian Pandemic Influenza Plan. Therefore, patients in these settings will either be ill with the pandemic strain of influenza or will have recovered from the pandemic strain of influenza; thus, patient-to patient transmission of influenza will not be a concern. In this setting, the risk of acute infections other than influenza (e.g., gastroenteritis, other respiratory infections, ectoparasites) will be of concern. Adherence to current Infection Control Guidelines to prevent the transmission of infection is required[3,5,6,9,84].

It is important to note that the influenza virus can survive on hands for up to 5 minutes following the transfer from environmental surfaces[14]. **The importance of hand washing/hand antisepsis during a pandemic cannot be overemphasized. See Appendix III.** Hand washing/hand antisepsis is the single most important method to prevent the transmission of infection including influenza and will be even more important because of the unavailability of influenza vaccine and antiviral prophylaxis early, during, or even late, in the pandemic.

Maintaining spatial separation of at least 1 metre between patients in this setting should be maintained because there is evidence that overcrowding has contributed to the spread of respiratory-transmitted infections[82].

Recommendations

3.1 Prevention of Pandemic Influenza

A. Immunization and Antivirals

Adherence to the recommendations for vaccine and antivirals for patients and HCWs, as outlined in Annexes D and E of the Canadian Pandemic Influenza Plan, is vital.

3.2 Control of Pandemic Influenza

A. Physical Setting

1. When Pandemic Phase 2 is declared (see Appendix II), open Temporary Influenza Hospitals as predetermined in the Canadian Pandemic Influenza Plan.

↑**AIII**

2. When planning for the location of a temporary influenza hospital, emphasize the need for spatial separation between patients, their families and care givers.

↑**AII**

3. Maintain at least a 1 metre spatial separation between beds in patient care areas and chairs in waiting areas[82].

↑**AII**

4. Plan for separate soiled and clean utility rooms; clean storage areas; dedicated sinks for utility purposes versus hand washing; designate food preparation areas including, dedicated utility versus hand washing sinks; provide an adequate number of toilets; set p a bereavement room and a location to store deceased bodies prior to pick up for funeral services.

↑**AII**

5. Settings with carpeted floors are discouraged.

↑**BIII**

B. Management of Staff

1. Provide education, as outlined in section 4.1.
2. Adhere to Occupational Health Management, as outlined in Section 3.5.

C. Infection Control Practices

1. Hygiene Measures to Minimize Influenza Transmission
   a. Temporary Influenza hospitals should adhere to published guidelines[3,6,9] to prevent nosocomial infections. Infection Control Practices adapted from Health Canada Infection Control Guidelines *Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care*[5] are summarized below:
   b. Patients, staff and visitors should minimize potential influenza transmission through good hygienic measures, i.e., using disposable, one-use tissues for wiping noses; covering nose and mouth when sneezing and coughing; hand washing/hand antisepsis after coughing, sneezing or using tissues; and keeping their hands away from the mucous membranes of the eyes and nose.

↑**AIII**

2. Hand Hygiene
   a. Staff, patients and visitors should recognize that strict adherence to hand washing/hand antisepsis recommendations is the cornerstone of infection prevention and may be the only preventative measure available during a pandemic. Hand hygiene procedures should be reinforced according to Appendix III.

↑**AII**

b. Hands should be washed or hand antisepsis performed after direct contact with ILI patients (see Glossary) and after contact with their personal articles or their immediate environment.

AII

c. When planning for the location and operation of a Temporary Influenza Hospital, it is important to note that, ideally, hand washing facilities should be conveniently located.

Note: See g. below if hand washing facilities are not available.

BII

d. Hand washing facilities should be available in, or adjacent to rooms where care is provided. If a large room is used for several patients, more than one sink may be necessary. Sinks for hand washing should be used only for hand washing and not for other purposes, e.g., as a utility sink. There should be access to adequate supplies as well as soap and towel dispensers should be in good working order[85-87].

BII

e. To avoid re-contaminating hands, single-use towels should be supplied for users to turn off faucets.

BIII

f. Plain soap may be used for routine hand washing[89,132].

BII

g. When access to sinks is limited, supplies of antiseptic hand rinses and detergent containing towelettes are necessary. Waterless antiseptic hand rinses are superior to soap and water in reducing hand contamination[66-68,91] and should made available in prominent areas throughout the temporary hospital.

AI

h. If there is visible soiling, hands should be washed with soap and water before using waterless antiseptic hand rinses. If soap and water are unavailable, cleanse hands first with detergent-containing towelettes[92].

BIII

i. Health Care Workers can reduce the required frequency of hand washing by minimizing unnecessary direct contact with patients and their immediate environments. This can be accomplished by the organization of care activities and avoiding touching surfaces in the patient's environment, e.g., bedrails, tabletops.

BIII

j. Hands must be washed[93,94] or antiseptic hand rinse used in the following situations:

   i. after any direct contact with a patient or their immediate environment and before contact with the next patient;

   ii. after contact with items known or considered likely to be contaminated with blood, body fluids, secretions, or excretions (e.g., bedpans, urinals, wound dressings, suction apparatus);

   iii. immediately after removing gloves[46];

   iv. between certain procedures on the same patient if soiling of hands is likely, to avoid cross-contamination of body sites[91,95];

v. before preparing, handling, serving or eating food and before feeding a patient;

vi. when hands are visibly soiled; and,

vii. after personal use of toilet, wiping nose, coughing or sneezing.

↑**AII**

k. Patients and family members and visitors should be taught how and when to wash their hands, e.g., after personal use of toilet, wiping nose, coughing or sneezing.

↑**AII**

l. When patient hygiene is poor, they should have their hands washed for them. Patients should be helped to wash their hands before meals, after going to the bathroom, when soiled and before leaving their bedspace.

↑**BIII**

m. Hand antisepsis, with an antiseptic soap or antiseptic hand rinse, is indicated before performing invasive procedures[92,132].

↑**BIII**

n. Hand lotion may be used to prevent skin damage from frequent hand washing[96]. Lotion should be supplied in disposable bags in wall containers by sinks or in small, non-refillable containers to avoid product contamination. Inappropriate handling and management of patients' or care givers' skin lotions have been reported as a source of outbreaks[97-101].

↑**BII**

o. Liquid hand-wash products should be stored in closed containers and dispensed from either disposable containers or containers that are washed and dried thoroughly before refilling.

↑**AII**

3. Personal Protective Equipment

a. Masks, Eye Protection, and Face Shields

i. Masks to minimize the transmission of influenza may be worn when face-to-face with coughing individuals in during the early phases of the pandemic but are not practical, or helpful, when transmission has entered the community and temporary hospitals have been opened.

↑**BIII**

ii. Masks should be worn in the temporary influenza hospital to prevent the transmission of other organisms when HCWs are face-to-face with undiagnosed coughing patients.

↑**BIII**

iii. Masks and eye protection, or face shields should be worn to prevent HCW exposure to sprays of blood, body secretions or excretions. Surgical masks are considered adequate for this purpose[9,44,45].

↑**BIII**

iv. HCWs should avoid touching their eyes with their hands to prevent self-contamination with pathogens.

v. Wear masks, as outlined in Section 2.6.

b. Gloves

i. Gloves are not required for the routine care of patients suspected of having or confirmed to have influenza. Meticulous hand washing with soap and water or performing hand antisepsis will inactivate the virus.

↑**AIII**

ii. Gloves should be used as an additional measure, not as a substitute for hand hygiene[46,47].

↑**BII**

iii. Gloves are not required for routine patient care activities in which contact is limited to a patient's intact skin, e.g., when transporting patients.

↑**BIII**

iv. Appropriate use of clean non-sterile gloves includes the following situations[9,44,102-105]:

a. for contact with blood, body fluids, secretions and excretions, mucous membranes, draining wounds or non-intact skin (open skin lesions or oozing rash);

b. for handling items visibly soiled with blood, body fluids, secretions or excretions;

c. when the health care worker has open skin lesions on the hands.

↑**AII**

v. When indicated, gloves should be put on directly before contact with the patient or just prior to starting the task or procedure requiring gloves[95,106,107].

↑**AII**

vi. Gloves should be changed between care activities and procedures with the same patient after contact with materials that may contain high concentrations of microorganisms[46,95], e.g., after handling an indwelling urinary catheter.

↑**BIII**

vii. Worn gloves should be changed:

a. between patient contacts,

b. if a leak is suspected or the glove tears.

↑**AII**

viii. Potentially contaminated gloves should be removed and disposed of immediately after completion of care or a specific task, at the point of use prior to touching clean environmental surfaces (e.g., blood glucose or temperature machines, blood pressure cuffs)[46,95,106,107,133].

↑**AII**

ix. Hands should be washed immediately after removing gloves[46,47].

↑**AII**

x. Single-use disposable gloves should not be reused or washed[47].

↑**AII**

c. Gowns

i. Gowns are not required for the routine care of patients with suspected or confirmed to have influenza.

↑**AI**

ii. Long sleeved gowns should only be used to protect uncovered skin and prevent soiling of clothing during procedures and patient care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions[9,45].

↑**BIII**

iii. HCWs should ensure any open skin areas/lesions on forearms or exposed skin is covered with a dry dressing at all times. Intact skin that has been contaminated with blood, body fluids, secretions or excretions should be washed as soon as possible thoroughly, but gently, with soap and warm running water.

↑**BIII**

D. Patient Activity Restrictions

1. There are no patient activity restrictions as patients and staff will have already been exposed to or infected with influenza.

↑**AIII**

E. Visitor Restrictions

1. Notices should be placed at the entrances to the temporary hospital:

   a. warning visitors that they may be at risk of acquiring influenza and requesting visitors who have not had influenza-like-illness not to visit. Close relatives of terminally ill patients are exempt.

   b. requiring that visitors with acute respiratory illness not visit as other respiratory illness may be circulating.

↑**AIII**

F. Patient Care Equipment (Cleaning, Disinfection and Sterilization)

Sterilization and high-level disinfection requires supervision by a trained professional, dedicated space and specialized equipment. Items requiring sterilization or high level disinfection should be disposable or managed by the "parent" organization.

The appropriate cleaning, disinfection sterilization, storage and handling of patient care equipment is an obligatory component of health care and cannot be overemphasized. Equipment and surfaces contaminated with secretions from patients suspected of having or confirmed to have influenza should be cleaned before use with another patient. The following recommendations apply in all circumstances. Please refer to the Glossary for definition of terms.

Recommendations

1. Process

   a. Reprocessing equipment (i.e., disinfection or sterilization) is **not** recommended but, if considered, the "parent" organization must provide a specially trained, knowledgeable person to be responsible for the processes. Where there is no "parent" organization to plan or operate the Temporary Influenza Hospital, it is expected that another organization would assume this role. If soiled equipment is to be transported for disinfection or sterilization, the parent organization must develop processes for the separation of soiled and clean/sterile equipment and safe handling/transport of contaminated equipment.

   ↑AIII

   b. Procedures should be established for assigning responsibility and accountability for routine cleaning of all patient care equipment[109,111,112,134].

   ↑BIII

   c. Reuse of single use items in this setting is strongly discouraged.

   ↑AII

2. Cleaning

   a. Items that are shared, should be cleaned between patients. A hospital grade germicide should be used for routine cleaning. Please see Appendix V, Table A *Cleaning Procedures for Common Items*.

   ↑BIII

   b. Reuseable items must be thoroughly cleaned before disinfection or sterilization[135-137]. Items should be washed with hot soapy water, using an enzymatic cleaner.

   ↑AII

   c. Equipment that is visibly soiled should be cleaned promptly.

   ↑BIII

   d. Soiled patient care equipment should be handled in a manner that prevents exposure of skin and mucous membranes and contamination of clothing and the environment.

   ↑BIII

   e. Commodes and toilets should be cleaned twice daily and when soiled. Ideally, bedpans should be reserved for use by a single patient, labeled appropriately or cleaned between uses.

   ↑BIII

   f. Personal care supplies (e.g., lotion, creams, soaps) should not be shared between patients.

   ↑BIII

3. Disinfection

   a. Reuseable items must be adequately rinsed and dried before disinfection or sterilization and dried before storage.

   ↑**AII**

   b. Manufacturers' written recommendations for the use of chemical disinfectant should be followed.

   c. Only disinfectants with a DIN (disinfectants approved for use in Canada) should be used.

   d. Respiratory therapy and anesthesia equipment require, at a minimum, high level disinfection[113-116].

   ↑**AIII**

4. Sterilization

   a. Critical items must be sterile[135].

   ↑**AIII**

   b. The steam sterilization process must be monitored by biologic indicator testing at least daily[137].

   ↑**AIII**

   c. The sterilization process must be monitored at each cycle by mechanical and chemical indicators[118]. Each pack must contain a chemical indicator[137].

   ↑**AIII**

   d. A procedure for the recall of items processed from a load that contained a positive biological indicator should be established and followed[137].

   ↑**AIII**

   e. Flash sterilization is **not** recommended.

   ↑**AIII**

   f. Microwave ovens, glass bead sterilizers and boiling for sterilization should not be used[138].

   ↑**AIII**

5. Storage

   a. After reprocessing, sterility must be maintained until point of use[118].

   ↑**AIII**

   b. Sterile items must be maintained sterile until use[118-120].

   ↑**AII**

   c. Sterile and clean supplies should be stored in a clean dry area.

   ↑**AII**

   d. Clean and sterile supplies should not be hoarded.

   ↑**AII**

   e. Soiled equipment should be kept physically separate from clean/sterile supplies and equipment.

   ↑**AII**

G. Environmental Control (Housekeeping, Laundry and Waste)

The influenza virus survives well in the environment and patients may contaminate their environment with respiratory secretions. On hard porous surfaces the virus can survive for 24-48 hours, can then be transferred to hands and survive for up to 5 minutes[14].

Equipment and surfaces (i.e., desks, arm rests, etc.) contaminated with secretions from patients suspected or confirmed to have influenza should be cleaned before use with another patient.

1. Housekeeping

   Appropriate housekeeping is a required component of health care and cannot be overemphasized. The following recommendations apply in all circumstances. Please refer to the glossary for a definition of terms.

Recommendations

a. Process

   i. "Parent" organizations must provide a specially trained, knowledgeable person responsible for housekeeping and the policies for cleaning schedules and methods.

      When there is no "parent" organization to plan or operate the triage settings, it is expected another organization would assume this role.

      ↑AIII

   ii. Products and procedures should be aligned with, or approved by, the "parent" organization

      ↑AIII

   iii. An education program for those providing housekeeping services should help them to understand the effective methods of cleaning and the importance of their work.

      ↑BIII

   iv. Housekeepers, as with other health care workers, should be offered immunization against hepatitis B[6,9].

      ↑AII

b. Cleaning

   i. Daily cleaning of environmental surfaces and noncritical patient care items should be sufficient to keep surfaces clean and dust free[121-123]. Surfaces that are frequently touched (i.e., contaminated) by the hands of health care providers and patients/residents/clients, such as surfaces of medical equipment and knobs for adjustment or opening, should be cleaned twice daily or when known to be contaminated.

      ↑BIII

   ii. Careful vigorous cleaning of environmental surfaces is effective in removing many contaminants from surfaces.

      ↑AII

   iii. Damp rather than dry dusting or sweeping should be performed, whenever possible, in order not to generate dust particles. Any dry cleaning should be done carefully with a chemically treated dry mop or vacuum cleaner

(equipped with exhaust filter) rather than a broom. (Note: carpets are discouraged in this setting).

↑**BIII**

iv. Vacuum cleaners, equipped with exhaust filters, should be used on carpeted areas. Expelled air from vacuum cleaners should be diffused so that it does not aerosolize dust from uncleaned surfaces.

↑**BIII**

v. During wet cleaning, cleaning solutions and the tools with which they are applied soon become contaminated. Therefore, a routine should be adopted that does not redistribute microorganisms. This may be accomplished by cleaning less heavily contaminated areas first and also by changing cleaning solutions and cloth/mop heads frequently.

↑**BIII**

vi. Wet mopping is most commonly done with a double-bucket technique, i.e., one bucket for soil, one for rinsing. This technique extends the life of the solution because fewer changes are required. When a single bucket is used, the solution must be changed more frequently because of increased soil.

↑**BIII**

vii. Tools used for cleaning and disinfecting must be cleaned and dried between uses.

↑**BIII**

viii. Mop heads should be laundered daily. All washed mop heads must be dried thoroughly before storage[121] or reuse.

↑**BIII**

c. Cleaning agents

i. In most areas, detergents are acceptable for surface cleaning. Please refer to Appendix V, Table A, Cleaning Procedures for Common Items.

ii. Cleaning and disinfecting agents must be mixed and used according to manufacturers' recommendations.

↑**AIII**

iii. Protective apparatus: Household utility gloves should be worn during cleaning and disinfecting procedures. Manufacturers' directions should be followed for product use to ensure safe handling practices.

↑**BIII**

iv. Disinfectant fogging (spraying disinfectant in a closed area) is not necessary and should not be done[139].

↑**AIII**

d. Blood Spills[9]

i. Appropriate personal protective equipment should be worn for cleaning up a blood spill. Gloves should be worn during the cleaning and disinfecting procedures. Care must be taken to avoid splashing or generating aerosols during the clean up. If the possibility of splashing exists, the worker should wear a face shield or safety glasses/mask and gown. For large blood spills, overalls, gowns or aprons as well as boots or protective shoe covers should be worn. Personal protective equipment should be changed if torn or soiled, and

always removed before leaving the location of the spill, then hands should be washed immediately.

↑**BIII**

ii. The blood spill area must be cleaned of obvious organic material before applying a disinfectant, as hypochlorites and other disinfectants are substantially inactivated by blood and other materials[9,140,141]. Excess blood and fluid capable of transmitting infection should be removed with disposable towels. Discard the towels in a plastic-lined waste receptacle.

↑**AII**

iii. After cleaning, areas should be disinfected with a low level chemical disinfectant (e.g., chemical germicides approved for use as 'hospital disinfectants', such as quaternary ammonium compounds) or sodium hypochlorite (household bleach). Concentrations ranging from approximately 500 ppm (1:100 dilution of household bleach) sodium hypochlorite to 5000 ppm (1:10 dilution of household bleach) are effective, depending on the amount of organic material (e.g., blood or mucous) present on the surface to be cleaned and disinfected. Please refer to Appendix V, Table B, Directions for Preparing Using of Chlorine-based Disinfectants.

Commercially-available chemical disinfectants may be more compatible with certain medical devices that might be corroded by repeated exposure to sodium hypochlorite, especially the 1:10 dilution[62,140,142]. Manufacturers' recommendations for dilutions and temperatures of chemical disinfectants approved for use as hospital disinfectants must be followed. Sodium hypochlorite or chemical germicide should be left on surface for at least 10 minutes.

↑**AII**

iv. The treated area should then be wiped with paper towels soaked in tap water. Allow the area to dry. The towels should be discarded in a plastic lined waste receptacle.

↑**AIII**

v. Hands must be thoroughly washed after gloves are removed.

↑**AII**

2. Laundry

Special handling of linen contaminated with secretions from patients suspected of having or confirmed to have influenza is not required. The following recommendations apply in all circumstances.

Recommendations

a. Process

i. Parent organizations must provide a specially trained, knowledgeable person responsible for laundry. Where there is no "parent" organization to plan or operate the triage settings, it is expected that another organization would assume this role.

↑**AIII**

b. Collection and handling

i. There is no special handling required for linen from patients suspected of having or confirmed to have influenza.

AII

ii. All soiled linen should be handled in the same way for all patients.

AII

iii. Linen should be handled with a minimum of agitation and shaking[126,127,143].

BIII

iv. Sorting and rinsing of linen should not occur in patient care areas.

BIII

v. Heavily soiled linen should be rolled or folded to contain the heaviest soil in the centre of the bundle[126,127]. Large amounts of solid soil, feces or blood clots should be removed from linen with a gloved hand and toilet tissue then placed into a bed pan or toilet for flushing. In order to prevent splashing, excrement (e.g., from clothing, reusable incontinence pads) should not be removed by spraying with water.

BIII

c. Bagging and containment

i. Soiled linen should be bagged at the site of collection[126,127,144].

CIII

ii. To prevent contamination or soaking through, a single, leakproof bag[126,144,145] or a single cloth bag can be used[143]. A second outer bag is only required to contain a leaking inner bag[126,127,145,146].

BII

iii. Use of water soluble bags is not recommended. These offer no benefit for infection control and add additional costs[126,127].

BIII

iv. Laundry carts or hampers to collect or transport soiled linen do not need to be covered[127] unless odor control is a factor.

BIII

v. Bags should be tied securely and not over-filled when transported either by chute or cart[126].

BIII

vi. Linen bags should be washed after each use and can be washed in the same cycle as the linen contained in them[127].

BIII

d. Transport

i. When linen is commercially laundered, adequate separation of clean and dirty laundry in the truck is essential to ensure that there is no opportunity for mixing clean and dirty linen.

BIII

ii. Linen transported by cart should be moved in such a way that the risk of cross contamination is minimized[121,127].

BIII

iii. Separate carts should be used for dirty and clean linens. Carts used to transport soiled linens should be cleaned after each use with a cleaning product specified for use in the health care setting.

↑BIII

iv. Clean linen should be transported and stored in a manner that prevents its contamination and ensures its cleanliness[121,126,127].

↑BIII

e. Washing and Drying

i. If low temperature water (less than 71.0° C) is used for laundry cycles, chemicals suitable for low temperature washing at the appropriate concentration should be used.

↑BIII

ii. High temperature washes (more than 71.1° C) are necessary if cold water detergents are not used[127].

↑BIII

iii. To achieve a level of at least 100 ppm of residual chlorine with household bleach, 2 mL of household bleach should be added for every litre of water. See Appendix V, Table B, Directions for Preparing and Using Chlorine-based Disinfectants.

↑BIII

iv. In institutional laundry areas, the addition of a mild acidic "souring" agent neutralized the alkalinity from the fabric, water and detergent. This shift in pH, from approximately 12 to 5, may inactivate any remaining bacteria and reduce the potential for skin irritation[127].

↑BIII

f. Protection of laundry workers

i. Workers should protect themselves from potential cross infection from soiled linen by wearing appropriate protective equipment, such as gloves, gowns or aprons, when handling soiled linen. Reuseable gloves should be washed after use, allowed to hang to dry, and discarded if punctured or torn.

↑BIII

ii. Hand washing facilities should be readily available.

↑BII

iii. Personnel should wash their hands whenever gloves are changed or removed[3,5,9].

↑BII

iv. Staff in care areas need to be aware of sharps when placing soiled linen in bags. Workers are at risk from contaminated sharps, instruments or broken glass that may inadvertently be contained with linen in the laundry bags[126,127].

↑BIII

v. Laundry workers, as other health care workers, should be offered immunization against hepatitis B[6,9].

↑AII

vi. All caregivers and laundry workers should be trained in procedures for handling soiled linen[9].

BIII

3. Waste

Waste generated in temporary hospitals is no more hazardous than household waste. Only sharps contaminated with body fluids[9] require special handling and treatment. Appropriate waste handling is a required component of health care and cannot be overemphasized. Special handling of waste contaminated with secretions from patients with suspected or confirmed influenza is not required. The following recommendations apply in all circumstances.

See Glossary for terms.

Recommendations

a. Process

i. Parent organizations must provide a specially trained, knowledgeable person responsible for waste. Where there is no "parent" organization to plan or operate the triage settings, it is expected that another organization would assume this role.

AIII

ii. Written policies and procedures to promote the safety of waste handlers should be established.

BIII

iii. Special handling of waste contaminated with secretions from patients with suspected or confirmed influenza is not required.

AII

b. Regulations

i. Local environmental and health regulations should be followed when planning and implementing treatment and disposal policies for biologic waste.

BIII

ii. Specific categories of biologic waste may be disposed of in a properly managed landfill provided that there are procedures in place to protect workers and the public from contact with the waste.

BIII

iii. Medical waste, (e.g., gloves, sponges, dressings, or surgical drapes that are soiled or soaked with blood or secretions) may be contained in impervious waste-holding bags or double bags and may be disposed of in a landfill[147-149].

BIII

iv. If local regulations permit it, blood, suctioned fluids, excretions and secretions may be disposed of in a sanitary sewer.

BIII

v. Used needles and other sharp instruments should be handled with care to avoid injuries during disposal. Used sharp items should be disposed of

immediately in designated puncture-resistant containers located in the area where the items were used[9,125].

↑**AIII**

vi. A biohazard symbol is required on all sharp containers. Provincial or territorial regulations regarding colour coding must be followed.

↑**BIII**

vii. The transportation of infectious waste must comply with the *Transportation of Dangerous Goods Act and Regulation,* Transport Canada[150].

viii. Infectious waste must be stored in a designated location with access limited to authorized personnel. Refrigerated space should be provided for lockable, closed storage of laboratory waste that will be disposed of off site[151]. Provincial/territorial regulations for specific storage requirements must be followed.

↑**BIII**

ix. As the waste generator is accountable for waste disposal, ensure careful selection of waste hauling, treatment and disposal firms so all stages of transportation and disposal are carried out in a safe and legal manner[151].

↑**BIII**

c. Waste Handlers

i. Waste handlers should wear protective apparatus appropriate to the risks involved, (e.g., protective footwear and heavy work gloves).

↑**BIII**

ii. Waste handlers, as with other HCWs, should be offered hepatitis B immunization[6,9].

↑**AII**

H. Care of the Deceased

Attention to routine infection prevention and control practices is sufficient for handling bodies of individuals who have died from influenza. There is no additional risk of transmission of influenza infection.

Recommendations

1. Adherence to the routine infection control practices for hand washing/hand hygiene, mask/eye protection/face shields, glove and gown use, as outlined above during the care of the deceased body, is required.

↑**AIII**

2. The body of the deceased should be placed in a body bag or wrapped in a sheet when a body bag is unavailable and, preferably, kept in a cool, dry location until pick up by funeral services.

↑**AIII**

Appendix I.
Guideline Rating System

Health Canada Guideline Evidence-Based Rating System

Three categories rank the strength of evidence for a recommendation and three grades describe the quality of supportive studies for that recommendation. This format uses an evidence-based approach through the critical scrutiny of evidence from clinical trials research, well designed experimental and observational studies, and places less emphasis on descriptive studies, clinical intuition, and recalled experiences. The rating scale is outlined in the table below.

Table: Strength and Quality of Evidence for Recommendations

Categories for strength of each recommendation	
CATEGORY	**DEFINITION**
A	Good evidence to support a recommendation for or against use
B	Moderate evidence to support a recommendation for or against use
C	Insufficient evidence to support a recommendation for or against use
Categories for quality of evidence	
GRADE	**DEFINITION**
I	Evidence from at least one properly randomized, controlled trial
II	Evidence from at least one well-designed clinical trial without randomization; from cohort or case-controlled analytic studies, preferably from more than one centre, from multiple time series; or from dramatic results in uncontrolled experiments
III	Evidence from opinions of respected authorities on the basis of clinical experience, descriptive studies, or reports of expert committees

Note: If established regulations are quoted in a document, no ratings are assigned to these legislative requirements

Appendix II.
World Health Organization (WHO) Definition of Preparedness Levels

Phase 0: Interpandemic activities

No indication of any new virus type has been reported.

Phase 0: Preparedness Level 1

New influenza strain in a human case.

No clear evidence of spread or outbreak activity.

Phase 0: Preparedness Level 2

Human infection confirmed.

Two or more human infections have occurred with a new virus sub-type, but the ability of the virus to readily spread from person-to-person and cause multiple outbreaks of disease leading to epidemics remains questionable.

Phase 0: Preparedness Level 3

Human transmission of the new virus sub-type has been confirmed through clear evidence of person-to-person spread in the general population, such as secondary cases resulting from contact with an index case, with at least one outbreak lasting over a minimum two week period in one country.

Phase 1: Confirmation of onset of pandemic

The pandemic will be declared when the new virus sub-type has been shown to cause several outbreaks in at least one country, and to have spread to other countries with consistent disease patterns indicating that serious morbidity and mortality is likely in at least one segment of the population.

Phase 2: Regional and multi-regional epidemics

Outbreaks and epidemics are occurring in multiple countries, and spreading region by region across the world.

Phase 3: End of the first pandemic wave

The increase in outbreak activity in the initially affected countries or regions has stopped or reversed, but outbreaks and epidemics of the new virus are still occurring elsewhere.

Phase 4: Second or later waves of the pandemic

Based on past experiences, at least a second severe wave of outbreaks caused by the new virus would be expected to occur within 3-9 months of the initial epidemic in many countries.

Phase 5: End of the pandemic (back to Interpandemic phase; Phase 0)

WHO will report when the Pandemic Period has ended, which is likely to be after 2-3 years. The indications for this will be that indices of influenza activity have returned to essentially normal inter-pandemic levels and that immunity to the new virus subtype is widespread in the general population.

Appendix III. Hand Hygiene Procedures

A. How to Wash Hands (using non antimicrobial soap and antimicrobial soap)

Remove jewellery before hand wash procedure[152,153].
Rinse hands under warm running water. Rationale: This allows for suspension and washing away of the loosened microorganisms.
Lather with soap and, using friction, cover all surfaces of the hands and fingers. Rationale: The minimum duration for this step is 10 seconds[154]; more time may be required if hands are visibly soiled. For antimicrobial agents 3-5mL are required[152]. Frequently missed areas are thumbs, under nails, backs of fingers and hands.
Rinse under warm running water. Rationale: To wash off microorganisms and residual hand washing agent.
Dry hands thoroughly with a single-use towel. Drying achieves a further reduction in number of microorganisms[155,156]. Re-useable towels are avoided because of the potential for microbial contamination.
Turn off faucet without re-contaminating hands, e.g., use single use towel. Rationale: To avoid re-contaminating hands
Keep fingernails short[157,158] and do not use fingernail polish or artificial nails. Rationale: Chipped nail polish may increase bacterial load[158]. Artificial nails including wraps, acrylics or tips increase bacterial load[159-161]. Nail polish and artificial nails impede visualization of soil under nails.

Adapted from Health Canada Infection Control Guidelines: *Hand Washing, Cleaning, Disinfection and Sterilization in Health Care,* 1998[3].

B. Decontaminating Hands with an Alcohol-based Hand Rub

To decontaminate hands that are not visibly soiled* using an alcohol-based hand rub:

- Follow the manufacturer's recommendations on the volume of product to use;
- Apply product to palm of one hand and rub hands together, covering all surfaces of hands and finger, until hands are dry.

Note: * Hand wash if hands are visibly dirty or contaminated with proteinaceous material or are visibly soiled with blood or other body fluids by washing with either a non-antimicrobial soap and water or an antimicrobial soap and water as outlined in Appendix III A, How to Wash Hands.

(adapted from[1])

Appendix IV. An Influenza-like Illness (ILI) Assessment Tool

An ILI assessment tool is to be used for immediate triage of patients or staff and for accommodation/cohort of patients prior to further OH or clinical management. This is not intended to be used as a clinical management tool. A clinical management assessment tool can be found in Annex G of the Canadian Pandemic Influenza Plan.

ILI Assessment Tool

Please check the following.

ILI in the general population is determined by the presence of 1, 2 and 3 and any of 4., a – c, which could be due to influenza virus:

___ ( ) 1. Acute onset of respiratory illness

___ ( ) 2. Fever (>38°C)*

___ ( ) 3. Cough

4. One or more of the following:

___ ( ) a. sore throat

___ ( ) b. arthralgia

___ ( ) c. myalgia or prostration

* May not be present in elderly people

Adapted from the ILI surveillance definition currently used by FluWatch for the 2002-2003 season[8].

Table A. Cleaning Procedures for Common Items

Surface/object	Procedure	Special considerations
Horizontal surfaces such as over bed tables, work counters, baby weigh scales, beds, cribs, mattresses, bedrails, call bells	1. Thorough regular cleaning 2. Cleaning when soiled 3. Cleaning between patients/ clients and after discharge	Special procedures sometimes called carbolizing are not necessary. Some environmental surfaces may require low level disinfection (e.g., in nurseries, pediatric settings, critical care, burn units, emergency rooms, operating rooms and bone marrow transplantation facilities).
Walls, blinds, curtains	Should be cleaned regularly with a detergent and as splashes/visible soil occur.	
Floors	1. Thorough regular cleaning 2. Cleaning when soiled 3. Cleaning between patients/ clients and after discharge. Damp mopping preferred	Detergent is adequate in most areas. Blood/body fluid spills should be cleaned up with disposable cloths followed by disinfection with a low level disinfectant.
Carpets/upholstery	Should be vacuumed regularly and shampooed as necessary.	
Toys	Should be regularly cleaned, disinfected with a low level disinfectant, thoroughly rinsed, and dried (between patients in acute care setting).	For pediatric settings, toys should be constructed of smooth, nonporous (i.e., not plush) materials to facilitate cleaning and decontamination. Do not use phenolics.
Toilets and commodes	1. Thorough regular cleaning 2. Cleaning when soiled 3. Clean between patients/ clients and after discharge. Use a low level disinfectant	These may be the source of enteric pathogens such as *C. difficile* and *Shigella*.

Table B. Directions for Preparing and Using Chlorine-based Disinfectants[3]

Product	Intended use	Recommended dilution	Level of available chlorine
Household bleach (5% sodium hypochlorite solution with 50,000 ppm* available chlorine	Cleanup of blood spills	Use concentrations ranging from 1 part bleach to be mixed with 99 parts of tap water (1:100) or one part of bleach to be mixed with 9 parts of tap water (1:10), depending on the amount of organic material (e.g., blood or mucus) present on the surface to be cleaned and disinfected.	0.05% or 500 ppm 0.5% or 5,000 ppm
	To add to laundry water	One part (one 8 ounce cup) of bleach to be mixed with about 500 parts (28 gallons†) of tap water	0.01% or 100 ppm
	Surface cleaning Soaking of glass-ware or plastic items	One part (one 8 ounce cup) to be mixed with about 50 parts (2.8 gallons) of tap water	0.1% or 1,000 ppm
NaDCC (Sodium dichloroisocyanurate) powder with 60% available chlorine	Cleanup of blood spills	Dissolve 8.5 g in one litre of tap water	0.85% or 5,000 ppm
Chloramine-T powder with 25% available chlorine	Cleanup of blood spills	Dissolve 20 g in one litre of tap water	2.0% or 5,000 ppm

** Parts per million*
† Imperial gallon (4.5 litres)

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Annex G

Health Services: Clinical Care Guidelines and Tools

Date of Latest Version: *February 2004**

Note:

- *This annex does not contain up to date information on the antiviral strategy. The appendix focusing on antivirals was removed in October 2006* to facilitate re-direction of the reader to the Antiviral Annex (this was the only change made to the 2004 version).*
- *This annex may be out-of-date with respect to other planning activities and policy decisions.*
- *This annex is expected to be updated in 2007.*

Table of Contents

Chapter 1. Clinical presentations of influenza: Case definition and pathogenesis

Chapter 2. Patient Management I

Chapter 3. Patient Management II: Management of Patients in Long-Term Care Facilities

Chapter 4. Patient Management III: Management of patients in Non-traditional Facilities and Telephone advice

Chapter 5. Patient Management IV: Hospital Management: Emergency Room, Short term observation and Ward management, Intensive Care Unit

Chapter 6. Special circumstances

Chapter 1. Clinical Presentations of Influenza

Case definition

The spectrum of illness associated with influenza virus infections is wide, and ranges from asymptomatic infection to fatal disease, frequently associated with viral pneumonia. The previous experience of a population with antigenically related virus variants is a determinant of the severity of the disease. ***Therefore, with a pandemic strain, which would be new in the population, the anticipated clinical spectrum will be more severe***. Age and pre-existing co-morbidities (Table 1) also influence the outcome. Young children, elderly adults, pregnant women, and individuals with chronic diseases are at greatest risk of complicated influenza [77,151,78,71,79,80,1,183,158].

A general "Clinical Case Definition" for an influenza-like illness (ILI) and a review of recent literature describing the most common presentations and complications of influenza in adults and children are given below. This is a general definition and applies mainly to the clinical presentation of interpandemic influenza; it may need modification once the pandemic occurs[17,42,28,85,146,71,1,235,207,92].

Clinical Case Definition:

When influenza is circulating in the community, the presence of fever and cough of acute onset are good predictors of influenza. The positive predictive value increases when fever is higher than 38°C and when the onset of the clinical illness is acute (less than 48 hours after the prodromes). Other symptoms, such as sore throat, rhinoorhea, malaise, rigors or chills, myalgia and headache, although non-specific, may also be present.

Confirmed cases of influenza are cases with laboratory confirmation (i.e., virus isolation from respiratory tract secretions, identification of viral antigens or nucleic acid in the respiratory tract, or a significant rise in serum antibodies) or clinical cases with an epidemiological link to a laboratory confirmed case[59,77,151].

For **surveillance** purposes, the Health Canada definition of ILI is:

- Acute onset of respiratory illness with fever (>38°C) and cough accompanied by one or more of the following: sore throat, arthralgia, myalgia or prostration, which could be due to an influenza virus (used by FluWatch for the 2000-2001 season[67].

For the 2001-2002 season, the Centers for Disease Control and Prevention (CDC) used the following case definition for **surveillance** in the USA (as of November 29, 2001):

- Temperature of >100°F (>37.8°C) and either cough or sore throat in the absence of a known cause[30].

Pathogenesis of influenza

The major site of infection by influenza viruses is the ciliated epithelial cell in the mucous layer of the respiratory tract. In the first few days after infection, necrosis of these cells and local edema occur, followed by infiltration by lymphocytes, plasma cells, histiocytes and polymorphonuclears. The incubation period may last 24h or up to 4-5 days (average of two days), varying with the infecting virus, size of the viral inoculum, and immunological status of the individual. The infectious period starts, typically, one day before the symptoms appear, and lasts approximately five days after the onset of clinical illness[77,151,1]. This may be longer for children and elderly patients. Infectious virus has been recovered from respiratory secretions 2-3 weeks after the onset of disease. Viral antigens have been detected in cells and secretions for several more days[21,183,135,70,29]. Asymptomatic carrier state, however, is not associated with influenza[183].

In uncomplicated influenza, repair starts 3-5 days after the beginning of symptoms; however, restoration of ciliated cells and mucous production are not restored until up to 15 days. If there is secondary bacterial infection, the inflammatory destruction of the basal cell layer is greater and the regeneration of the epithelia may take much longer[210,151].

Fatal cases of viral pneumonia have varying degrees of interstitial cellular infiltrate, alveolar edema, and hyalin membrane deposition. The virus also infects polymorphonuclear and mononuclear leucocytes, depressing their response to chemotactic stimuli and decreasing cellular functions (phagocytosis, proliferation, costimulation, etc.). This, together with the necrosis and desquamation of the ciliated epithelial cells and the general distortion in mucus secretion, favours the development of bacterial pneumonia (or combined viral/bacterial pneumonia). Bacterial sinusitis and/or otitis media following influenza apparently result through similar mechanisms[151,77,210].

The virus replicates throughout the respiratory tract and it is possible to recover infectious particles from the upper and lower tract of individuals naturally or experimentally infected with influenza[151,77,210]. The hemagglutinin of the virus (HA) binds to the receptor molecules of cells, while the neuraminidase (NA) facilitates release of viral particles, liquefying the mucous secretions to promote access to new cells. At 1-2 days post infection, there is a peak in virus replication, which decreases over the next 5-10 days. There is a direct correlation between virus shedding and severity of disease, with higher titres and longer shedding, in severely ill individuals (up to 10^9 in severe influenza pneumonia[77,109]. Children and elderly patients generally have high titres of virus in their secretions, and continue shedding viruses for longer periods of time (8-13 days); promoting transmission[21,183,135,232]. In some patients, viral antigens may be detected in secretions and cells for prolonged periods, even when virus isolation is negative[151].

Influenza viruses have been isolated from blood only on rare occasions[153,118,179,178,179,176,151]; however, it is possible to isolate the virus from the muscles of patients with rhabdomyositis and from other extrapulmonary sites in individuals with fatal influenza. Foetal transmission is also possible[77,117,189,151]. It has been suggested that the virus may circulate in infected lymphocytes[227,77].

An increase in the number of leukocytes in blood is usually detected between days 1 and 3 after influenza infection, with a rise in neutrophils and a fall in lymphocytes. This lymphopenia includes T cells, B cells, and null cells[48,128]. A recently described protein, encoded by some influenza A virus, is a candidate for inducing apoptosis of human monocytic cells with the CD8+T cell phenotype, and may be related to the high lethality of some strains[33].

The severity of clinical disease during an influenza pandemic is determined by the immunological status of the population and viral factors. For example, the cleavage of the HA molecule in Influenza A, is critical in determining the virulence of two avian strains: the H5 strain, which is very virulent, and the H7 strain, which is almost avirulent. In the less virulent strains, proteases able to cleave the HA were present only in the respiratory and gastrointestinal tracts of poultry, thus limiting virus replication to these areas. Changes in the amino acid composition of the HA (as seen in H5 virions), rendered this protein cleavable by more ubiquitous enzymes and allowed the virions to replicate systemically, causing a generalized, fatal disease[210]. A similar mechanism, i.e., high cleavability of the HA glycoprotein, has been suggested to explain the high human-lethality of H5N1 influenza A infections in Hong-Kong in 1997[95]. Recently, a new viral protein, PB1-F2, was described in some avian influenza virus; this protein may be involved in the ability of avian H5N1 and H9N2 influenza A virus to infect humans and cause disease[190,33].

Following infection by influenza virus, antibodies are produced against four major components of the virion: HA (hemagglutinin), NA (neuraminidase), NP (the predominant protein of the nucleocapsid), and M protein (matrix protein). Nevertheless, only antibodies against HA and NA have been linked with resistance to infection by influenza[151]. Anti-HA antibodies are the primary neutralizing antibodies and participate in complement-mediated lysis of infected cells, aggregation of virions, and cell cytotoxicity. Anti-NA, on the other hand, reduce the number of new infectious units released from infected cells, and may reduce the severity of disease and even prevent clinical illness if present in high titre.

In nasal secretions, the neutralizing antibodies are predominantly IgA, but IgM and IgG are also secreted locally. Local antibodies are associated with resistance to infection and can be detected for 3-5 months after illness. There is also local memory.

B cells producing specific IgG, IgA, and IgM can be detected in peripheral blood of normal individuals and of subjects with influenza infection. The level of anti HA and anti NA antibodies in blood has been associated with resistance to infection and with recovery from the disease[41,151]. A protective effect for maternally transmitted antibodies can be inferred from the relation existing between age in months of infants and symptomatic influenza, and is supported by studies measuring levels of maternal antibodies in cord serum[174].

The replication of influenza viruses in a new host activates a cascade of inflammatory cytokines, which is followed by fever and by the symptoms of the disease. Nasal lavage specimens from humans infected with influenza A contain interleukin-6 (IL-6), tumour necrosis factor-α (TNF-α), gamma interferon (IFN-γ), interleukin-10, monocyte chemotactic protein 1, and macrophage inflammatory proteins 1α and 1-β[187]. Studies performed in volunteers with experimental infection and in patients with influenza A of less than 36 h of duration, showed that the levels of IL-6 and of TNF-α in upper respiratory secretions correlate directly with virus replication, fever, respiratory and systemic symptoms, and with an increase in respiratory secretions. High levels of IFN-γ, on the other hand, were associated with an early decrease in viral titre[109,97]. IL-6 is a potent pyrogen that induces fever, chills and fatigue when administered to humans[220], it is also involved in the initiation of the immune response to the virus[109]. TNF-α, on the other hand, correlates with fever but not with symptoms, and recent experiments demonstrated that it has potent anti-influenza activity[109,187]. Very high levels of both cytokines, IL-6 and TNF-α, were also found in serum and cerebrospinal fluid (CSF) of patients with influenza-associated encephalopathy. In a study done in Japan, Il-6 levels were used for diagnosis and prognosis of the course of the disease: the lower the level of IL-6, the milder the CNS participation. Values higher than 6,000 pg/mL were found in children with brain stem dysfunction, about 150 pg/mL were present in children without brain stem

dysfunction and less than 80 pg/mL in controls; children with values higher than 15,000 pg/mL did not survive[2].

Human monocytes are highly susceptible to influenza A virus and die 24-48 hours after infection. Although the release of complete virus particles from these cells is very low, they secrete several pro-inflammatory cytokines (TNF-α, IL-1β, IL-6, interferon α/β) and chemotactic factors responsible for the mononuclear infiltrate characteristic of influenza infected tissues[115]. In addition, secondary trigger signals, such as very small amounts of LPS (or other secondary bacterial products) could cause an excessive increase in cytokine production and secretion by the monocytes. This priming-triggering effect may be responsible for the severe complications of secondary bacterial super-infections observed after influenza A infections[115].

It has been shown that H5N1 influenza viruses infecting humans in 1997 can avoid the antiviral activity exerted by TNF-α and by the interferons[186]. Post-mortem reports from two patients suggested that virus replication in the respiratory tract caused an increase in the level of inflammatory cytokines, resulting in a reactive hemophagocytic syndrome that was the main cause of death. The authors propose that the synthesis of high levels of cytokines was stimulated after the virus could escape their antiviral effect and continued to replicate[186].

1.1 Most Common Clinical Presentations

1.1.1 Adults

The typical clinical presentation of uncomplicated influenza is tracheobronchitis with some small airway involvement. The onset of disease is usually abrupt: headache, chills and dry cough, followed by fever of 38-40°C that may peak as high as 41°C within the first 24 hours, together with myalgia, malaise, and anorexia. Physical signs include hot and moist skin, flushed face, injected eyes and clear nasal discharge. Some patients also have nasal obstruction, sneezing, pharyngeal inflammation, excessive tearing and mild cervical adenopathy[77,151,1,17,42,28,183,26,147,27,146]. Chest x-rays and auscultatory findings are usually normal, with occasional crackles and wheeze. In uncomplicated influenza, the airflow in large airways remains relatively normal. There is, however, a transient increase in bronchial reactivity and some temporary alterations in gas exchanges in small peripheral airways[151,133,104]. Bronchial hyper reactivity may continue well beyond the clinical illness, even in subjects without a history of bronchospasm[133].

In uncomplicated influenza the fever usually declines after 2-3 days and disappears by the 6th day (median three days). Biphasic fever patterns are usually associated with secondary bacterial infections, but may be observed in some cases of uncomplicated influenza. While the temperature declines, some respiratory symptoms, like cough and rhinorrhea, may increase, followed by the production of small amounts of, usually mucoid, sputum. Cough, weakness and fatigue can persist for 1 to 2 weeks and up to 6 weeks[77,151,1,17,42,28,183].

The disease is more severe in individuals younger than 5 years or older than 65 years[1,183,12,13,193,195,196]. The risk of lower respiratory tract infection (LRTI) is much higher in young children, smokers, geriatric patients and persons with underlying cardio-respiratory disorders (most frequently asthma in younger patients and chronic bronchitis and emphysema in older persons[78,71,119,42,56,135,158,11,57,112]. Viral pneumonitis is most frequent in young children, while bacterial superinfection is common in the elderly. *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Moraxella catarrhalis*, and *Staphylococcus aureus* are the most common agents of secondary bacterial pneumonia. Gram-negative bacteria,

Chlamydia pneumoniae and *Mycoplasma pneumoniae* are also found in some patients[77,78,80,130,140,16].

Different strains of influenza may be associated with different symptoms or severity of disease[71,42,28]. Two influenza A subtypes: A (H1N1) and A (H3N2), and one influenza B strain, have been circulating worldwide in the last decade (with minor strain variations) and are associated with yearly epidemics. Influenza A (H3N2) is frequently associated with more severe clinical diseases and pneumonia[71,76,135,42,158,11,196,122]. It affects young and old equally, and accounts for up to 28% of acute cardiopulmonary hospitalizations of older persons[135,11]. Focal outbreaks in nursing homes are usually caused by A (H3N2) viruses[56,102,9]. Influenza A (H1N1), on the other hand, infects children every year but has only a minor impact in the elderly, and influenza B preferentially causes disease in children, with frequent gastrointestinal symptoms[135,11,26,69,195].

During the 2001-2002 season, a new subtype, influenza A (H1N2) was isolated in several countries. These new viruses resulted from gene reassortment between the circulating A (H1N1) and A (H3N2) viruses. Because both viral proteins were similar to the homologous antigens in the circulating strains and in the vaccine strains, the new viruses did not cause more severe illness or higher influenza activity in this season[32].

Human infections by influenza A (H5N1) were first detected in Hong Kong in 1997, where six of 18 patients admitted to hospital died[42,35,235]. These infections were characterized by a high case-fatality rate, a high incidence of gastrointestinal symptoms in adults, and a high rate of pulmonary, renal, hepatic and haematologic complications in patients without previously identified high risk conditions[42,235,95].

Influenza C viruses are usually associated with mild illnesses, which are sometimes asymptomatic. For that reason, virus isolation has not been performed regularly, and the spectrum of diseases produced by influenza C is not well characterized. Studies in Japan found temperatures of 38-40°C for 2-3 days in young children, who also had coryza and cough lasting for a period of 2 weeks in up to 50% of the patients[183,114]. Adults had similar but milder symptoms, and complained mainly of malaise, sore throat and headache. In another study, however, the symptoms reported in young adults were as severe as those associated with influenza A infection and lasted longer[51].

Only influenza A has been associated with pandemics, however interpandemic epidemics can be attributed to both A and B viruses[42,75,151].

Although almost all deaths related to annual epidemics of influenza occur in the elderly or in the very young, and approximately 90% of excess deaths during epidemics occur among persons older than 65 years[12,122], in pandemic periods, adults younger than 65 years have accounted for 50% of the deaths[193]. For example, nearly half of the influenza-related deaths during the 1918-1919 influenza A (H1N1) pandemic occurred in the 20-40 years olds. Most of the deaths during the 1968-1969 influenza A (H3N2) pandemic occurred in adults 45-65 years old (half of them were previously healthy and without any detectable co-morbid illness[192,193], and a large proportion of influenza-related deaths during the 1957-1958 influenza A (H2N2) pandemic occurred among persons younger than 65 years[85,193,195,122,196].

1.1.2 Children

Children have the highest rates attack rates of influenza, and are the major disseminators of the virus[192]. In a regular "influenza season", influenza infections are the most important causes of consultation in outpatient clinics and account for one half of lower respiratory tract infections that result in hospitalizations of children[80,183]. During most influenza epidemics,

influenza viruses supplant all other major respiratory viruses as causes for consultation for respiratory infection in children[80,183,205].

The highest rate of influenza-related serious illness in children occurs in the 6-12 months old age group, after the waning of maternal antibodies[183,192,82]. Although uncomplicated influenza in children may be similar to the disease in adults, there are some age related differences in toddlers and infants[77,151,1,147]:

1) Young children usually develop higher temperatures (over 39.5°C) and may have febrile seizures[151,80,233,21,42].
2) Unexplained fever can be the only manifestation of the disease in neonates and infants[151,80,233,21,119,170,29,110,7,18].
3) Influenza viruses are an important cause of laryngotracheobronchitis (croup), pneumonia and pharyngitis-bronchitis in young children. Both types, A and B, are significant causes of low respiratory tract infections[151,78,80,76,233,21,119,170,183].
4) Gastrointestinal manifestations, such as nausea, vomiting, diarrhoea and abdominal pain, are found in 40-50% of patients, with an inverse relation to age (mainly in 3 years old or younger)[151,170,42,183].
5) Otitis media and non-purulent conjunctivitis are more frequent in young ages[151,233,21,119,170,36,101].
6) A variety of central nervous system findings, including apnea, opisthotonos and seizures may appear in as many as 20% of the infants[183]. Children may also present with symptoms suggestive of meningitis, e.g., headache, vomiting, irritability and photophobia[77,171].
7) Myositis is a complication in young children, especially after infection with influenza B.

In children over 5 years and adolescents the most frequent symptoms are fever, cough, non-localized throbbing headache, chills, myalgia and sneezing. The fever is usually in the 38-40°C range and a second peak, without bacterial superinfection, may occur around the fourth day of illness. Backache, sore throat, conjunctival burning with watery eyes and epistaxis may be present, but gastrointestinal symptoms are infrequent. Chest auscultation is usually normal, but occasionally coarse breath sounds and crackles may be heard[183].

Respiratory illness caused by influenza is non-specific and difficult to distinguish from illness caused by other respiratory pathogens on the basis of symptoms alone. Many viral infections (respiratory syncytial virus [RSV], parainfluenza, adenovirus and rhinovirus), as well as other pyrexial diseases, can cause an illness that is clinically indistinguishable from influenza[183,135,219,191,161].

1.1.3 Special Populations: High-risk Conditions (Table 1)

The Canadian National Advisory Committee on Immunization (NACI) considers the following groups to be at "increased risk for complications from influenza"[152]:

- **Adults and children with chronic cardiac or pulmonary disorders (including bronchopulmonary dysplasia, cystic fibrosis and asthma) severe enough to require regular medical follow-up or hospital care**. Chronic cardiac and pulmonary disorders are by far the most important risk factors for influenza-related death.

- **People of any age who are residents of nursing homes and other chronic care facilities**. Such residents often have one or more of the medical conditions outlined in the first group. In addition, their institutional environment may promote spread of the disease.
- **People ≥ 65 years of age**. The risk of severe illness and death related to influenza is moderately increased in healthy people in this age group, but is not as great as in people with chronic underlying disease.
- **Adults and children with chronic conditions, such as diabetes mellitus and other metabolic diseases, cancer, immunodeficiency, immunosuppression (due to underlying disease and/or therapy), renal disease, anemia, and hemoglobinopathy**. Immunosuppressed patients are at increased risk for influenza infection, morbidity and mortality. Influenza may result in significant morbidity and mortality among HIV-infected individuals.
- **Children and adolescents (6 months to 18 years of age) with conditions treated for long periods with acetylsalicylic acid (e.g., Kawasaki disease, juvenile rheumatoid arthritis, acute rheumatic fever, and others**[59]. This therapy might increase the risk of Reye's syndrome after influenza.

The Advisory Committee on Immunization Practices (ACIP) and the CDC in the USA also include as "persons most susceptible to complications or death from influenza":

- **"Women who will be in the second or third trimester of pregnancy during the influenza season (fall or winter)**[1,29].
- **"Children younger than 2 years of age"**[29].
- **The CDC also include people ≥ 50 year old rather than ≥ recommended by NACI**[29]

1.1.3.1 Pregnant women

Women with influenza infection in their second and third trimesters of pregnancy are at increased risk of hospitalization for cardio-respiratory disorders[158,159,40]. This is probably due to the increase in heart rate, stroke volume, and oxygen consumption observed in these months, as well as to decreases in lung capacity and changes in immunological function[1,123,144,189,120]. Fatal influenza in pregnant women is characterized by the rapid development of cardiovascular and/or pulmonary insufficiency after several days of classical ILI. Fulminating viral or bacterial pneumonia may follow the initial viral infection[123,144,189,120]. In some cases the virus has been isolated from the offspring[86].

An increase in mortality of pregnant women, miscarriages, premature births and stillbirths was documented during the 1918-1919 and the 1957-1958 pandemics[42,94,231,86,144,224]. The reported mortality rate of pregnant women admitted to hospital with influenza in 1918 was 51.4% compared with 33.3% in hospitalized influenza patients from the general population[94,231]. Mortality rates among these hospitalized women were higher if pneumonia was present, with a peak at 61% during the last month of gestation[94,231,144,42]. Influenza deaths in pregnant women represented 50% of all deaths in women of childbearing age, and 10% of deaths from influenza during the epidemics of 1957-1958 in New York City and Minnesota[86,72]. These women experienced illness lasting 1-10 days and died from respiratory insufficiency associated with pulmonary edema and pneumonia (bacterial and/or viral). A review of 30 deaths from pneumonia and influenza in pregnant women in Massachusetts between 1954 and 1974 showed more fatalities towards the last trimester and early puerperium (no deaths occurred in the first trimester), and the risk was higher with increasing

maternal age[189]. Only four of the thirty women who died had underlying medical pulmonary or cardiac conditions.

During 17 inter-pandemic influenza seasons[159] the relative risk for hospitalization for selected cardio-respiratory conditions among pregnant women increased more than three times between weeks 14-20 and weeks 37-42 of gestation. The respective increased rates of hospitalization were 1.4 and 4.7 compared with women who were 1-6 months postpartum. Women in their third trimester of pregnancy were hospitalized at a rate comparable with that of non-pregnant women who had high-risk medical conditions (i.e., 250/100,000 pregnant women[159].

1.1.3.2 Elderly adults in long-term facilities

Excess hospitalization and death, and functional decline, occur in elderly individuals after epidemics of influenza. Community dwelling adults 65 years of age or older, and particularly frail elderly in long-term care institutions, are at increased risk of influenza complications[56,10,65,8,58,57,13,12,102,196].

Although influenza pneumonia and bacterial pneumonia following influenza are considered the main causes of influenza related hospitalization in the elderly, many influenza related hospitalizations are attributed to the exacerbation of chronic obstructive pulmonary disease or congestive heart failure following the viral infection[56,11].

The symptoms and signs seen in older adults are similar to those in younger individuals, but most cases are characterized by the presence of dyspnea, wheezing, sputum production, and temperatures of 38°C[56,207]. In addition, any unexplained acute deterioration in health status associated with fever, may be a manifestation of influenza infection in elderly individuals[11].

Influenza-like illness in older adults can also be caused by other viruses, mainly RSV or parainfluenza. RSV infections are an important cause of hospitalization and death of elderly individuals and it is impossible to distinguish between RSV and influenza on the basis of clinical manifestations alone[56,135,11,65,57,219].

1.1.4 Preexisting co-morbidity

1.1.4.1 Respiratory

Patients with chronic pulmonary conditions constitute the largest high-risk group, and the exacerbation of pulmonary diseases is the most frequent cause of hospitalization after influenza infection[77,151,78,1,79,158]. Among children and young adults (< 35 years), asthma is the most common co-morbidity requiring hospitalization for complicated influenza; emphysema and COPD predominate in individuals older than 45 years, and chronic bronchitis is observed in all ages[160,77,208,78,93]. Clinical studies have shown that influenza can trigger wheezing episodes in children with asthma[77,78]. A decrease in mucociliary clearance and phagocytic function (with the consequent reduction in local defences and local immunity) are frequently observed after influenza infection, and can be particularly severe in patients with chronic bronchitis or COPD[93,155].

1.1.4.2 Cardiovascular

In several population studies, cardiac disorders were the most common co-morbidity reported as a cause of death in influenza patients[78,158,13,93,162,154]. Deaths attributed to heart disease increase during the peak period of culture positive influenza, and precede by two weeks the peaks of pneumonia and influenza deaths[81].

Although pre-existing cardiovascular pathology is the most frequent cause of death in individuals older than 65 years, serious and sometimes fatal myocarditis may be a complication of influenza infection in otherwise healthy people[93,154].

1.1.4.3 Diabetes

Individuals 25 to 64 years old with diabetes were 3.7- 4.0 times more likely than those without diabetes to have pneumonia and influenza as a cause of death during influenza seasons[216]. In addition, individuals 65 years old or older with diabetes were twice as likely to die from pneumonia and influenza than their non-diabetic counterparts[216]. The elevated morbidity and mortality attributed to influenza in diabetics is expected, given the high risk of complications from respiratory infections in this group[158,74,216,124, 46,136]. Mechanisms of defence like phagocytosis and intracellular killing may be decreased in these patients[46]. *Staphylococcus aureus* and *Streptococcus pneumoniae* are the most frequent causes of bacterial infection. In addition, combinations of risk factors increase mortality rates exponentially, and diabetes is frequently associated with secondary cardiac and/or pulmonary diseases and with immune impairment[46]. Influenza infection may also provoke severe metabolic deterioration and ketoacidosis in diabetic patients, increasing the risks for complications of the diabetes[46.93,54].

1.1.4.4 Immunocompromised patients and patients with HIV

Influenza virus infections in immunosuppressed individuals and transplant recipients may be similar to the immunocompetent population. However, an extended clinical course and prolonged shedding of virus is more common in these patients, as well as more severe, life threatening, diseases[132,184,14,55,141,134,180,221].

Persons Infected with HIV: Influenza in AIDS patients is prolonged and more frequently associated with complications[184,14,55,175]. In a cohort of young and middle-aged women HIV infected, the risk for cardiopulmonary hospitalization was higher during influenza seasons than during the peri-influenza periods. This risk was even higher than for women with other high-risk conditions, like chronic heart and lung diseases[158]. Influenza-associated excess mortality was found for the adult and adolescent US population with AIDS during three influenza seasons. Among persons aged 25-54 years, the risk for influenza-related death was estimated at 9.4-14.6/10,000 persons with AIDS compared with 0.09-0.10/10,000 in the general population, and 6.4-7.0/10,000 for persons older than 65 years[132]. Deaths of AIDS patients due to pneumonia and influenza followed a seasonal pattern (and also a virus isolation pattern) with peaks in December-January, as in the general adult population. More than 90% of AIDS deaths occurred in the 25-54 years age group. The excess death rate in this age group was 81-155 times higher in AIDS patients than for the general US population in this age range, compared with the summer. These death rates are comparable and even higher than those seen in the general population 65 years or older[132]. Other studies reported that AIDS patients experience more severe respiratory symptoms and prolonged duration of illness with an increased risk of complications[184,14,55,141].

Immunocompromised children: No prospective studies of influenza in immunosuppressed children or in children with AIDS have been published. It is known, however, that children with HIV commonly have severe and persistent viral respiratory infections, including influenza. Children with cancer receiving immunosuppressive therapy had similar clinical manifestations to control populations, but the duration of the disease was longer[183,134,180]. In a study of transplant recipients, two of 19 patients

developed severe infections, one child died and the second was febrile for 21 days with persistent virus isolation in respiratory secretions[183,134,180].

1.1.4.5 Other chronic illnesses, neoplastic diseases, renal diseases, etc.

Any patient suffering from a chronic disease that compromises the immune and/or metabolic homeostasis (other than the mentioned above) may develop complications of influenza. These include neoplastic diseases, renal diseases, hemoglobinopathies, some congenital diseases, and illnesses due to autoimmunity[183,61,116,134,64].

1.2 Complications of Influenza (Tables 2 and 3)

Influenza can exacerbate underlying medical conditions (e.g., pulmonary or cardiac disease), lead to secondary bacterial pneumonia, or cause primary viral pneumonia[77,151,1,13,193,195,196,194,81]. Influenza infection has also been associated with encephalopathy, transverse myelitis, Reye's syndrome, myositis, toxic shock syndrome, myocarditis, and pericarditis[1,159,193,195,196,194,81,192,93,167,154,176,53,52,105,68,138,37]. Hospitalization rates for children aged 0-4 years ranged from approximately 100/100,000 for those without high-risk conditions to 500/100,000 individuals, for those with high-risk conditions respectively[78,160]. Hospitalization rates are highest among children younger than 1 year of age and adults older than 65 years[1,160,106,96].

Since the influenza A (H3N2) virus pandemic in 1968, influenza-associated hospitalizations have been highest during epidemics caused by type A(H3N2) viruses[195,196]. Influenza-related deaths during influenza epidemics can result from pneumonia as well as from exacerbations of cardiopulmonary conditions and other chronic diseases. Older adults account for >90% of deaths attributed to pneumonia and influenza[1,193,10,65,8,58,57,13,12]. Sudden deaths have also been observed during influenza epidemics[167,68,171].

1.2.1 Lower respiratory tract complications

Involvement of the respiratory tract is found in 10% of cases in individuals 5-50 years old and up to 73% after 70 year of age[210]. Three different syndromes of severe pneumonia have been described as influenza-associated complications in adults and children (Table 3). Additional presentations of viral and/or bacterial respiratory tract infection are also seen frequently during interpandemic outbreaks of influenza (Table 2).

a) **Primary viral pneumonia:**

This is actually a manifestation of the disease at the more severe end of the spectrum[77,151,183]. It occurs mainly in high-risk patients, although 25% of reported cases are in young healthy individuals, and 13% in healthy pregnant women. Primary viral pneumonia develops abruptly following the onset of influenza illness and progresses within 6 to 24 hr to a severe pneumonia with tachypnea, tachycardia, cyanosis, high fever (>39-40°C) and hypotension. The illness may progress to hypoxemia and death in 1-4 days. Frothy haemoptysis, tachypnea and cyanosis are poor prognostic signs.

Clinical, physiological and laboratory findings are not specific. Bilateral crepitant inspiratory crackles are frequent, as well as mottled densities and diffuse symmetrical interstitial infiltrates or areas of consolidation in the X-rays. The presence of cavitations or pleural infiltrates, suggests bacterial superinfection. The pathology reveals interstitial pneumonitis with severe hyperaemia, broadening of the walls of the alveoli with edema and exudates, intraalveolar haemorrhage and hyaline membranes, infiltration

predominantly mononuclear, and capillary dilatation and thrombosis. Autopsy specimens usually have high virus titres. Nonfatal cases recover 5 to16 days after the onset of pneumonia, but require up to 4 months for resolution of the x-rays and residual lung damage is frequent[77,151,183].

Milder forms of influenza viral pneumonia involving only one lobe or segment have been described (Table 3). This "localized viral pneumonia" is less serious than the primary pneumonia described above and is frequently confused with pneumonia due to *Mycoplasma pneumoniae*[210].

b) **Combined viral-bacterial pneumonia**

This is three times more common than viral pneumonia, from which it may be clinically indistinguishable. The symptoms usually appear later; chest x-rays frequently show cavitations or pleural effusion. The diagnosis requires isolation of pathogenic bacteria in the sputum or pleural fluid and the radiological findings. The most frequent agents are: Streptococcus pneumoniae, *Staphylococcus aureus* or *Haemophilus influenzae*. Mortality of viral or combined viral-bacterial pneumonia is ~10-12%. Some strains of Staphylococcus aureus have a synergistic effect with the virus and increased pathogenicity[77,151]. Decreased leukocyte chemotaxis and tracheobronchial clearance increases the severity of bacterial infections and may lead to the development of fatal pneumonia and toxic shock syndrome (TSS) in healthy young individuals.

c) **Secondary bacterial pneumonia**

After initial improvement from viral infection (~ 4 days), the patient develops chills, pleuritic chest pain, increased productive cough and purulent or bloody sputum. Chest x-rays reveal local areas of consolidation and leukocytosis is common. The fatality rate is about 7%. These patients are more often elderly and have chronic diseases (i.e., pulmonary, cardiac, metabolic, etc.). Gram staining and culture of sputum usually show a bacterial pathogen, most frequently *Streptococcus pneumoniae*, or *Haemophilus influenzae*[84,77,151,210].

d) **Other pulmonary complications**

In children, pneumonia is less common, although bronchitis or bronchiolitis may also occur as manifestations of influenza infection. It may be difficult to distinguish influenza from RSV or parainfluenza infections. Croup associated with influenza A seems to be more severe, but less frequent than after parainfluenza or RSV[210].

Acute exacerbation of chronic obstructive pulmonary disease is frequent seen with influenza infection and can result in permanent loss of function, mainly in elderly patients. Other diseases exacerbated by the virus are asthma and cystic fibrosis[148,210,131,62,208].

1.2.2 Otitis media and conjunctivitis

Any viral or bacterial infection of the upper respiratory tract, including influenza A and B, increases the likelihood of otitis media in children[36,101]. Influenza A and B may cause otitis media either by direct viral invasion or by predisposing to bacterial superinfection. Little is known about influenza conjunctivitis, but the virus has been isolated from the conjunctiva in some patients[77,125].

1.2.3 Cardiovascular

Sudden death of young patients has been reported after influenza myocarditis or pericarditis, probably due to arrhythmia[167]. Even though influenza primarily involves the respiratory system, 43% of patients with confirmed influenza A had transient electrocardiographic changes in one community with epidemic disease[167,218]. During the Asian pandemic in 1957, one third of fatal cases with autopsies had signs of focal or diffuse myocarditis.

In a case study of nine patients with influenza-like symptoms and serological conversion for influenza A, cardiac involvement with increasing dyspnea was found after 4-7 days post infection[169]. The ECG and echocardiography showed abnormalities and serum creatine kinase (CK) levels were increased. Two of the patients had fulminant myocarditis and a third patient died of pneumonia. The remaining six patients returned to normal left ventricular function.

Theories explaining the pathogenesis of viral myocarditis include direct invasion of the cardiac muscle, autoimmune mechanisms, or vascular damage[167]. In some cases of myocarditis, the virus could be grown from heart tissue[167,176,53]. The most frequent finding in adults, however, is the aggravation of pre-existing cardiac pathologies. Atrial fibrillation is common in older patients, and myocardial infarction may occur following influenza infection[162,154].

1.2.4 Central Nervous System (CNS)

Influenza infection of the CNS has been associated with a wide spectrum of manifestations, from drowsiness and irritability to seizures and severe coma. Two specific syndromes have been described: a sometimes-fatal encephalopathy occurring at the peak of the disease, and occasional postinfluenzal encephalitis, seen 2-3 weeks after recovery.

There is high incidence of serious neurologic manifestations in children in Japan, that has not been observed in other countries[43,188,66,103,73,142]. In 5 influenza seasons in this country, 64 infants and children were identified with influenza-related encephalitis or encephalopathy. Forty-three percent of these children died and 20% had neurological sequellae[43]. Generalized vasculopathy was found in an autopsy. Another study identified 217 cases of encephalopathy/encephalitis in children in an epidemics of A H3N2 in Japan, 82.5% were younger than 6 years. Some of these cases were associated with acute necrotizing encephalopathy[43,113].

Another complication associated with influenza is Reye's syndrome: acute encephalopathy with fatty micro-infiltration of the liver and liver failure. It has been described in children and adolescents younger than 18 years of age (most commonly in the 4-12 year range) with influenza and receiving acetylsalicylic acid (also after acetylsalicylic acid administration to children with chickenpox or other viral diseases). It is rare in adults[15,105,129,151,5]. The classic presentation is a change in mental status, ranging from lethargy to delirium, seizures and respiratory arrest. The most frequent laboratory abnormality is the elevation of ammonia in blood, seen in almost all patients. As death is usually due to cerebral edema, lowering intracranial pressure is the most effective treatment. The recognition of the association of this syndrome with the use of acetylsalicylic acid lead to the recommendation for the use of other agents to manage children with influenza, and to a decrease in the number of cases.

Guillain-Barre Syndrome and myelitis have also been reported after influenza infections, but epidemiological studies supporting a causal association are lacking[66,103,77,185].

1.2.5 Muscular system

Acute rhabdomyolisis, with tender leg muscles and elevated serum CK occurs most frequently in children with influenza B infections; but it is also observed, occasionally, in adults or after influenza A infections. The course is usually benign, but sometimes-severe myonecrosis and myoglobinuria may lead to acute, occasionally fatal, renal failure. Influenza viruses have been recovered from affected muscles of some patients[117,145,47,151,150,234,45,182].

1.2.6 Systemic: Toxic shock syndrome

Toxic shock syndrome (TSS) is characterized by fever, hypotension, erythroderma followed by desquamation, and multiorgan failure. This syndrome is associated mainly with infections by *Staphylococcus aureus* and the production of an exotoxin (TSST-1or exotoxin B); group A *Streptococcus* may also be involved. TSS was originally associated with cutaneous and subcutaneous infections, and with menstruating and postpartum women. A link with post-influenza complications in previously healthy children and adults was found recently, after outbreaks of influenza A and B. The supposed pathogenic mechanism is a change in the colonization and replication of *S. aureus* (patients may be asymptomatic carriers of *S. aureus*) facilitated by the influenza infection. The patient may develop staphylococcal tracheitis or pneumonia and only a superficial infection of the tracheobronchial tree is required for the development of TSS[199,138].

1.2.7 Other

Another complication that has been related to influenza infection is the sudden infant death syndrome (SIDS), but a usal relationship has not been demonstrated[236,49,225,19,156].

Table 1.1. Patient factors which may delay recovery from influenza infection and facilitate the development of influenza-related complications

High-risk conditions: (Co-morbidity)	References
Age: ≤ 2 or ≥ 65 years	59, 29, 1, 152, 183, 192, 82, 57, 10, 9, 196
Pregnancy (2nd and 3rd trimesters)	159, 158, 1, 123, 144, 42
Cardiovascular diseases: Congenital, rheumatic, ischemic heart disease, congestive heart failure	78, 158, 13, 93, 162, 154, 81
Bronchopulmonary diseases: asthma, bronchitis, bronchiectasis, emphysema, cystic fibrosis	78, 158, 79, 77, 151, 93, 160
Metabolic diseases: diabetes	216, 158, 74, 124, 46, 136, 93
Renal diseases	79, 77, 78, 93, 24, 163
Malignancies	221, 61, 116
Immunodeficiency, AIDS, immunosuppression, transplant recipients	132, 184, 141, 134, 158, 183, 180, 210, 175
Diseases of the blood, anemia, hemoglobinopathy, oncologic disorders	230, 215, 4, 23, 22

High-risk conditions: (Co-morbidity)	References
Hepatic diseases, cirrhosis	50
Long-term salicylate therapy and younger than 18 years of age (Kawasaki disease, rheumatoid arthritis, acute rheumatic fever, others)	59, 5, 151, 77

Table 1.2. Complications of Influenza

Complications of Influenza	Major Clinical Category	References
Respiratory	› Upper respiratory: Otitis media, sinusitis, conjunctivitis › Acute laryngotracheo bronchitis (croup) › Bronchitis › Bronchiolitis › Pneumonia: Primary viral, secondary bacterial, combined › Complication of pre-existing disease	36, 77, 77, 151, 183, 76, 68, 21, 162, 93, 162, 130, 132, 84, 60, 168, 204
Cardiovascular	› Pericarditis › Myocarditis › Complication of pre-existing disease	167, 218, 176, 53, 154, 169
Muscular	› Rhabdomyositis › Rhabdomyolisis with myoglobinuria and renal failure	117, 145, 47, 150, 234, 45, 182
Neurologic	› Encephalitis › Reye's syndrome › Guillain-Barre › Transverse myelitis	43, 188, 66, 73, 103, 113, 105, 151, 77
Systemic	› Toxic shock syndrome › Sudden death	138, 199, 167, 149, 49, 236, 225, 19, 156

Table 1.3. Comparative features of pulmonary complications of Influenza [210]

	Primary Viral Pneumonia	Secondary Bacterial Pneumonia	Mixed Viral-Bacterial Pneumonia	Localized Viral Pneumonia
Setting	› Cardiovascular disease › Pregnancy › Young adult	› ≥ 65 yr › Pulmonary disease	Any, associated with influenza A or B	? Normal
Clinical history	Relentless progression from classic 3-day flu, rapid deterioration	Improvement and then worsening	Progression from classic influenza or biphasic pattern	Continuation of classic 3-day syndrome
Physical examination	Bilateral findings, no consolidation	Consolidation	Consolidation	Area of crackles
Sputum bacteriologic findings	Normal flora	› Pneumococci › *Staphylococcus aureus* › *Haemophilus influenzae*	› Pneumococci › *Staphylococcus aureus* › *Haemophilus influenzae*	Normal flora
Chest x-ray infiltrate	Bilateral findings	Consolidation	Consolidation	Segmental
White blood cell count	Leukocytosis with shift to the left	Leukocytosis with shift to the left	Leukocytosis with shift to the left	Usually normal
Isolation of Influenza virus	Yes	Yes/no	Yes	Yes
Response to antibiotics	No	Yes	Often	No
Mortality	High	Low	Variable	Very low

2.1 Initial Assessment Management

The algorithms shown in this chapter were designed to be used by healthcare staff and also by volunteers with minimal triaging experience to identify influenza patients who present to the health clinics, doctor's offices, emergency rooms, temporary emergency services, or other influenza triaging centres. Assuming that there will be a large number of cases and limited resources during a pandemic, the assessment guidelines are intended to evaluate the needs of each individual, and triage influenza patients efficiently in a crisis situation. Triage personnel will decide when patients can be managed in an ambulatory setting, redirected home, sent to an alternate care site, or admitted to an acute care hospital.

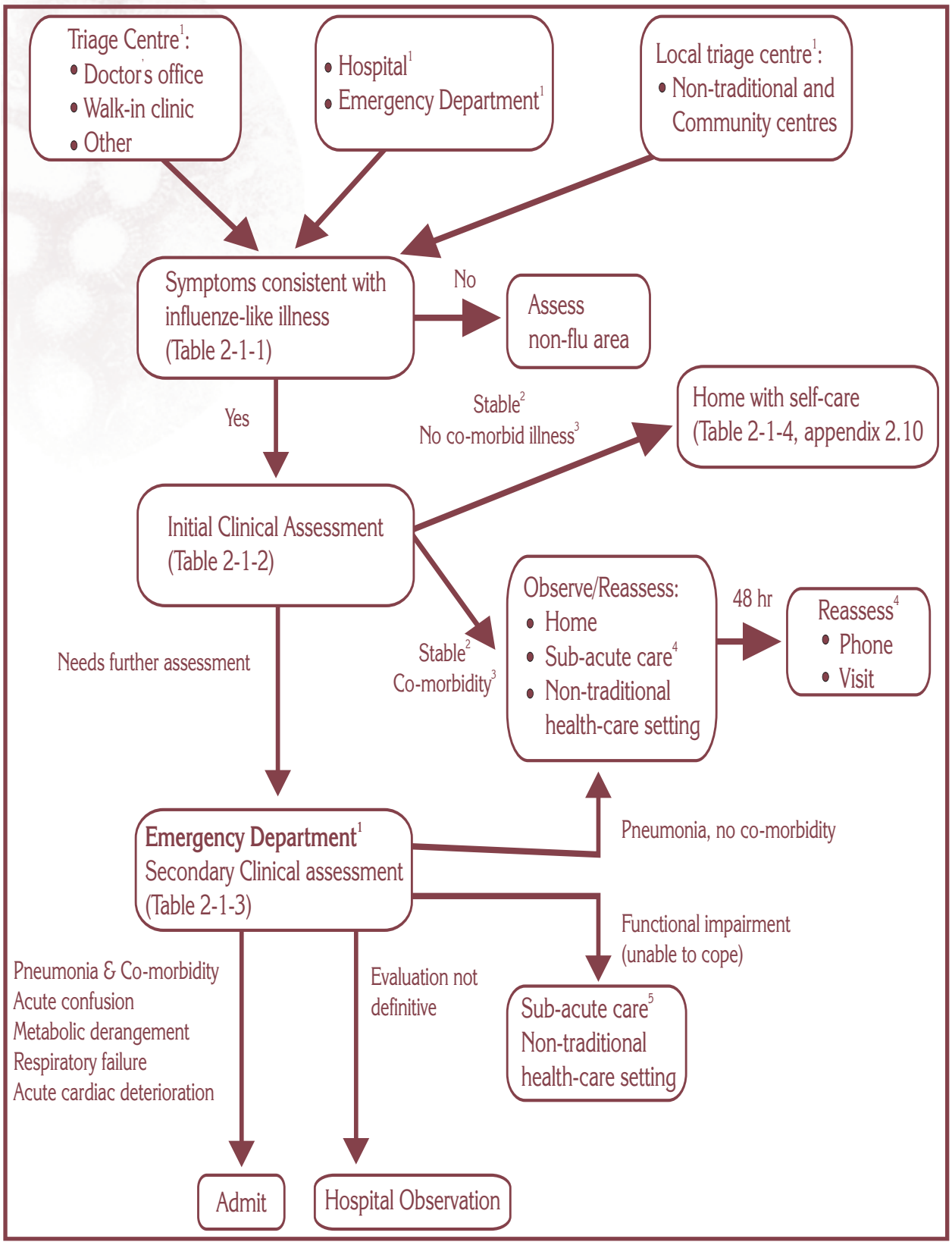
Two algorithms are included in this chapter, one for adults and adolescents (Section 2.1), and a second for children (Section 2.2). There is no clear age limit for the use of these algorithms. Depending on the age of the patient, place of consultation, and on the number of cases of influenza in a given community, young children and adolescents may be seen by personnel specialized in childcare or by the same staff and volunteers who assess the adult population. Nevertheless, influenza can be more severe in youngsters, and different criteria should be used to judge the seriousness of the illness in children (Section 2.2).

Healthy seniors living in the community can be evaluated as other adults (Section 2.1). Nevertheless, elderly individuals are also at increased risk for complications of influenza and those over 65 years of age should be monitored closely (see Chapter 1).

Management of patients/residents in long-term care facilities is discussed in Chapter 3. Because of their age and/or underlying medical condition, most individuals living in long-term care facilities are at increased risk for developing complications after influenza infection. In a pandemic situation it is expected that long-term care residents will remain in the long term care facility for treatment.

These algorithms were designed mainly for urban centres that have a variety of health resources as well as alternative sources of assistance. See Chapter 6 for assessment recommendations tailored to the health care resources found in rural and isolated communities.

Triage of adults (≥ 18 years)



Legend:

1) Triage centres may be located at doctor's offices, clinics, and in non-traditional (NT) sites such as schools, churches, community centres, military field hospitals, etc. When possible, hospitals should assign a special "emergency" area for the triage, secondary assessment and treatment of influenza patients, avoiding the passage of these patients through the regular Emergency Department.
2) Stable: Patient with ILI but without abnormalities meeting the criteria for secondary assessment (Table 2.1.2).
3) Co-morbidity:
   - ≥ 65 yr
   - pregnancy
   - chronic lung disease (e.g., chronic obstructive pulmonary disease, cystic fibrosis, asthma)
   - congestive heart failure
   - renal failure
   - immunosuppression (due to underlying disease or therapy)
   - haematological abnormalities (anemia, haemaglobinopathies)
   - diabetes
   - hepatic disease
   - socially unable to cope (i.e., without personal support at home, such patients may need an alternative centre of care). An alternate care arrangement may also be considered if a high-risk individual lives in the same household as the influenza patient.
   - Patients on long-term acetylsalicylic acid therapy (increased risk of Reye's syndrome).
4) Neighbourhoods should develop local plans for the support, assessment and control of influenza patients at home (e.g., "Flu-block" watch). Some individuals may not be able to self-care at home and will therefore need community support or an alternate care centre. When possible, individuals from the same household should be kept together.
5) In addition to providing sub-acute care, some local NT sites may be able to handle patients more critically ill (Please see Non-traditional Site Guideline, Annex J).

Symptoms consistent with flu like illness

Clinical Case Definition:

When influenza is circulating in the community, the presence of fever and cough of acute onset are good predictors of influenza. The positive predictive value increases when fever is higher than 38°C and when the onset of clinical illness is acute (less than 48 hours after the prodromes). Other symptoms, such as sore throat, rhinorrhea, malaise, rigors or chills, myalgia and headache may also be present. Any case definitions developed prior to the pandemic may need to be modified once the pandemic occurs. A history of contact with another patient with influenza-like illness or with an influenza case confirmed by the laboratory should be sought. If present, it is of diagnostic value.

Adults ((18 years)

a) **Systemic**

- Fever
- Chills
- Headache
- Aching muscles and joints
- Stiffness
- Weakness

b) **Respiratory**

- Cough
- Sore throat
- Hoarseness
- Stuffy or runny nose
- Shortness of breath (patients with influenza and shortness of breath should undergo chest radiography)
- Chest symptoms: thoracic pain when taking a deep breath, retrosternal tracheal pain, pleuritic pain (see legend of Table 2.1.2)
- Red and/or watery eyes
- Earache

c) **Digestive (seen mainly in children and elderly)**

- Vomiting
- Diarrhoea
- Abdominal pain

d) **Neurological**

- Confusion, drowsiness
- Convulsions
- Symptoms suggestive of meningitis (mainly in children)

Initial influenza illness assessment (≥ 18 years)

Primary Assessment	Results Requiring Secondary Assessment
Temperature[a]	≤ 35°C or ≥ 39°C
Pulse	New arrhythmia (irregular pulse) >100 beats/min (if ≥ 16 years)
Blood pressure	≤ 100 systolic Dizziness on standing
Respiratory rate	≥ 24/minute (tachypnea)
Skin colour (lips, hands)	Cyanosis
Chest signs or symptoms[b]	Any abnormality on auscultation or chest pain
Mental status	New confusion[c]
Function	New inability to function independently[c] Persistent vomiting (≥ 2-3 times/24 hr.)[d]
Oxygen saturation[e]	≤ 90% room air

[a] For indications about types of thermometers and how to take the temperature see Appendix 2.I. High fever (≥ 39°C) in adults or in adolescents needs further assessment.

[b] Chest pain should always be investigated because it may be a sign of pneumonia (chest pain on inspiration), or may be a sign of cardiac failure. It may also appear as retrosternal pain (tracheal/bronchial pain) or as a pleuritic pain. When positive, it is an indication for secondary evaluation.

[c] A deterioration in level of consciousness or inability to function independently compared with previous functional status should be further investigated, particularly in elderly patients.

[d] Vomiting (≥ 2-3 times/24 hr.), particularly in elderly patients, requires further assessment.

[e] Determination of blood gases by pulse oximetry as sign of respiratory failure (see Appendix 2.III)

- If no abnormality and no co-morbidities are found: send home with instructions for self-care (2.1.4 and Appendix 2.I).
- If no abnormality, but co-morbidity: send home with instructions for self-care (2.1.4 and Appendix 2.I) and with reassessment after 48 hr; or send to non-hospital domicile. Follow-up.
- Co-morbidities: >65 yr, pregnancy, chronic lung disease, congestive heart failure, renal failure, immunocompromised, haematological abnormalities, diabetes, neoplastic disease, hepatic diseases, socially unable to cope (i.e., non supportive household).
- If secondary assessment is required, and the patients are sent to another centre/ward for complementary evaluation (see 2.1.3) each individual should be provided with a summary of the clinical/laboratory data. Some triage centres may have the facilities to perform secondary assessment and treatment without transferring patients.

Secondary influenza illness assessment (≥ 18 years)

When the patient's secondary assessment has to be completed in a different setting, a new clinical evaluation to confirm the diagnosis at the primary triage centre should precede laboratory studies. Not all the tests mentioned below will be needed for all patients, and clinical assessment should determine which procedures are done, particularly if resources are scarce:

Complementary laboratory studies	Results requiring supervision or admission
CBC (core battery, if appropriate)[a]	Hgb ≤ 80 g/l WBC ≤ 2.500 or ≥ 12, 000 Bands[b] >15% Platelets ≤ 50,000/µL
Electrolytes	Na ≤ 125 meq/L or ≥ 148 meq/L K ≤ 3 meq/L or ≥ 5.5 meq/L
BUN, creatinine	BUN ≥ 10.7 mmol/L Creatinine ≥ 150 µmol/L
Glucose	≤ 3mmol/L or ≥ 13.9 mmol/L
CPK (only in patients with severe muscle pain)	CKMB ≥ 50% Total CK ≥ 1,000 µ/L
Blood gases, O2 saturation (see Appendix 2.III)	Blood gases p02 ≤ 60 room air O2 saturation ≤ 90% room air
Chest x-ray (CXR)[a]	Abnormal, consistent with pneumonia or with congestive heart failure
EKG (clinical criteria)	Evidence of ischemia, new arrhythmia

[a] Under optimal circumstances, blood work and CXR should be obtained before admission. If resources are limited, priority should be given to patients with co-morbidity or suspected complications (i.e., pneumonia, etc.). Patients with normal gases and normal chest auscultation do not need CXR. Likewise, when the clinical diagnosis of pneumonia is unquestionable and the resources are scarce, no CXR need to be taken unless there is suspicion of a complication of the pneumonia (i.e., empyema). If antibiotics are limited, however, CXR may be indicated to confirm pneumonia before prescribing any drug. Conversely, if pneumonia is suspected but the radiology resources are limited, antibiotics may be prescribed without radiological confirmation.

[b] An increase in the number of circulating neutrophil-bands (i.e., immature neutrophils, with an elongated, non-segmented nucleus) suggests bacterial infection. Mean normal values of bands are 12.4% (range 9.5-15.3%)[229]. In a typical acute bacterial infection, the ratio bands/segmented neutrophils may go up to values of 16-17%[228].

Microbiologic Diagnostic tests

Microbiologic diagnostic tests (bacteriologic and/or virologic) may be appropriate for secondary assessment. They will be performed depending on the clinical presentation and availability of resources. Once the pandemic strain is confirmed in a community, virologic tests will be needed only to confirm diagnosis in atypical cases and for surveillance purposes. Rapid tests are useful for diagnostic and treatment decisions (see Appendix 5.II). Isolation and culture of the virus is needed for surveillance purposes.

Ideally, purulent sputum will be analysed by Gram staining and culture to identify infecting bacteria and their susceptibility. In a pandemic, these studies should be reserved for patients admitted to hospitals, especially those in intensive care or those failing initial antibiotic therapy. If culture is not possible, Gram staining should be attempted.

Ideally, blood cultures should be obtained prior to antibiotic therapy in patients with pneumonia. If resources are scarce, blood cultures will be reserved for patients who are very ill, with toxic signs and low blood pressure; for patients who fail to recover after 48 hours of treatment with antibiotics; or for patients admitted to intensive care units.

Sample	Test
Sputum (purulent)	Bacteriologic: Gram and culture
Blood (only for very ill patients or for patients who do not respond to 48h of treatment with antibiotics)	Bacteriologic: Culture
Nasopharyngeal aspirate (only for atypical cases or for surveillance)	Virologic: Virus antigens, RNA, culture

Instructions for self-care of subjects sent home (≥ 18 years)

No co-morbidity:

- Acetaminophen (adults or children), ibuprofen or acetylsalicylic acid (adults only), to treat myalgia and arthralgia*.
- Fluids
- Bed rest
- Drink hot liquids
- Decongestants
- Do not smoke or expose to second hand smoke
- Seek help if:
  - Increasing shortness of breath
  - New pleuritic, chest pain
  - New purulent sputum
  - Persistent vomiting

Co-morbidity: in addition to above

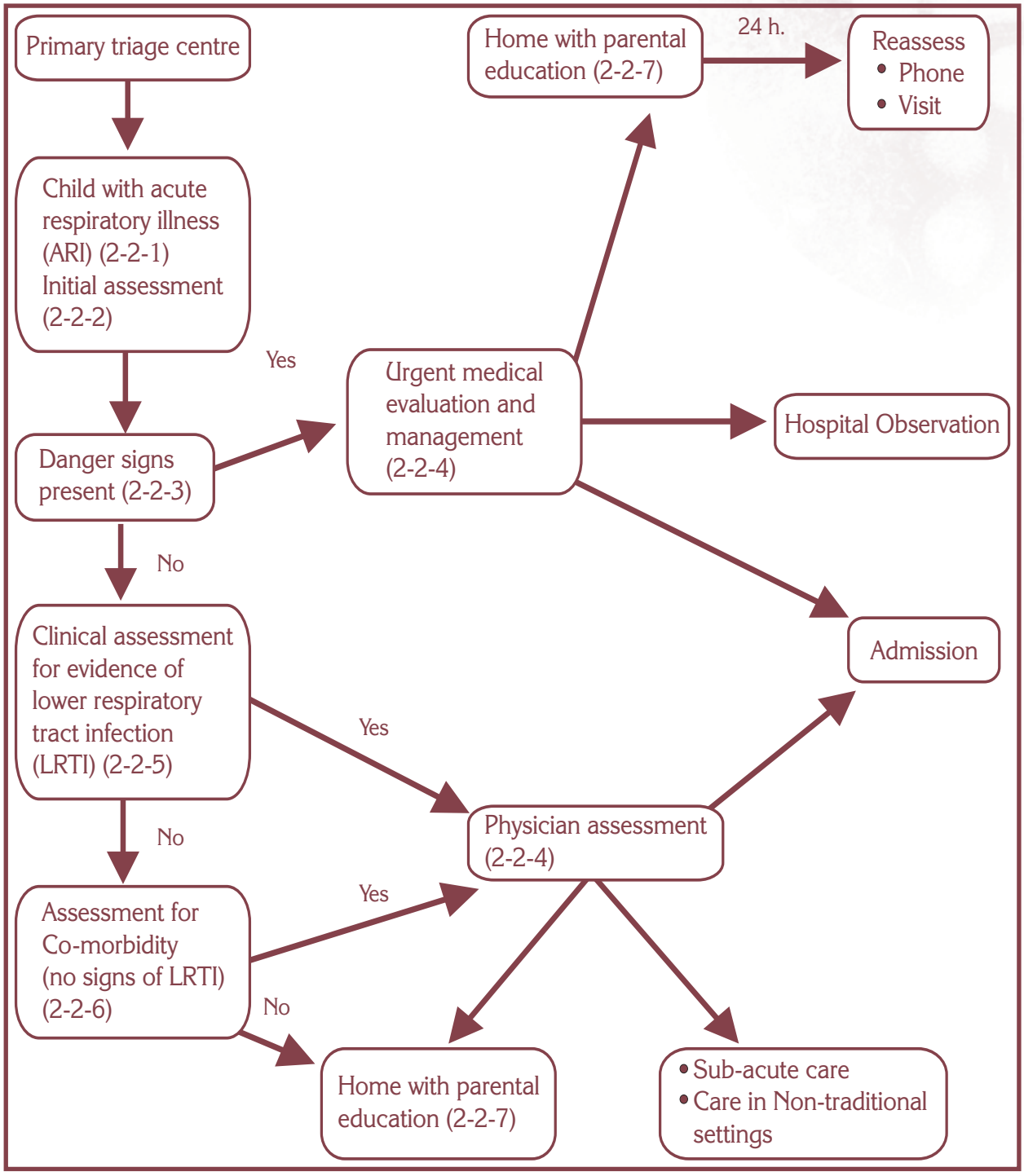
- Supervision (family, friends, allied health, nurse)
- Antiviral therapy (if seen before 48 hours of onset, contingent on pandemic priorities)
- Follow-up after 48 hours by phone call/ health care worker visit.

* A syndrome characterized by acute encephalopathy with fatty micro-infiltration and liver failure, **Reye's syndrome**, has been described in children and adolescents younger than 18 years of age (most commonly in the 4-12 year range) with influenza and receiving acetylsalicylic acid (ASA) e.g., Aspirin[15,105,129,151,5]. The classic presentation is a change in mental status, ranging from lethargy to delirium, seizures and respiratory arrest. The recognition of the association of this syndrome with the use of acetyl salicylic acid to treat viral symptoms, lead to the recommendation for the use of other agents and a decrease in the number of cases.

The province of Alberta developed a self-care plan for the management at home of uncomplicated cases of influenza[200]. It has been developed for interpandemic influenza and will be evaluated during the 2002-2003 influenza season. Appendix 2.I. is a summary of this plan, which has been adapted to be used nationwide, and in a pandemic.

2.2 Pediatric Triage

This algorithm was designed to help medical and healthcare staff, as well as lay persons with minimal knowledge and experience, to manage children with influenza-like illness during a pandemic. Triage centres may be located at the doctor's offices, clinics, hospitals, and in non-traditional care settings (schools, churches, community centres, military field hospitals, etc). The numbers in each of the following boxes refer to sections within this document where additional information can be found.



Child with acute respiratory illness (ARI,[107]) (i.e., one respiratory symptom and fever)

The most common presentation of influenza in children is fever and cough of sudden onset. The term ARI is preferred for children since most distinguishing features in adults are not characteristic in children until the second decade. Young infants (less than 2 months old) can become ill and progress to severe illness rapidly. They are much less likely to cough with pneumonia and frequently have only non-specific signs such as poor feeding, apnea, and fever or low body temperature.

Systemic:

- Fever (≥ 38°C core temperature)
- Apnea

Respiratory symptoms:

- Cough,
- Nasal congestion and/or rhinorrhea (second most common presentation),
- Difficulty breathing (including chest retractions, stridor, etc.)
- Fast breathing* (tachypnea)
- Hoarse voice
- Earache

*Definitions of fast breathing (tachypnea)[222]

< 2 months = >60 breaths per minute
2-12 months = >50 breaths per minute
> 12 months to 5 years = >40 breaths per minute
> 5 years = > 30 breaths per minute

Associated non-respiratory symptoms:

- Not feeling well, malaise
- Low energy, lethargic
- Not playing,
- Needing extra care
- Poor feeding
- Vomiting, diarrhoea
- Irritability, excessive crying, fussy

Initial influenza illness assessment (<18 years)

Primary Assessment	Results Requiring Secondary Assessment
Temperature[a]	≤ 35°C or ≥ 39°C
Respiratory rate	< 2 months = >60 breaths per minute 2-12 months = >50 breaths per minute > 12 months to 5 years = >40 breaths per minute > 5 years = > 30 breaths per minute
Skin colour and temperature (lips, hands)	Cyanosis, sudden pallor, cold legs up to the knee
Chest signs and symptoms[b] (pain may be difficult to detect in young children)	Chest indrawing, wheezing, grunting, inquire for chest pain
Mental status	Lethargic or unconscious, confused[c]
Function	Unable to breastfeed or drink, persistent vomiting (>2-3 times/24 hr.)[d] Inability to function independently[c]
Neurologic symptoms and signs	Convulsions, full fontanelle, stiff neck, photophobia
Oxygen saturation[e]	≤ 90% room air

a For indications about types of thermometers and how to take the temperature see Appendix 2.I. High fever (≤ 39°C) in adolescents is a warning sign and needs further assessment.

b Children with ARI and chest pain should always have medical evaluation, since it may be a sign of pneumonia (chest pain on inspiration). It may also appear as retrosternal pain (tracheal/bronchial pain) or as a pleuritic pain.

c A deterioration of consciousness and functional status, lack of interest in playing and inappropriate sleepiness should be further investigated.

d Vomiting (>2-3 times/24 hr.), particularly if the children are not feeding or drinking well, requires secondary assessment.

e Determination of blood gases by pulse oximetry as sign of respiratory failure (see Appendix 2.III)

Note: If the child must be transported for secondary assessment (see 2.1.3) a summary of the clinical/laboratory data should accompany the patient. Some triage centres, however, may have the facilities to perform secondary assessment and treatment without moving the patients.

Danger signs (paediatrics): (2 months to 5 years old)[222]

- Difficulty breathing (chest indrawing or nasal flaring or grunting or stridor or fast breathing)
- Cyanosis
- Unable to breastfeed or drink
- Vomiting everything (continuous vomiting)
- Lethargic or unconscious or confused
- Convulsions/seizures
- Full fontanelle

- Stiff neck, photophobia

When these danger signs are present in infants younger than 2 months, they suggest very severe disease and may be life threatening. These children should always be referred immediately for physician assessment. Additional danger signs in children under 2 months include:

- The child stopped feeding well (less than half of the usual amount of fluids)
- Fever or low temperature (high fever can represent a serious infection, but low temperature may also be present)
- Wheezing
- Grunting or stridor when calm
- Severe chest indrawing
- Abnormally sleepy or difficult to wake
- Poor circulation: sudden pallor, cold legs up to the knees
- Less than four wet diapers in 24 hours
- Signs of pneumonia (pneumonia in young infants is considered very serious and these children should be referred urgently to a hospital for evaluation)

Urgent medical assessment (paediatrics)

While a primary care provider may give first aid, children with danger sign must be seen by a physician.

Secondary assessment (<18 years)

When the patient's secondary assessment has to be completed in a different setting, a new clinical evaluation to confirm the primary assessment should precede laboratory studies. Not all tests will be needed for all patients, and clinical judgement should be used, particularly if resources are scarce.

Complementary laboratory studies	Results requiring supervision or admission
CBC (core battery, if appropriate)[a]	Hgb[b] ≤ 8.0 g/dL WBC[c] ≤ 2,500 or ≥ 12, 000 cells/µl Bands[d] >15% Platelets[e] ≤ 50,000/µl
Electrolytes	Na[f] ≤ 125 meq/L or ≥ 148 meq/L K[f] ≤ 3 meq/L or ≥ 5.5 meq/L
BUN, creatinine	BUN[f] ≤ 10.7 mmol/L Creatinine[f] ≤ 150 µmol/L
Glucose[f]	≤ 3mmol/L or ≥ 13.9 mmol/L
CPK[f] (only in patients with severe muscle pain)	CKMB ≥ 50% Total CK ≥ 1,000 µmol/L
Blood gases, O2 saturation	Blood gases p02 ≤ 60 room air O2 saturation ≤ 90% room air
Chest x-ray (CXR)[a]	Abnormal, consistent with pneumonia

Legend:

a) Under optimal circumstances, blood work and CXR should be obtained for all patients before admission. When resources are restricted, priority should be given to patients with co-morbidity or suspected complications (i.e., pneumonia, etc.). Similarly, when the clinical diagnosis of pneumonia is definite and resources are scarce, no CXR is needed, unless there is suspicion of a complication of the pneumonia (i.e., empyema). When antibiotics are limited, CXR may be an indication to confirm pneumonia before prescribing any drug and, if pneumonia is suspected but the resources for CXR are in short supply, antibiotics may be prescribed without radiological confirmation.

b) Values of haemoglobin for young children are age related. Normal values for different ages are[157]:

Age	Haemoglobin g/dL	Reference values (SI) mmol/l
1-3 days	14.5 - 22.5	2.25 - 3.49
2 month	9.0 - 14.0	1.40 - 2.17
6 - 12 years	11.5 - 15.5	1.78 - 2.40
12 - 18 years (M)	13.0 - 16.0	2.02 - 2.48
12 - 18 years (F)	12.0 - 16.0	1.86 - 2.48

c) Values of WBC for young children are age related. Normal values for different ages are[157]:

Age	Cells/μ L (limits)	Reference values (SI) 10^9 cells/L
Birth	9,000 - 30,000	9.0 - 30.0
24 h	9,400 - 34,000	9.4 - 34.0
1 month	5,000 - 19,500	5.0 - 19.5
1-3 years	6,000 - 17,500	6.0 - 17.5
4-7 years	5,500 - 15,500	5.5 - 15.5
8-13 years	4,500 - 13,500	4.5 - 13.5
> 13 years	4,500 - 11,000	4.5 - 11.0

d) In a typical acute bacterial infection, the ratio bands/segmented neutrophils may increase up to 16-17%[228]. Mean values of bands in normal individuals are 12.4 % (range 9.5-15.3%)[229].

e) Normal values for children older than one week are the same as for adults[157].

f) Values normal for infants/children[157].

Analyte	Age ranges	Normal values
Sodium	Infants Children Thereafter	139 - 146 mmol/L 138 - 145 mmol/L 136 - 146 mmol/L
Potassium	< 2 months 2 -12 months > 12 months	3.0 - 7.0 mmol/L 3.5 - 6.0 mmol/L 3.5 - 5.0 mmol/L
BUN	Infant/child Thereafter	1.8 - 6.4 mmol urea/L 2.5 - 6.4 mmol urea/L
Creatinine	Infant Child Adolescent	18 - 35 μmol/L 27 - 62 μmol/L 44 - 88 μmol/L
Glucose	Child	3.3 - 5.5 mmol/L

Microbiologic Diagnostic tests

See adult assessment

Clinical assessment for evidence of LRTI (paediatrics)

a) **Clinical assessment**

- Crackles
- Wheeze
- Tachypnea (fast breathing), use of accessory muscles
- Consolidation
- Poor air entry

Any young infant (< 2 months) with pneumonia has a severe, life threatening infection. The most important signs to consider when deciding if a young infant has pneumonia are:

- Breathing rate (≥ 60 times/minute)
- Severe chest indrawing, use of accessory muscles

b) **Secondary assessment (laboratory):**

- Chest radiograph (CXR)
- Respiratory tract specimen for diagnosis (e.g., nasopharyngeal aspirate, sputum on children over 7 years of age)
- Blood work
- Other diagnostic tests (as required).

Determine if patient has co-morbidity of concern

(No evidence of lower respiratory tract infection).

According to NACI, patients at "high risk for complications from influenza" include[152]:

- Chronic cardiac or pulmonary disorder (bronchopulmonary dysplasia, cystic fibrosis, asthma) severe enough to require regular medical follow up or hospital care,
- Chronic conditions such as diabetes and other metabolic diseases,
- Cancer,
- Immunosuppression (due to underlying disease and/or therapy),
- Renal disease,
- Anaemia, hemoglobinopathy,
- Residents of chronic care facilities,
- Patients on long-term acetylsalicylic acid therapy (increased risk of Reye's syndrome).

Asthma and diabetes are the most frequent co-morbidities found in young children. Premature babies and low-weight infants should also be included in this list. All children younger than 2 years of age may be considered as high-risk patients[29].

Socio-economic issues such as age and education of the parents, single parents, multiple young siblings, support at home by other family members, etc., should also be taken into account when sending a child back home. Similarly, whether other individuals at home have high risk of influenza associated complications (siblings with chronic diseases, elderly grandparents, etc.) should be evaluated.

Children at risk for influenza-associated complications (no signs of LRTI). Consider physician assessment to determine eligibility (in agreement with the pandemic guidelines) for:

- Antiviral therapy (within the framework of antiviral prioritization for pandemic influenza, Appendix 5.III).
- Stopping ASA *
- Immunization of patient and family if not already done (according to the pandemic guidelines).
- Plan follow up
- Setting for care (admission, home, institution etc). When possible, members of the same household should be kept together.

Parental/patient education

Children without co-morbidities presenting with uncomplicated influenza infection may be sent home with parental education regarding:

- Maintaining hydration
- Fever management (avoid salicylic acid*)
- Watching for signs of deterioration, failure to improve
- When to return
- Follow up plan if necessary
- Mothers of young infants should be told to return to the health centre immediately if the child worsens or does not feed well, or if breathing becomes difficult.
- Immunization/prophylactic treatment of high-risk contacts in the household (abide by existing pandemic guidelines).
- Infection control practices such as avoiding close contact with othersand paying attention to hand hygiene, proper disposal of tissues, etc.

See Appendix 2.I.: CARING FOR YOUR-SELF: “When a child is unwell” and “how to take a child’s temperature”.

* A syndrome characterized by acute encephalopathy with fatty micro-infiltration and liver failure, **Reye’s syndrome**, has been described in children and adolescents younger than 18 years of age (most commonly in the 4-12 year range) with influenza and receiving salicylates (ASA)[15,105,129,151,5]. The classic presentation is a change in mental status, ranging from lethargy to delirium, seizures and respiratory arrest. The recognition of the association of this syndrome with the use of acetyl salicylic acid to treat viral symptoms, lead to the recommendation for the use of other agents and a decrease in the number of cases.

This appendix is prepared from a draft written by Ms. Diane Spillett for Alberta Health and Wellness (September 2001). The original document was designed for the province of Alberta, to reduce hospital overload during interpandemic influenza. It has been adapted to be used nationwide in a pandemic situation.

I. Staying Well

A. Be Informed About Influenza

What is Influenza?

Influenza (flu) is an infection of the cells that line the lungs and airways (the respiratory system). In North America it usually affects people during the winter (November - April). It is caused by one of three types of viruses - Influenza A, Influenza B, and Influenza C. Influenza A usually causes the worst illness, Influenza B is more common in children and Influenza C is rare. **Only influenza A has been associated with pandemics**.

The influenza viruses that circulate every winter are related to those from the preceding epidemics. These viruses spread among people with varying levels of immunity (body defences) following infections earlier in life. Over a period of 2 or more years, this circulation promotes the selection of new viruses that have changed enough to again cause epidemic infection among the general population.

At unpredictable intervals, "**novel influenza viruses emerge, which are totally different from strains circulating the year before. If such viruses have the potential to spread readily from person-to-person, then more widespread and severe epidemics may occur, usually to a similar extent in every country within a few months to a year, resulting in a pandemic**."[223]

How is Influenza Spread?

Influenza is very contagious. People can pass the virus for up to seven days or more, beginning from the day before they have the first symptoms of the illness. People breathe-in the virus from particles in the air when they are around those who have the flu and who have been talking, coughing, or sneezing. The virus can travel from 1 - 2 meters in the air, and can live several hours on your hands and surfaces. People can also become infected when they touch those who are ill (e.g., kiss them or shake their hand), or contact objects on which viruses have landed (e.g., telephones, door knobs, dishes, handrails), and then touch their own nose, mouth or eyes. It is especially easy for the virus to spread where there are crowds or where people live or work/study close together. The flu virus lives longer in cool, dry places. It can live for one or two days on hard surfaces, and 8-12 hours on cloth, tissue and paper.

What are the Symptoms of Influenza?

A person develops symptoms of the flu within one to three days after becoming infected with the virus. They suddenly develop a fever and possibly chills, and may have a headache and aching muscles, especially in the back and legs. They usually have a dry cough and feel weak and tired. Some people have a sore throat and a runny or stuffy nose. They probably won't feel like eating. In general, people feel very sick and want to stay in bed. The fever usually falls in three to five days, and the person begins to feel better. However, tiredness and a cough can sometimes continue for several weeks.

People often mistakenly refer to stomach upsets and colds as "the flu". Influenza is quite different from both of these. It rarely causes vomiting and diarrhoea, but may do so in young children or elderly individuals. Unlike influenza, the common cold comes on gradually, rarely causes a fever, and is usually limited to a sore throat, coughing and sneezing, and a stuffy, runny nose. It is generally milder than influenza and people can carry on with their usual activities.

How Serious is Influenza?

Most healthy people recover from influenza without any serious problems. However, there are certain groups of people who are "at risk" of developing complications which can be very serious, and even cause death.

Some people, such as very young children and the elderly, are "at risk" because they have weaker body defences (immune systems). Pregnant women, particularly those who are in the second and third month of their pregnancies, have also increased risks of pneumonia, lung insufficiency, and death after influenza infections. Similarly, those with diseases such as cancer and HIV/AIDS, people who have had organ transplants and persons who take certain medications frequently develop complications.

Another group of people "at risk" are those who have chronic (long term) conditions such as heart disease, lung disease (asthma, cystic fibrosis, emphysema), kidney disease and diabetes. When a body system is not strong, it is easier for bacteria to invade the cells that have been damaged by the flu virus and cause other illnesses such as pneumonia. Influenza can also stress the body so much, that the underlying chronic illness may be worsened.

Children under the age of eighteen years and who have influenza **should avoid taking acetylsalicylic acid (ASA), e.g., Aspirin**, because they can develop a very serious illness affecting the nervous system and liver, called Reye's syndrome. It is important for parents of children who need to take ASA on a regular basis for a health problem, to discuss possible complications associated with influenza with their doctor, and find out what they can do to reduce the risk.

For More Information

If there is an outbreak of pandemic influenza in your community, watch the television or listen to the radio for up to date information, or access the Health Canada website at http://www.hc-sc.gc.ca/.

If you have questions about somebody in your household that may have the flu, call the Public Health Centre in your area.

B. Protect Yourself Against Influenza

Immunization

Vaccination is the best way to avoid or to lessen the severity of influenza.

Vaccination is advised once a vaccine with the pandemic strain becomes available. Priorities for vaccination, including the types of individuals that should be immunized first if vaccine supply is limited, have been identified in the Canadian Pandemic Influenza Plan and will be confirmed at the time of a pandemic.

Who Should Get the Flu Vaccine?

Vaccine supply may be limited during the early stages of the pandemic; therefore the Pandemic Influenza Committee (PIC) will define priority groups, which should be immunized first. This prioritization will evaluate the impact that the vaccine may have on: a) reducing morbidity and mortality by maintaining the health services response, and by individual protection of high-risk groups, and b) minimizing societal disruption by maintaining essential services (as stated in the pandemic guidelines, Vaccines section).

Call the Public Health Centre in your area to learn about vaccine availability and to find out if any of the members of your household belongs to a priority group. They will also inform you where they are holding "Flu Clinics" for immunization. Some doctors may provide the vaccine to their patients. Two shots may be required (as per pandemic guidelines).

The vaccine is safe for pregnant women, breast-feeding mothers and children. It is not effective for children under the age of 6 months.

Who Should NOT get the Flu Vaccine?

People who are severely allergic to eggs should not receive the vaccine, as viruses used in making the vaccine are grown in eggs. Rarely, a person has had an allergic reaction to some other ingredient in the vaccine - a raised itchy rash, swollen throat or tongue, red itchy eyes or possibly a swollen face within 12 hours of getting the injection. These people should not get be vaccinated again.

If a person is "at risk" for getting serious complications from influenza and cannot be vaccinated, their doctor may wish to prescribe an antiviral drug to give them some protection during the pandemic. Antivirals stop the flu virus from multiplying. It is a good idea to ask your doctor about this medication, if you are allergic to the vaccine. He/she will need to consider your medical problems, available medications (the Pandemic Influenza Committee will also define priority groups, if antivirals are in short supply), and possible side effects of the drug.

Doctors may also prescribe antivirals for:

1. People at high-risk even though they were vaccinated, if they need extra protection,
2. People who were vaccinated after the virus was present in the community, and need to be protected for the two weeks required for a response to the vaccine.
3. The public at large, if there is a pandemic and the vaccine with the pandemic strain is not available or is insufficient.

If a person has a minor illness, they can still get the flu shot. However, tell your doctor if you have a temperature of 37.8°C (100°F) or more or if you have other symptoms.

What Reactions do People have to the Flu Shot?

Some people think that they will get the flu from the flu shot. This is not possible, because the virus in the vaccine has been killed. The most common reaction to the flu shot is some redness and soreness where the needle entered the skin. This is usually gone in two days. Some people may develop a fever, tiredness and aching after six to twelve hours that may last for a day or two. More serious reactions are rare. The benefits and risks of this vaccine should be discussed with your vaccine provider as part of the informed consent process.

Hygiene

In addition to getting vaccinated, the single most important step people can take to prevent the flu is to wash their hands often.

Wash your hands often, especially after being in contact with someone who has a respiratory infection, or with children who get the virus easily and are the main spreaders of the virus in the community. Do not shake hands. It is good for everyone to get into the habit of washing their hands before meals, after using the toilet, and after they cough or sneeze or blow their nose. The sooner children are taught this, the better. It is best to wash your hands with warm soap and water, scrubbing your wrists, palms, fingers and nails for ten to fifteen seconds. Rinse and dry with a clean dry towel.

Be aware of the times you rub your eyes or touch your nose or mouth, and try to avoid these habits. This can bring the virus into your airways, if you have recently touched someone who has the flu, an object that they have used, or a surface on which the virus has settled.

Remember not to share eating utensils or drinks.

Don't visit people who have the flu unless it is absolutely necessary. If a member of your family has the flu, keep their personal items, such as towels, separate from the rest of the family. Clean surfaces (such as bathroom sinks and taps, kitchen sinks and counters) after the ill person has handled them. Wash hands after cleaning a child's nose.

Avoid large crowds.

Care for Your Self

Taking good care of yourself physically and emotionally strengthens your overall well-being and the ability of your body to fight off infections and to stay healthy. Not smoking is particularly important for the health of the lungs and airways, and drinking plenty of water helps to keep the airways moist and able to cleanse the system of unwanted material.

C. Plan Ahead

Spend a little time thinking about what you would need if you got the flu.

If you live alone, or are a single parent of young children, or are the only person caring for a frail or disabled adult, it might be a good idea to:

- Have enough fluids (juices, soups etc.) on hand to last you and your family for 1-2 weeks.
- Have enough basic household items (e.g., tissues) to last for 1-2 weeks.
- Have acetaminophen and a thermometer in your medicine cabinet. Do you know how to use/read a thermometer correctly? If not, don't be shy about asking someone to show you how.
- Think of someone you could call upon for help if you became very ill with the flu and discuss the possibility with him or her.
- Think of someone you could call upon to care for your children if their school or daycare was closed because of the pandemic, and you were required to work, and discuss the possibility with them. If you cannot think of anyone who could help you in such a situation, you can call the Public Health Centre in your area to find out what is available in the community to help with these difficulties.

II. If You Are Unwell

A. Is It The Flu?

The most prominent characteristics of the flu are the sudden appearance of a fever (38°C or 100.4°F or more), a dry cough and aching in the body, especially in the head and lower back and legs. Usually the person feels extremely weak and tired and doesn't want to get out of bed. Other symptoms can be chills, aching behind the eyes, loss of appetite, a sore throat and a runny, stuffy nose. After your symptoms first appear you can spread the virus to others for 4-6 days or more.

B. What Can You Do For Yourself?

- **Rest** - Probably, you will feel very weak and tired until your temperature returns to normal (about three days), and resting will provide comfort and allow your body to use its energy to fight the infection. You should avoid contact with others while the infection is contagious (at least six days after the first symptom appears).
- **Drink plenty of fluids** - Extra fluids are needed to replace those lost because of the fever (sweating). If your urine is dark, you need more to drink. Liquids, especially warm ones like chicken soup, help loosen mucus. Try to drink a glass of juice/water or an equal amount of some other fluid every hour while you are awake.
- **Take acetaminophen or ibuprophen** as recommended on the package to bring down your fever and ease your muscle pain (unless your doctor says otherwise). **CHILDREN UNDER 18 YEARS OF AGE SHOULD NOT TAKE ACETYLSALICYLIC ACID (ASA) OR ANY PRODUCTS CONTAINING ASA**. The combination of influenza and ASA in this age group has been known to cause Reye's syndrome, a very serious condition affecting the nervous system and liver. **ANTIBIOTICS ARE NOT EFFECTIVE AGAINST INFLUENZA** because it is a virus, and antibiotics fight bacteria. A hot water bottle or heating pad may also relieve muscle pain. A cup of Epsom salts in a warm bath may be soothing.
- **Gargle** - with a glass of warm water to ease a sore throat. Sugarless hard candy also helps, as do lozenges.
- **Use saline nose drops or spray** (ones that contain salt water but no medicine) to help soothe or clear a stuffed nose. Try not to blow your nose as this could send infected secretions into your sinuses. Wipe your nose with disposable tissues and put them in the garbage can immediately. Cover your nose and mouth with tissues when you cough or sneeze and throw them in the garbage as well. **Wash your hands often**.
- **Do not smoke** - it is very irritating to the damaged airways.
- **If you are a single parent, or you are responsible for the care of someone who is frail or disabled, you may need to call someone to help you until you are feeling better**.
- If you buy medicine at the drug store to treat your symptoms ("over-the-counter" medications), check with the pharmacist to see if it is the best one for you. Mention if you have a chronic illness or are taking any other medicine. Take into consideration that:
    - It is better to buy a remedy that treats only one symptom. This way you are not taking in substances that are doing nothing, or that may trigger an adverse reaction.

- Read the label to be sure that the ingredient treats the symptom you have.
- Extra strength remedies contain a higher dose of the ingredient. Try the standard dose first. It may work fine and not have the same risk of side effects.
- Long acting medications tend to have more side effects than short acting medications.
- Read the label and note any possible side effects or interactions with other drugs or health conditions.
- If you have a chronic condition and are taking prescription medications, it is a good idea to ask the pharmacist to suggest a medication that would be safe for you to take, if you have not already discussed this with your doctor.

Muscle pain and fever - Acetaminophen is a good choice because it causes less stomach irritation than other drugs. **Acetylsalicylic acid should not be given to children under the age of eighteen**.

A cough can be helpful if it gets rid of mucus. If a dry cough is keeping you awake, a cough suppressant, Dextromethorphan is safe and effective. If you need help loosening mucus, an expectorant such as Guaifenesin is good. It is not helpful to take a suppressant and an expectorant together.

A stuffy nose - Decongestants help shrink swollen blood vessels in the nose. There are two kinds pills and nose drops/sprays. Nose drops/sprays act in minutes. They work better and have fewer side effects than the pills. However, *they only work for 2 or 3 days, and then they make matters worse*. Oxymetazoline, Phenylephrine and Xylometazoline are nose drops/sprays. If your nose is still stuffy after three days, you may want to switch to the pills. The pills take 1/2 hour to work. They may cause dry mouth, sleep disturbances and other side effects. Pseudoephrine is a decongestant in pill form.

Sore throat - Some medications work by numbing the throat, Dyclonine works the best. Others are Benzocaine, Hexylreorcinol, Menthol and Phenol. These are lozenges or throat sprays. Other lozenges act by coating the throat. They may contain honey, herbs or pectin.

Ingredients to avoid:

- Phenylpropanolamine (PPA) has been linked with strokes.

Note: Older people may become much more sensitive to medications in general and may experience more side effects, especially to the nervous system (e.g., confusion). It is best to take no more than three or four medications at a time. This includes both prescription and over the counter drugs.

If you have any questions at all about medications, don't hesitate to talk to your pharmacist.

Generally, people begin to feel better after their temperature returns to normal, in about three days, and are ready to return to their normal activities/work in about a week. It is common for tiredness and a cough to linger on for several more weeks.

C. When To Seek Medical Attention

If you are a normally healthy person **and have been suffering with the flu, it is time to call the doctor, EMS or health help line if**:

- **You become short of breath while resting or doing very little;**
- **Breathing is difficult or painful;**
- **You are coughing up bloody sputum;**
- **You are wheezing**
- **You have had a fever for three or four days and you are not getting better - or you may be getting worse;**
- **You have started to feel better, and suddenly you get a high fever and start to feel sick again;**
- **It is noted by yourself or others that you are extremely drowsy and difficult to wake up or that you are disoriented or confused;**
- **You have extreme pain in your ear.**

Seek medical care as soon as possible, in order to prevent your condition from worsening. Bacteria may have invaded your damaged tissues. At this point your doctor may consider giving you an antibiotic.

If you have heart or lung disease or any other chronic condition that requires regular medical attention, if you are frail, or if you have an illness or are on treatments or medications that affect your immune system and you get the flu, call your doctor. If you are living with a long-term illness, your doctor may suggest changes to your usual management routine and/or provide you with extra help in treating the flu and preventing complications e.g., antiviral drugs. **These medications must be taken within 48 hour of the first symptoms to be effective so call your doctor right away**.

What your Doctor May Prescribe:

Recently, drugs called antivirals have been developed which can fight viruses. ***To treat influenza, they must be started within 48 hours of the first symptoms of the flu*** - the sooner, the better.

At the time of a pandemic, antivirals will likely be in short supply. Health Canada will provide advise as to who should get antivirals as a priority. For example, persons with underlying chronic diseases may be one of the first groups to receive treatment with antivirals. If you are in a priority group and you have symptoms of the flu, you should call your doctor straight away. If you are a healthy person and have not been identified as being in a priority group for antivirals, you do not need to call your doctor unless you have the more severe symptoms listed above.

D. When A Child Is Unwell

Older children and teens have the same symptoms of the flu as adults. Very young children and infants probably have similar symptoms, but do not know how to tell people they have sore muscles or a headache. These children may be irritable and eat poorly. They sometimes develop a hoarse cry and barking cough (croup). Younger children may also have diarrhoea, vomiting and stomach pain - especially children under 6 months.

Some of the things you can do for your child are:

- Give acetaminophen or ibuprofen every four to six (ibuprofen) hours for the fever in the dose recommended on the package (unless your doctor says otherwise). **DO NOT GIVE ACETYLSALICYLIC ACID CONTAINING MEDICATION (e.g., Aspirin, Bufferin etc.)** Your pharmacist can provide advice on appropriate over-the-counter medications for treating fever.
- Do not expect to be prescribed antibiotics for uncomplicated influenza, as they will have no benefit. Antibiotics may be prescribed for complications of influenza such as pneumonia or ear infection.
- Dress the child in lightweight clothing and keep the room temperature at 20°C.
- Offer cool fluids frequently when the child is awake.
- Avoid cool baths.
- Allow the child to rest and stay at home if possible for 6 days or more, so the virus isn't spread to other children.
- Use salt-water nose drops to treat a stuffy nose. Throw away tissues as soon as you have wiped your child's nose. Teach the child to cover their mouth when they cough or sneeze and then to throw the tissue away. Wash your hands often and teach your child to do so after wiping the nose.

Take your child to the doctor if your child:

- Has heart or lung disease or any chronic illness requiring regular medical care; has a disease or is taking drugs or treatments that affect the immune system; takes acetylsalicylic acid (ASA) e.g., takes ASA regularly for a medical condition;
- Has trouble breathing;
- Is less than 6 months old and has any temperature over 38.5°C;
- Is constantly irritable and will not calm down;
- Is listless and not interested in playing with toys;
- Has a fever that lasts more than 5 days;
- Drinks so little fluid that they are not urinating at least every 6 hours when awake;
- Has vomiting for more than 4 hours, or has severe diarrhoea;
- Note: green or yellow nasal discharge does not mean a child has a bacterial infection and needs antibiotics.

TAKE YOUR CHILD TO THE HOSPITAL EMERGENCY DEPARTMENT OR CALL 911 IF YOUR CHILD:

- Has severe trouble breathing not caused by a stuffy nose
- Has blue lips
- Is limp or unable to move
- Is hard to wake up, unusually quiet or unresponsive
- Has a stiff neck
- Seems confused
- Has a seizure (convulsion/fit)
- Has not had a wet diaper in 12 hours.

A) How To Take A Child's Temperature

There are 4 ways to take a child's temperature:

- by the mouth (oral)
- by the bum (rectal)
- under the armpit (axillary)
- in the ear (tympanic)

The best method to choose depends on your child's age:

- **Birth to 2 years**: best choice for an exact reading-rectal, second choice -armpit (to check for fever)
- **Between 2 and 5 years**: best choice-rectal, second-ear, third-armpit
- **Older than 5 years**: first choice-oral, second-ear, third-armpit

There are two types of glass thermometers: one for oral and axillary temperatures (it has a long slender bulb at one end, containing mercury) and one with a short, stubby, larger bulb for rectal temperatures. As the mercury expands, in response to the heat from the child's body, it moves up the column.

A digital thermometer can be used for rectal, oral and armpit temperature taking. It is made of unbreakable plastic, is easy to read and measures temperature faster than glass. Ear thermometers are available but are expensive.

A fever strip is not recommended because it does not give an accurate temperature reading.

Rectal Method

- *If you are using a glass thermometer*, be sure it is a rectal thermometer.
- Clean the thermometer with cool, soapy water and rinse (hot water causes the mercury to expand and may burst the thermometer).
- Hold the thermometer at the end away from the mercury and shake it with firm downward flicks of the wrist so that the mercury goes below 36°C (96.8°F).
- Cover the silver tip with petroleum jelly (such as Vaseline)
- Place the baby on his/her back with his knees bent.
- Gently insert the thermometer in the rectum, about 2.5 cm (1 inch), while holding it with your fingers.
- Hold for at least two minutes. Remove the thermometer. Hold it near the light and slowly turn it until the line of mercury is seen. Read the temperature where the line of mercury ends.

- Clean the thermometer with cool soapy water and rinse. Use a cotton swab soaked in alcohol to rub down the thermometer.
- Store the thermometer in a container to prevent breakage.
- NB. This method is not recommended for children with illnesses/treatments affecting their immune system.

Armpit Method

- Use an oral glass thermometer.
- Clean the thermometer and shake down the mercury as in "rectal method".
- Place the silver tip of the thermometer in the center of the armpit.
- Make sure your child's arm is tucked snugly against his/her body.
- Leave the thermometer in place for at least 4 minutes.
- Remove, read, clean and store the thermometer as in "rectal method".

To use a digital thermometer:

- Press the button to turn the thermometer "on".
- Put the thermometer under your child's armpit. The silver tip must touch the skin.
- Hold the top of the thermometer with one hand and hold down your child's arm with the other hand.
- Wait for the thermometer to beep.
- Read the temperature on the display.
- To clean a digital thermometer, wash only the tip with soap and warm (not hot) water and wipe off with alcohol after use. Dry well.

Mouth Method

- Clean the thermometer and shake down the mercury as in "rectal method".
- Do not give the child cold or hot liquids for 1/2 hour before taking his/her temperature.
- Carefully place the tip of the thermometer under the child's tongue. Tell him/her to close the mouth but not to bite down. (NB. This method is not recommended for children under 5 years of age.)
- With the child's mouth closed, leave the thermometer in place for 3 to 4 minutes. Stay with child and make sure he/she remains still.
- Remove thermometer, Read, clean and store as in rectal method.

Ear Method

- Use a clean probe tip each time, and follow the manufacturer's instructions carefully.
- Gently tug on the ear, pulling it up and back. This will help straighten the ear canal, and make a clear path inside the ear to the eardrum.
- Gently insert the thermometer until the ear canal is fully sealed off.

- Squeeze and hold down the button for one second.
- Remove the thermometer and read the temperature.
- NB. This method is not recommended for children under one year of age.

Ask the pharmacist any questions you may have when you purchase your thermometer. If you are purchasing a glass thermometer, look for one with a mercury column that is easy to see, and degree markings that are easy to read.

What is a normal temperature?

The normal temperature range varies, depending on the method you use:

Rectum: 36.6°C to 38°C (97.9°F to 100.4°F)

Armpit: 34.7°C to 37.3°C (94.5°F to 99.1°F)

Mouth: 35.5°C to 37.5°C (95.9°F to 99.5°F)

Ear: 35.8°C to 38°C (96.4°F to 100.4°F)

B) How To Take An Adult's Temperature

Normal body temperature is regulated between 35.8°C and 37.2°C in healthy persons, it may vary by 0.5-1 degree during the day. Body temperature shows a definite pattern: low in the morning, gradually increasing during the day, and reaching its maximum during the late afternoon or evening.

There are 3 ways in which an adult's temperature is usually taken:

- by the mouth (oral)
- in the ear (tympanic)
- under the armpit (axillary). This method is less accurate, and is usually only used if the person is extremely drowsy or not clear mentally.

There are two types of glass thermometers: one for oral and axillary temperatures (it has a long slender bulb at one end, containing mercury) and one with a short, stubby, larger bulb for rectal temperatures. (These are usually used with children). As the mercury expands, in response to the heat from a person's body, it moves up the column.

A digital thermometer can be used for oral, armpit (and rectal) temperature taking. It is made of unbreakable plastic, is easy to read and measures temperature faster than glass. Ear thermometers are available but are expensive.

A fever strip is not recommended because it does not give an accurate temperature reading.

Oral Method

- *If you are using a glass thermometer*, be sure it is an oral thermometer.
- Clean the thermometer with cool, soapy water and rinse (hot water causes the mercury to expand and may burst the thermometer).
- Hold the thermometer at the end away from the mercury and shake it with firm downward flicks of the wrist so that the mercury goes below 36°C.

- Make sure that you/the person whose temperature is being taken has not smoked a cigarette, had a hot or cold drink or taken a hot bath for 1/2 hour, or the reading will not be accurate.
- Carefully place the silver tip of the thermometer under tongue. Close mouth but do not to bite down. (NB. This method is not recommended for children under 5 years of age.)
- With mouth closed, leave the thermometer in place for 3 to 4 minutes.
- Remove the thermometer. Hold it near the light and slowly turn it until the line of mercury is seen. Read the temperature where the line of mercury ends.
- Clean the thermometer with cool soapy water and rinse. Use a cotton swab soaked in alcohol to rub down the thermometer.
- Store the thermometer in a container to prevent breakage.

If you are using a digital thermometer:

- Press the button to turn the thermometer "on".
- Put the thermometer tip under tongue and close mouth.
- Wait for the thermometer to beep.
- Read the temperature on the display.
- To clean a digital thermometer, wash only the tip with soap and warm (not hot) water and wipe off with alcohol after use. Dry well.

Ear Method

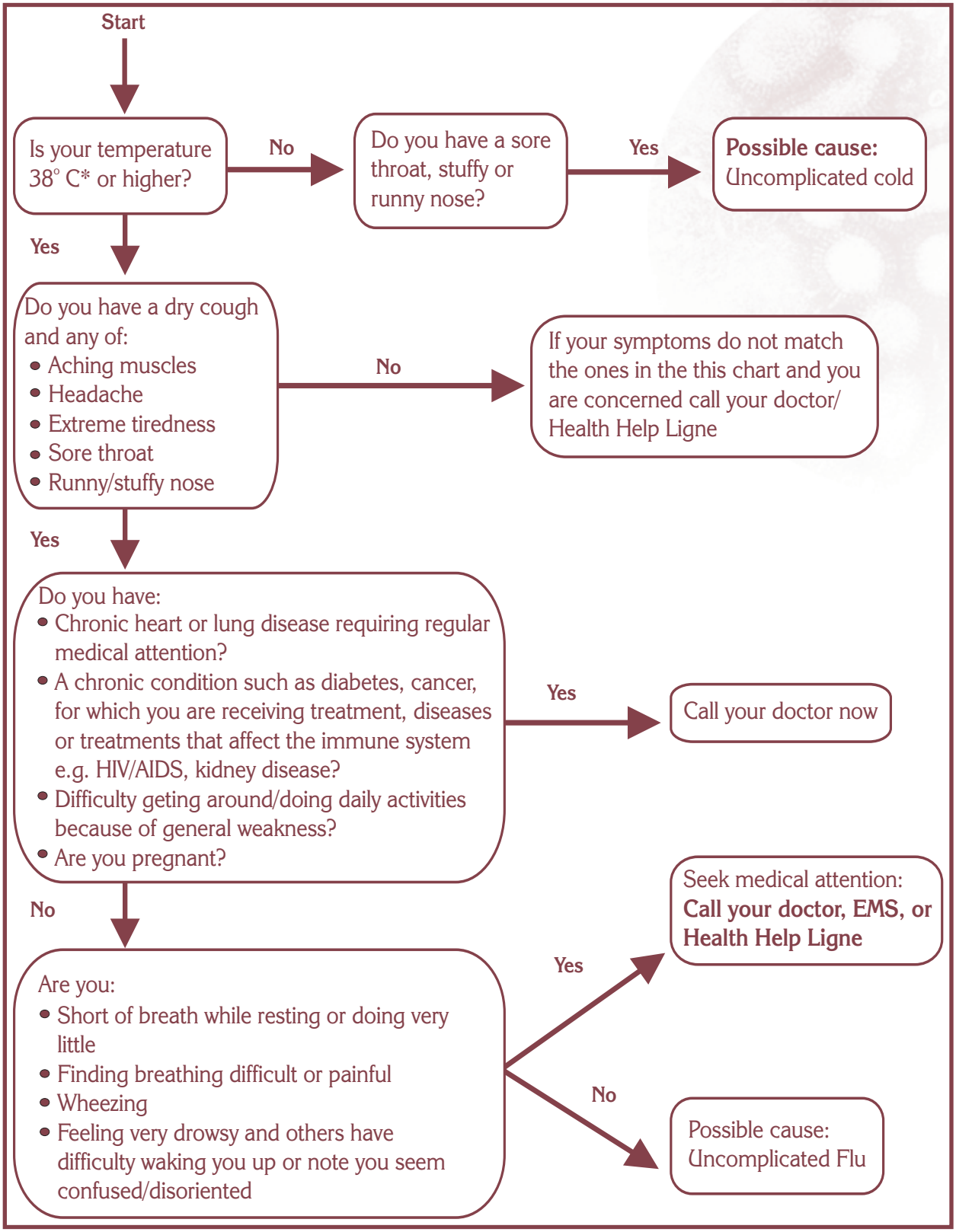
- Use a clean probe tip each time, and follow the manufacturer's instructions carefully.
- Gently tug on the ear, pulling it up and back. This will help straighten the ear canal, and make a clear path inside the ear to the eardrum.
- Gently insert the thermometer until the ear canal is fully sealed off.
- Squeeze and hold down the button for one second.
- Remove the thermometer and read the temperature.

Axillary Method

- Use an oral glass thermometer.
- Clean the thermometer and shake down the mercury as in "oral method".
- Place the silver tip of the thermometer in the center of the armpit.
- Make sure the person's arm is held snugly against his/her body (forearm across chest).
- Leave the thermometer in place for at least 4 minutes.
- Remove, read, clean and store the thermometer as in "oral method".

Ask the pharmacist any questions you may have when you purchase your thermometer. If you are purchasing a glass thermometer, look for one with a mercury column that is easy to see, and degree markings that are easy to read.

C) Self-care Algorithms, Adults



*For people older than 75 years, the temperature may be lower, e.g., 37.2°C

What you can do for yourself (uncomplicated flu)

- Rest-you will probably feel very weak until your temperature returns to normal.
- Fluids-extra fluids are needed to replace those lost in sweating. If your urine is dark, you need more to drink. Warm fluids help loosen mucus.
- Take acetaminophen 1 or 2 tablets every 6 hours or ibuprophen as recommended on the package for fever and muscle pain. Children under 18 years of age should not take acetylsalicylic acid (ASA) or any products containing acetylsalicylic acid (ASA). Antibiotics won't help.
- Treat your symptoms, e.g., cough suppressant.
- Stay home from work/school for 6 days (while you are contagious), or until you are feeling better.
- Ask for help from family/friends if you live alone, are a single parent with small children, etc. and are having a hard time taking care of your own/your family's needs.

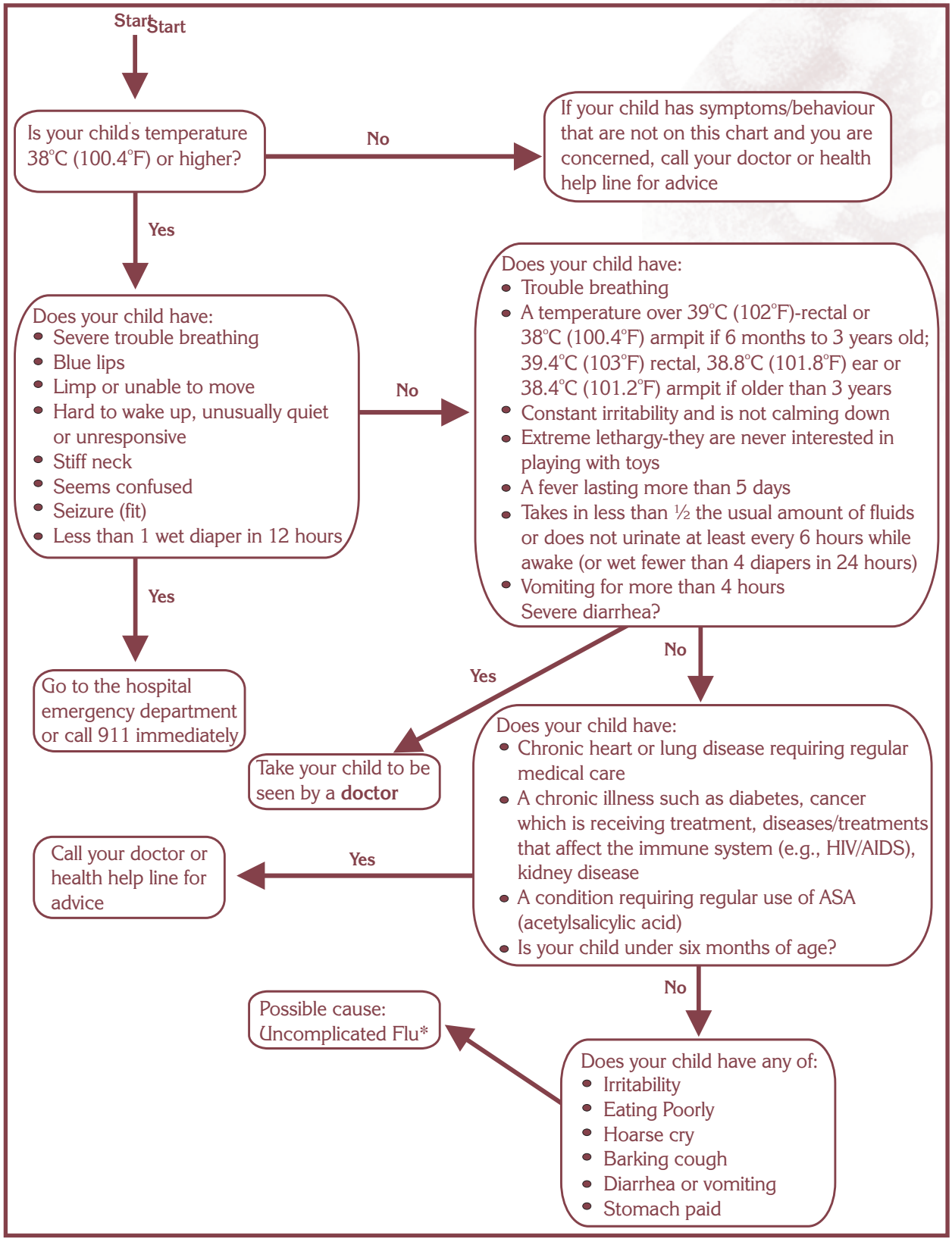
What to expect

- **Day 1-3**: Sudden appearance of fever, headache, muscle pain and weakness - also dry cough, sore throat and stuffed nose (but overshadowed by previous symptoms)
- **Day 4**: Fever and muscle aches decrease. Hoarse, dry or sore throat, cough and possible mild chest discomfort become more noticeable
- **Day 8**: Symptoms decrease. Cough and tiredness may last 1-2 weeks or more.

If any of the following happen during the flu, SEEK MEDICAL ATTENTION (Call your doctor, EMS, Health Helpline or go to the Emergency Room):

- You are short of breath even while resting.
- You have pain in your chest when you breathe.
- If you have heart disease and develop chest pain.
- You are coughing up bloody sputum.
- You are wheezing.
- You still have a fever and are not feeling better after 5 days.
- You are feeling better and suddenly you develop a fever.
- You or others note that you are extremely drowsy or are confused/disoriented.

Does Your Infant or Young Child (Birth to 6 Years) Have The Flu?

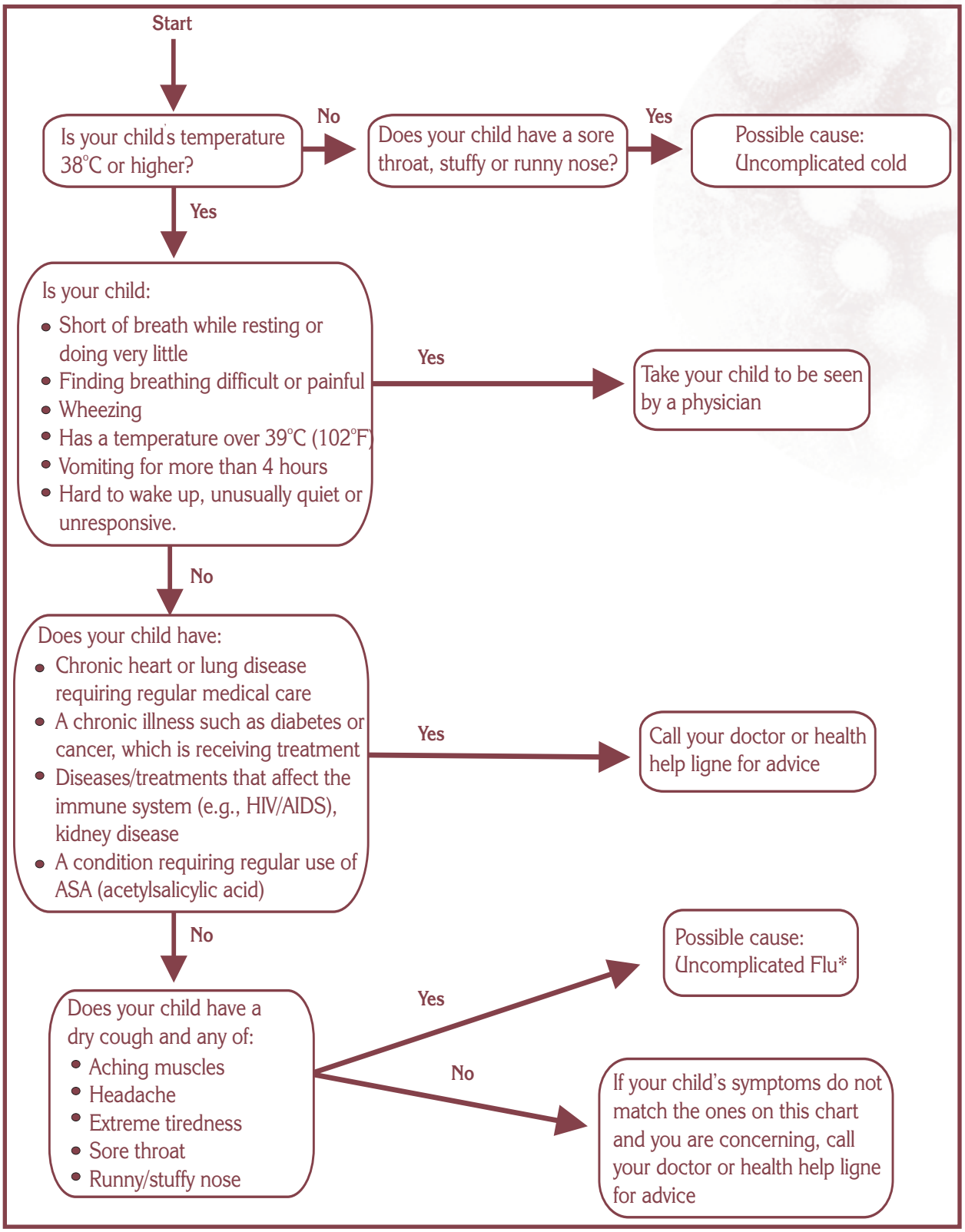


If your child has symptoms/behavior that are not on this chart and you are concerned, call your doctor or health help line for advice.

Uncomplicated Flu: Usually the symptoms start to clear up in 5 to 7 days

- Give acetaminophen or ibuprofen for fever (in the dose recommended on the package every 4-6 hours until the child's temperature comes down, unless your doctor says otherwise; do not give more than 5 doses in 24 hours). Do not give ASA. Antibiotics will not help.
- Dress in light-weight clothing and keep room at 20°C.
- Offer cool fluids frequently while awake.
- Allow to rest. Keep home for 6 days so the virus isn't spread.
- Use salt-water nose drops to treat a stuffy nose. Teach the child to cover their mouth when they cough and then to throw the tissue away. Wash your hands often and teach your child to do so as well.
- Avoid cool baths.

Does Your Older Child (Age Six Years to Adolescence) Have the Flu?



What You Can Do For Your Child

- Allow your child to rest. He/she will probably feel very weak until their temperature returns to normal.
- Offer fluids frequently while awake; extra fluids are needed to replace those lost in sweating. If your child's urine is darker than usual, they need more to drink.
- Give your child acetaminophen every 6 hours or ibuprophen as recommended on the package for fever and muscle pain. Children under 18 years of age should not take acetylsalicylic acid (ASA) or any products containing ASA. Antibiotics won't help.
- Treat your child's symptoms e.g., cough suppressant, salt water nose drops . Teach the child to cover their mouth when they cough and then throw the tissue away. Wash your hands often and teach your child to do so as well.
- Keep your child home from school for 6 days (while they are contagious), or until they are feeling better.

What to Expect

- Day 1-3: Sudden appearance of fever, headache, muscle pain and weakness - also dry cough, sore throat and stuffed nose (but overshadowed by previous symptoms)
- Day 4: Fever and muscle aches decrease. Hoarse, dry or sore throat, cough and possible mild chest discomfort become more noticeable
- Day 8: Symptoms decrease. Cough and tiredness may last 1-2 weeks or more.

If any of the following happen during the flu, TAKE YOUR CHILD TO SEE A DOCTOR:

Your child:

- Is short of breath even while resting.
- Has pain in the chest when breathing.
- Is coughing up bloody sputum.
- Is wheezing.
- Still has a fever and is not feeling better after 5 days.
- Is feeling better and suddenly develops a fever.
- Is hard to wake up, unusually sleepy or unresponsive.

1. **Primary triage centre**
   a) Adults (≥ 18 years)

Identification

Health Care Number:
Name: _____ Surname/Family Name First Name
Age _____ (yrs) **DOB** ____/____/____ DD MM YYYY
DATE OF CONSULTATION ____/____/_____ DD MM YYYY

Risk Assessment For Complications Of Influenza

- Does this patient fall into a "high risk group" for complications of influenza? **Y/N**

High-Risk Groups	Tick all relevant
Women in the second or third trimester of pregnancy	
Chronic cardiac disease (hypertension is not enough)	
Chronic pulmonary disease - asthma	
Chronic pulmonary disease - COAD or emphysema	
Chronic pulmonary disease - other than asthma, COAD or emphysema	
Chronic renal disease	
Non insulin dependent diabetes mellitus	
Insulin requiring diabetes mellitus	
Receiving immunosuppressive therapy, AIDS patients	
Neoplastic disease	
Hepatic disease	
Resident of nursing home	
Resident of other chronic care facility	
≥ 65 year old	

Details of vaccination	Yes	No	N/A	Batch number	Date given DD/MM/YYYY	Tick if given >14 days ago
INFLUENZA vaccine within the last 12 months?						
PNEUMOCOCCAL vaccine within the last 5 years?						

Details of antivirals: Within last 3 months?	Yes	No	N/A	Date commenced DD/MM/YYYY	Date ceased DD/MM/YYYY	Tick if still taking	Dose
AMANTADINE				/ /	/ /		
RIMANTADINE				/ /	/ /		
ZANAMAVIR				/ /	/ /		
OSELTAMAVIR				/ /	/ /		

Symptoms (adults ≥ 18 years)

Date and time of onset of first symptoms:

Clinical features on history	YES	NO	N/A	DETAILS: e.g., Date of onset, symptoms that predominate
In contact with someone with influenza in the last 3 days?				
Fever				
Chills				
Aching muscles and joints				
Stiffness				
Headache				
Fatigue				
Runny/stuffy nose				
Cough				
Sore throat, hoarseness				
Purulent sputum				
Thoracic pain when taking a deep breath				
Retrosternal soreness (tracheitis)				
Breathlessness				

Clinical features on history	YES	NO	N/A	DETAILS: e.g., Date of onset, symptoms that predominate
Anorexia				
Vomiting				
Diarrhoea				
Confusion, drowsiness				
Rash				

Examination Findings (adults ≥ 18 years)

Date _____/_____/_____ **Time:** _____:_____
DD MM YYYY HH MM

Vital signs

Description	Threshold for indication of secondary assessment	Values for this patient
Temperature	<35°C or (39°C	
Respiratory Rate	(24/minute	
Heart rate	(100/minute	
Blood pressure	<100 mmHg Systolic	
Altered mental status	New confusion	
Function	New inability to function independently	
Skin colour	Cyanosis (bluish colour)	
Oxygen saturation*	<90% on room air	

* Some primary or secondary triage centres may be able to perform pulse oximetry (see Appendix 2.III).

Provisional Diagnosis

Please Tick All That Apply

	Yes	No
Influenza		
Suspected		
Recent contact (could be incubating)		
Unlikely but at risk of complications and not immunized		
Unlikely but at risk and immunized		
Unlikely (recovered from documented influenza)		
Other		
Pregnant		
Breastfeeding		

Note: If secondary assessment is required, and patients are sent to another centre/ward for complementary evaluation, each individual should be provided with a summary of the symptoms and signs detected at the primary triage centre.

b) Children ≤ 18 years:

Identification

Health Care Number:
Name: _____ Surname/Family Name First Name
Age _____ (yrs) **DOB** ____/____/____ DD MM YYYY
DATE OF CONSULATION ____/____/_____ DD MM YYYY

Risk Assessment for Complications of Influenza

- Does this patient fall into a "high risk group" for complications of influenza? **Y/N**

Child with

High-Risk Groups	Tick all relevant
Chronic cardiac disease	
Chronic pulmonary disease - asthma	
Chronic pulmonary disease - other than asthma	
Chronic renal disease	
Diabetes mellitus	
Child with cyanotic congenital heart disease	
Receiving immunosuppressive therapy, AIDS patients	
Neoplastic disease	
Hepatic disease	
Resident of long-term care facility	
< 2 years old	

Details of vaccination	Yes	No	N/A	Batch number	Date given DD/MM/YYYY	Tick if given >14 days ago
INFLUENZA vaccine within the last 12 months?						
INFLUENZA vaccine within the last 12 months?						
PNEUMOCOCCAL vaccine within the last 5 years?	7-valent 23-valent					
PNEUMOCOCCAL vaccine within the last 5 years?	7-valent 23-valent					
PNEUMOCOCCAL vaccine within the last 5 years?	7-valent 23-valent					
PNEUMOCOCCAL vaccine within the last 5 years?	7-valent 23-valent					
PNEUMOCOCCAL vaccine within the last 5 years?	7-valent 23-valent					

Details of antivirals: Within last 3 months?	Yes	No	N/A	Date commenced DD/MM/YYYY	Date ceased DD/MM/YYYY	Tick if still taking	Dose
AMANTADINE				/ /	/ /		
RIMANTADINE				/ /	/ /		
ZANAMAVIR				/ /	/ /		
OSELTAMAVIR				/ /	/ /		

Symptoms (children ≤ 18 years)

Date and time of onset of first symptoms:

Clinical features on history	YES	NO	N/A	DETAILS: e.g., Date of onset, symptoms that predominate
In contact with someone with influenza in the last 3 days?				
Fever				
Chills				
Aching muscles and joints				
Stiffness				
Headache				
Fatigue				
Runny/stuffy nose				
Cough				
Sore throat, hoarseness				
Purulent sputum				
Thoracic pain when taking a deep breath				
Retrosternal soreness (tracheitis)				
Breathlessness				
Anorexia				
Vomiting				
Diarrhoea				
Confusion, drowsiness				
Rash				

Examination Findings (children ≤ 18 years)

Date _____/_____/_____ **Time:** _____:_____
DD MM YYYY HH MM

Vital signs

Primary Assessment	Results Requiring Secondary Assessment	Vital signs for this patient
Temperature[a]	≤ 35°C or ≥ 39°C	
Respiratory Rate	< 2 months = >60 breaths per minute 2-12 months = >50 breaths per minute > 12 months to 5 years = >40 breaths per minute > 5 years = > 30 breaths per minute	
Skin colour and temperature (lips, hands)	Cyanosis, sudden pallor, cold legs up to the knee	
Chest symptoms[b] (pain may be difficult to detect in young children)	Chest indrawing, wheezing, grunting, inquire for chest pain	
Mental status	Lethargic or unconscious[c]	
Function	Unable to breastfeed or drink, persistent vomiting (>2-3 times/24 hr.)[d] Inability to function independently[c]	
Neurologic symptoms and signs	Seizures, full fontanelle, stiff neck	
Oxygen saturation[e]	≤ 90% room air	

a For indications about types of thermometers and how to take the temperature see Appendix 2.I. High fever ((39°C) in adolescents is a warning sign and needs further assessment.

b Signs of dehydration: sunken eyes, no saliva, doughty skin

c Chest pain may be a sign of pneumonia, even in the absence of crackles or wheeze . It may also appear as retrosternal pain (tracheal/bronchial pain) or as a pleuritic pain. When positive, it is an indication for secondary evaluation.

d A deterioration of the consciousness and inability to function, lack of interest in playing and sleepiness should be further investigated.

e Vomiting (>2-3 times/24 hr.), particularly if the children are not breast-feeding or drinking well, is a warning sign and requires a secondary assessment.

f Determination of blood gases by pulse oximetry as sign of respiratory failure (see Appendix 2.III).

Provisional Diagnosis

Please Tick all that Apply

	Yes	No
Influenza		
Suspected		
Recent contact (could be incubating)		
Unlikely but at risk of complications and not immunized		
Unlikely but at risk and immunized		
Unlikely (recovered from documented influenza)		

2. **Secondary clinical assessment:**

   a) Adults (≥ 18 years):

Identification

Health Care Number:
Name: _____ (Surname/Family Name) (First Name)
Age _____ **(yrs)** **DOB** ____/____/____ (DD MM YYYY)
DATE OF CONSULTATION ____/____/_____ (DD MM YYYY)

Risk Assessment for Complications of Influenza

- Does this patient fall into a "high risk group" for complications of influenza? **Y/N**
- Which symptoms and/or signs were found at the primary triage centre that required secondary assessment?

Note: When the secondary assessment has to be completed in a different setting, a new clinical evaluation of the patient, to confirm the diagnosis done at the primary triage centre, should always precede the laboratory studies mentioned below. **NOT ALL THE TESTS MENTIONED UNDERNEATH WILL BE NEEDED FOR ALL PATIENTS, AND CLINICAL JUDGEMENT SHOULD ALWAYS PRECEDE ANY PROCEDURE, PARTICULARLY IF RESOURCES ARE SCARCE.**

The primary assessment forms, or part of these forms, may be repeated here.

Investigations in Adults (≥ 18 years)

Complementary laboratory studies	Results requiring supervision of patient or admission	Results for this patient
CBC (core battery, if appropriate)	Hgb ≤ 80 g/L	Hgb:
	WBC ≤ 2,5000 or ≥ 12, 000 cells/µL	WBC:
	Bands ≥ 15%	Bands:
	Platelets ≤ 50,000/(µL	Platelets:
Electrolytes	Na ≤ 125 meq/L or ≥ 148 meq/L	Na:
	K ≤ 3 meq/L or ≥ 5.5 meq/L	K:
BUN, creatinine	BUN ≥ 10.7 mmol/L	BUN :
	Creatinine ≥ 150 µmol/L	Creatinine:
Glucose	≤ 3mmol/L or ≥ 13.9 mmol/L	
CPK (only in patients with severe muscle pain)	CKMB ≥ 50%	CKMB:
	Total CK ≥ 1,000 µmol/L	Total CK:
Blood gases, O2 saturation	Blood gases p02 ≤ 60 room air PH <7.35	PO2: PH:
	O2 saturation ≤ 90% room air*	O2 saturation:
Chest x-ray (CRX)	Abnormal, consistent with pneumonia Pleural effusion	
EKG	Evidence of ischemia, new arrhythmia	

*Some primary or secondary triage centres may be able to perform pulse oximetry (see Appendix 2.III)

Under optimal circumstances, blood work and CRX should be done to all patients before admission. If resources are restricted, however, priority should be given to patients with co-morbidity or if complications of the disease are suspected (i.e., pneumonia, etc.). Patients with normal gases in blood and with clear lungs during auscultation do not need CRX. Similarly, when the clinical diagnosis of pneumonia is unquestionable and the resources are scarce, no CRX need to be taken, unless there is suspicion of a complication of the pneumonia (i.e., empiema).

Provisional Diagnosis

Please Tick all that Apply

	Yes	No
Influenza		
Suspected		
Recent contact (could be incubating)		
Unlikely but at risk of complications and not immunized		
Unlikely but at risk and immunized		
Unlikely (recovered from documented influenza)		
Pneumonia, confirmed (C)/suspected (S)/unlikely (U)	C / S / U	
Viral		
Bacterial		
Other		
Pregnant		
Breastfeeding		

Bacterial pneumonia

Confirmed (by chest radiograph), suspected, unlikely.

Influenza viral pneumonitis

Confirmed (by chest radiograph and oxygen transfer), suspected (by oxygen transfer), unlikely.

Admission

Yes:

- Suspected Flu ward
- Confirmed Flu ward
- General ward
- Observation
- ICU Admission
- CCU Admission

If not admitted:

Sent to:

- Home care with self-care
- Health worker/Volunteer contacted
- Not Traditional care centre: Hotel, School, Community Centre, etc.

Provide copy of:

- Assessment sheet
- Instruction sheet
- Contact names/numbers (if get more breathless/deteriorate)

b) Children (≤ 18 years):

Identification

Health Care Number:
Name: _____ Surname/Family Name First Name
Age _____ (yrs) **DOB** ____/____/____ DD MM YYYY
DATE OF CONSULTATION ____/____/_____ DD MM YYYY

Risk Assessment for Complications of Influenza

- Does this patient fall into a "high risk group" for complications of influenza? **Y/N**
- Which symptoms and/or signs were found at the primary triage centre that required secondary assessment?

When the secondary assessment has to be completed in a different setting, a new clinical evaluation of the child, to confirm the diagnosis done at the primary triage centre, should always precede the laboratory studies mentioned below. **Not all the tests mentioned underneath will be needed for all patients, and clinical judgement should precede any procedure, particularly if resources are scarce**.

As with adults, part of the primary assessment forms may be added here.

Investigations

Complementary laboratory studies	Results requiring supervision of patient or admission*	Results for this patient
CBC (core battery, if appropriate)	Hgb: Values of Hemoglobin for young children are age related, see Table 2.2.4	Hgb:
	WBC: Values of WBC for young children are age related, see Table 2.2.4	WBC:
	Bands ≥15%	Bands:
	Platelets ≤ 50,000/µl	Platelets:
Electrolytes (see Table 2.2.4)	Na ≤125 meq/L or ≥148 meq/L	Na:
	K ≤ 3 meq/L or ≥ 5.5 meq/L	K:
BUN, creatinine (see Table 2.2.4)	BUN ≥10.7 mmol/L	BUN:
	Creatinine ≥150 µmol/L	Creatinine:
Glucose (see Table 2.2.4)	≤ 3mmol/L or ≥13.9 mmol/L	Glucose:
CPK (only in patients with severe muscle pain)	CKMB ≥ 50%	CKMB:
	Total CK ≥1,000 µmol/L	Total CK:
Blood gases, O2 saturation	Blood gases p02 ≤ 60 room air PH <7.35	PO2: PH:
	O2 saturation ≤ 90% room air	O2 saturation:
Chest x-ray (CRX)	Abnormal, consistent with pneumonia Pleural effusion	

*Some of these values are age-dependant and appropriate values for each age should be consulted (see Chapter 2, Table 2.2.4).

Under optimal circumstances, blood work and CRX should be done to all patients before admission. If resources are restricted, however, priority should be given to patients with co-morbidity or if complications of the disease are suspected (i.e., pneumonia, etc.). Patients with normal gases in blood and with clear lungs during auscultation do not need CRX. Similarly, when the clinical diagnosis of pneumonia is unquestionable and the resources are scarce, no CRX need to be taken, unless there is suspicion of a complication of the pneumonia (i.e., empiema).

Provisional Diagnosis

Please Tick all that Apply

	Yes	No
Influenza		
Suspected		
Recent contact (could be incubating)		
Unlikely but at risk of complications and not immunized		
Unlikely but at risk and immunized		
Unlikely (recovered from documented influenza)		
Pneumonia, confirmed (C)/suspected (S)/unlikely (U)	C / S / U	
Viral		
Bacterial		
Other		
Pregnant		
Breastfeeding		

Bacterial pneumonia

Confirmed (by chest radiograph), suspected, unlikely.

Influenza viral pneumonitis

Confirmed (by chest radiograph and oxygen transfer), suspected (by oxygen transfer), unlikely.

Admission

Yes:

- Suspected Flu ward
- Confirmed Flu ward
- General ward
- Observation
- ICU Admission
- CCU Admission

If not admitted:

Sent to:

- Home care with self-care
- Health worker/Volunteer contacted
- Not Traditional care centre: Hotel, School, Community Centre, etc.

Provide copy of:

- Assessment sheet
- Instruction sheet
- Contact names/numbers (if get more breathless/deteriorate)

Appendix 2.III. Pulse Oximetry and Trans-cutaneous Oximetry

Although the measurement of the "in vitro" saturation of arterial blood is still the golden standard for measuring arterial oxygen, it involves repeated sampling of arterial blood, is costly and time consuming, and only gives intermittent and delayed results. Two non-invasive procedures have been developed recently for continuous monitoring of oxygen saturation: pulse oximetry and trans-cutaneous oximetry. Both procedures, however, have some shortfalls; and, ideally, they should be used in combination[214,172]. In a pandemic situation, this will not be possible in most facilities, and, therefore, clinicians should be aware of the limitations of each device, particularly when testing critically ill patients. Taking the mean of two or more measurements, if possible, can reduce variability and increase reliability[172].

1. **Pulse oximetry** is a non-invasive, continuous monitoring procedure that has supplanted arterial sampling methods for studying patient's oxygen saturation. It allows the estimation of the arterial tension of oxygen [SPO2 is the oxygen saturation (PO2) measured with a pulse oximeter, given in %] in the ranges that are clinically relevant (i.e., 75-95%, Fig. 2.1). It has been reported to be accurate within 5% (2% for SPO2 > 70%, and responds to cardiopulmonary changes that affect tissue oxygenation[181,165,172,108]. Pulse oximetry has, however, some limitations:
   - It does not provide information regarding patient's ventilation and carbon dioxide tension. The patient may have a normal reading and still be hypercapnic and have respiratory failure. Carboxyhemoglobin and methemoglobin, on the other hand, have light absorption similar to oxyhemoglobin, and, therefore, both can modify the SPO2 readings (similarly: extreme anemia, intravenous dyes used in diagnostic and hemodynamic testing, bilirubin, skin colour, and brown-red nail polish, can also modify the readings[108]).
   - Pulse oximeters require careful sensor placement and adequate pulse pressures (> 20 mm Hg), and they are prone to movement artefacts (which is a serious shortcoming with young children). Sensors should be placed 2-3 mm apart from each other, and any optical shunt should be avoided (i.e., light received by the sensors without passing through the skin). It must be ensured that all light emitted pass through the tissues, that the receiving diode is located exactly opposite to the emitter, and that both are shielded from ambient light[172].
   - Skin burns are possible and, therefore, the sensors should be checked carefully before use, and patients should be checked each 6-8 hours[172]. Probes may be placed in the ear or in the fingers, although finger probes are considered more accurate[108].
   - Patients with low perfusion states may hinder the performance of pulse oximeters. In these patients the results become blood-flow dependent. During shock, the proportion of wrong or missing values sharply increases[172]. Increased venous pulsations may occur if probes are secured too tightly, or in cases of right heart failure, tricuspid regurgitation, etc. and they may, mistakenly, be detected by the pulse oximeter[108].
   - Although the response time is the time it takes for the blood to travel from the lungs to the sensor, pulse oximeters usually average their values over periods from 2-15 seconds or from 4-32 heartbeats. This intends to level out any erroneous

measurements and minimize false alarms; however, this procedure prolongs the response time, and also may lead to false readings after body movements or may mask intermittent hypoxemia[172]. Some brands have the option to be used in a beat-to-beat mode (i.e., without averaging their readings), what may be preferred for same patients.

- Pulse oximeters derive their results from an "empiric" table elaborated with data from healthy adults. Therefore, each instrument should be validated if measurements are done in infants and young children. In addition, saturations < 70-80% were not attained in healthy volunteers, and are, therefore, extrapolated, which may lead to an underestimation of the true degree of hypoxemia.
- There are considerable differences in bias (or systematic error, this indicates the overestimation or underestimation of one brand relative to the other) and precision (variability or random error) between brands, and it is important to determine which brand of oximeters is used, mainly when the values of PO2 are in the low ranges[165]. Available data shows considerable differences not only between instruments but also between studies[172]. The algorithms used to calculate the SPO2, and the way these measurements are displayed can partially explain these differences. Users should be aware of this fact and know the brand of oximeter and software they are using. Data from one brand cannot be transferred to another brand.

2. **Transcutaneous sensors** may also be used to determine the tcPO2 (transcutaneous tension of oxygen, given in mm Hg), a variable that reflects the PO2 in the peripheral tissue. Sensitivity to PO2 < 50 mm (hypoxemia) and > 80 mm (hyperoxemia) is approximately 85%[172]. Limitations of tcPO2 are:

   - The tcPO2 decreases relative to arterial PO2 with increasing patient's age[172].
   - Values are influenced by skin thickness (results will be low in areas of thick or poorly perfused skin), sensor temperature (should not be <44(C and it takes 15 minutes to heat the skin, otherwise the values will be unreliable), amount of gel used (if too much gel is used, the values will be wrongly high), and peripheral perfusion[172]. Additionally, the sensor must be regularly relocated (particularly in young children) to avoid skin burns.
   - In the presence of severely reduced cardiac output and peripheral perfusion, the tcPO2 values deviate from the arterial PO2 and become blood flow dependent. If interpreted correctly, it may provide an early warning of cardiac failure, hypotension, or acidemia[214].
   - Response times are delayed, caused by the time required for the oxygen to travel from the capillaries through the skin into the electrodes. The average response time to a rapid decrease in the PO2 is approximately 16 seconds and up to 30 seconds.

Normal values (Fig. 2.1)

Normal values for children and adults are published in some papers (see below). However, the interpretation of the results obtained with the different brands should follow instructions included with the instrument's manuals.

1. **Pulse oximetry** (always refer to instrument's manuals):
   - Data on baseline SPO2, controlled for movement artefacts and taken in a beat-to-beat mode, for neonates, infants and children, was obtained with one brand, Nellcor oximeters. Baseline SPO2, during quiet sleep and away of apneic pauses is between 95-100% in preterm infants and 97-100% in older infants and children. The frequency of episodic desaturation varies considerably with age. In children 2-16 years SPO2 almost never reaches 80% and even reductions to 90% are infrequent, while in newborns short episodes of SPO2 (80% are quite common[172].
   - In healthy newborns, the mean SPO2 was 97.2% (1.6% with a median value of 97%. Only age and activity affected the SPO2 significantly; values obtained while the infants were fussy and crying were lower compared to measurements done when they were sleeping[127]. Values measured in 60 term infants (with a Nellcor N200) in the first 4 weeks of life, detected episodes of desaturation (≤ 80% for ≥ 4s) in 35% of the recordings obtained in the first week and 60% in weeks 2-4. The clinical significance of these values remains to be determined[173].
   - Values taken from 150 normal adult volunteers (not arterialised in advance) with a pulse oximeter, resulted in 13.3% individuals with values <94%, none below 90%. When patients receiving anaesthesia were studied, only 1.1% of the patients who received O2 following anaesthesia had values below 90%, while this value was 16.7% for patients not receiving O2. The alarm limit for Criticalcare Systems 501 oximeter, used for this study, is 90%[198].
   - In a study of stroke patients, the overall SPO2 was above 90%, and similar to controls of the same age, when patients were sitting up[197]. Episodes of desaturation were defined as SPO2 < 90%.
   - All night pulse oximetry values from a total of 350 healthy subjects with ages ranging from 1 month to 85 years were compared to 25 individuals with obstructive sleep apnea (OSA) and 21 individuals with asthma. Mean values +/- SD for the healthy patients were: 1) the lowest saturation recorded during the night = 90.4% +/- 3.1; the saturation below which the individuals spent 10% of the night was 94.7% +/- 1.6; and the median saturation was 96.5% +/- 1.5%. No relation was found with sex, obesity, or race. Asthma patients did not have differences with healthy controls, but OSA had significantly lower saturation values. Healthy older subjects (>60 years) had lower O2 saturation than younger individuals[87].

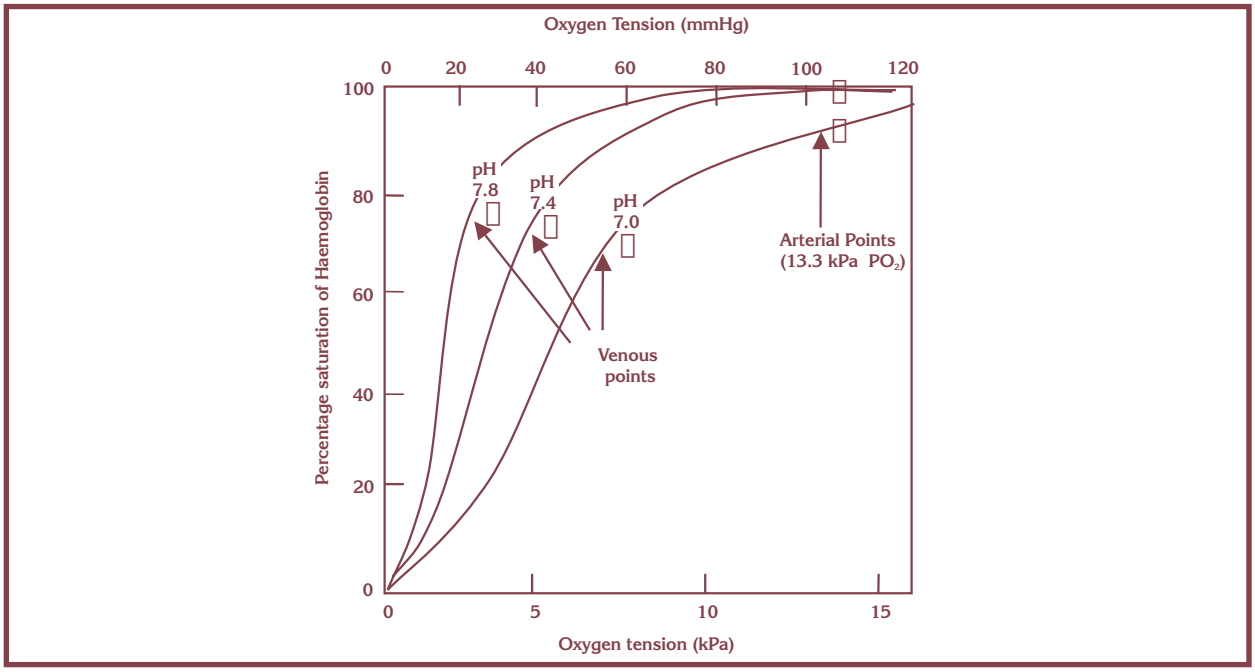
2. **Trans cutaneous PO2 monitoring**

- Mean tcPO2 of newborns and infants during both, quiet sleep and wakefulness (excluding feeding or crying) was about 70-80 mm of Hg with a deviation of 6-10 mm of Hg[172].
- Index values for tcPO2 in adults have been reviewed by Tremper and Barker[214].

O2 in blood

Blood concentration of haemoglobin (Hb) in adults is 14(2 g/dL blood (140 ± 20 g/L) and it can carry about 20ml oxygen per dL, as oxyhemoglobin. The Hb binding sites bind oxygen in accordance with the partial pressure of the gas in solution (PO2), and the percentage of saturation of the Hb is given by the percentage of binding sites occupied. The relation between the PO2 and the Hb saturation is non-linear and has the shape of an S (Figure 2.1), which has physiological advantages: In the arterial part of the graph, it is fairly flat, what means that moderate changes in PO2 cause only small decrements in saturation. However, the curve is fairly steep in the normal ranges for venous PO2, which allows delivery of oxygen to the tissues with minor changes in the PO2 (Figure 2.1)[44,137]. The relative affinity of the Hb for oxygen is given by the parameter P_{50}, i.e., PO2 at 50% saturation; it is decreased by physiologic factors like pH, PCO2 and temperature (Figure 2.1). In clinical practice, patients requiring blood gas measurements also have altered temperatures, blood pH and CO2 excess. Blood gas machines usually take these factors under consideration[44,137].

Figure 2.1



Legend. The centre curve is the normal curve under standard conditions. The other graphs show the displacements caused by changes in blood pH, with all other parameters remaining constant. Venous and arterial saturation points are also shown, based in an arterial/mixed venous oxygen saturation difference of 25%. Arterial saturation for these graphs corresponds to a PO2 of 13.3 kPa (100 mm Hg). Temperature 37°C, base excess = 0[137].

Management of Patients in Long Term Care Facilities

3.1 Long-Term Care Facilities

Long-term care facilities (LTCF) include a heterogeneous group of establishments. Although they accommodate mainly elderly individuals (nursing homes are the most common), the spectrum of services provided is wide and there are establishments for residents with physical or psychiatric disability, pediatric centres and geriatric centres. Some institutions provide permanent custodial care, however other organizations provide only temporary rehabilitation care[166,100].

Because of their age and underlying medical conditions, most individuals living in long-term care facilities are at increased risk for developing complications after influenza infection. Health-care personnel and visitors may introduce the virus, and the closed environment will favour transmission[88,166]. During influenza outbreaks in hospitals or nursing homes, as many as 70% of individuals (either personnel or patients) may become infected. The increased use of invasive devices such as central lines, chronic respirators, feeding devices, etc. facilitate the development of infections and complications[88,166].

A goal, in the pandemic situation, will be to manage patients within the facility without transferring them to an acute care facility. This may require that the long-term care facility designate an area for more acute care, where closer monitoring and more intensive nursing care can be provided, and where parenteral therapy and oxygen therapy may be given.

Prior to any pandemic, long-term care facilities should have in place policies to support appropriate management of residents and personnel. The inter-pandemic epidemics suffered almost every year are an opportunity to develop such policies and test their efficacy.

They should include:

a) An institutional policy for the management of influenza outbreaks;

b) Immunization of residents and staff;

c) Plans to establish an area within the facility for management of more acutely ill patients;

d) Advanced directives for all residents, which should be completed and updated regularly and are consistent with provincial legislation and institutional policy.

The goals of an institutional influenza plan are:

- To prevent influenza illness and complications in residents and staff;
- Timely diagnosis and appropriate management of influenza infection in patients;
- Timely diagnosis and management of an influenza outbreak within the LTCF;
- To provide care for ill residents within the facility without transfer to another facility.

3.2. Assessment and management of long-term facility residents

3.2.1 Prevention

a) Yearly influenza vaccine for all residents and staff according to national/local recommendations (interpandemic influenza). If a pandemic is declared, pandemic vaccine priorities will be considered.

b) Pneumococcal vaccination of all residents, consistent with NACI guidelines.

c) Comprehensive, timely surveillance for influenza-like illness in residents and staff, including rapid laboratory confirmation and viral culture (interpandemic influenza). Microbiological tests (bacteriologic and/or virologic determination) may be required depending on the clinical presentation and on the availability of resources. Once the presence of the pandemic strain has been confirmed in the facility, virologic tests will be needed only to confirm diagnosis in atypical cases, and for surveillance purposes. Current rapid tests may be useful for confirmation of diagnosis and treatment decisions (see Appendix 5.II).

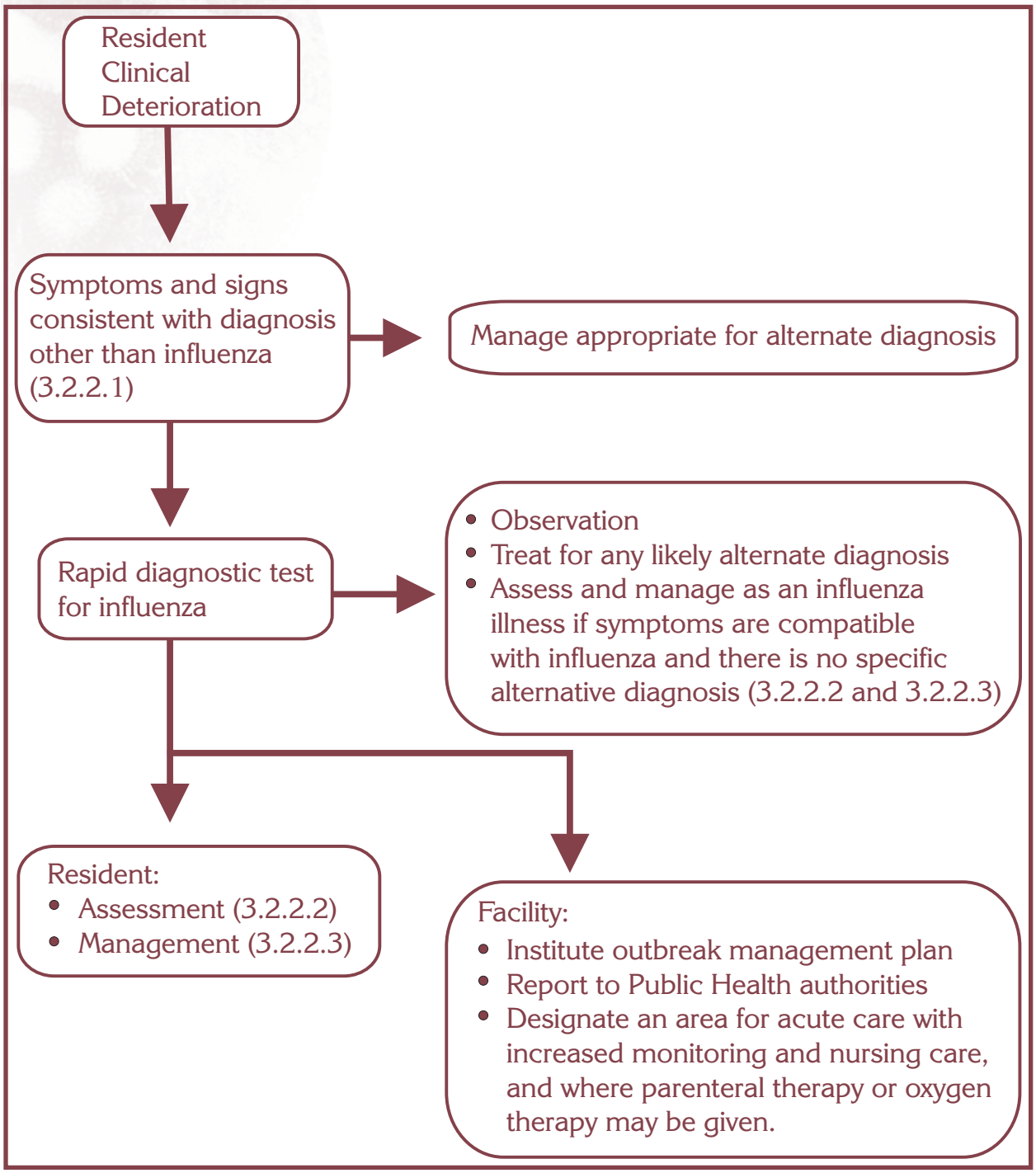
d) Facility guidelines for use of prophylactic antivirals, within the framework of antiviral prioritization for pandemic influenza, should be in place in all LTCF.

The following algorithms are general, and designed for "nursing homes", where residents are elderly and have multiple co-morbidities. Nevertheless, the approach is applicable to other LTCFs, although specific needs for other populations should be considered in advance.

3.2.2 Diagnosis and management of residents with influenza

Triage of long term care facility residents

The algorithm suggested in this page is intended to help personnel in LTCFs to identify patients with influenza, to assess the severity of the disease, and to determine follow up during a pandemic.



3.2.2.1 Symptoms consistent with flu like illness. Long-term care facility residents

These recommendations assume that influenza is known to be present in the community or region. In this situation, any resident of a long-term facility who deteriorates clinically and for whom there is no clear alternate diagnosis may have influenza illness[84].

The clinical presentation of any infectious illness in an elderly impaired long-term care facility resident may be non-specific, and non-classical. Alternate diagnoses must be considered when the patient is initially assessed, including non-infectious causes such as deterioration of co-morbid illness or medication adverse effects. A diagnosis of influenza should be excluded with any non-specific presentation.

Influenza infection of elderly residents in a long-term care facility may present with:

a) Fever (could be only a low grade fever) or hypothermia.

b) Anorexia

c) Vomiting

d) Increased confusion or decreased functional status e.g., a decreased ability to walk independently.

e) White cell count may be normal, with or without a shift to the left.

Rapid diagnostic tests are useful to confirm or discard influenza in elderly patients with uncertain clinical presentations. They are helpful if antiviral therapy is considered, as these should be started shortly after the onset of disease (within the 48 hours of onset) to get maximum results (see Appendix 5.II). Rapid tests may not be available in a pandemic situation and there may be many false negatives tests. Therefore, patients with symptoms compatible with influenza should be assessed and managed as such, especially if there are no other obvious diagnoses.

3.2.2.2 Influenza illness assessment. Long-term care facility residents

The **initial assessment** and evaluation of the residents should be consistent with advance directives, and include the following:

a) History: age, duration of residence in the facility, co-morbid illnesses, documentation of last influenza vaccination, documentation of pneumococcal vaccination, time of onset of symptoms.

b) Physical assessment: temperature, skin colour, pulse, blood pressure, respiratory rate, peripheral oedema, chest auscultation, chest pain on inspiration, mental status, function (ability to function independently, continuous vomiting, etc.).

c) Diagnostic testing should include 02 saturation. For residents who are clinically stable and not judged to be severely ill this may be sufficient.

In residents where there are concerns about metabolic status, or the degree of illness, additional tests which may be considered include a CBC with white cell count, electrolytes, blood glucose, CPK, BUN and creatinine, an EKG if there is a new arrhythmia or evidence of significant deterioration in cardiac status. A chest x-ray should be considered for all residents with an oxygen saturation of (90% on room air, with new purulent sputum, or respiratory rate (30 per minute. A sputum culture may be helpful for residents producing sputum, and blood

cultures should be considered in individuals who appear to be severely toxic (depending on the availability of resources, see Chapter 2).

Long-term care facilities should have in place arrangements by which portable chest x-rays may be obtained, and should consider a phone reporting system to ensure that results are returned promptly and in a standardized fashion.

In addition to nursing homes, some elderly adults live in residences for the old, where there are basic health services. These residences should be considered as potential sites for triage and care of residents (non-traditional sites) in a pandemic, and should be equipped to provide basic diagnostic tests and healthcare services to residents with influenza.

3.2.2.3 Instructions for the management of subjects remaining in the long term care facility

A written plan for the timely management of patients should be in place. This will include diagnostic and follow-up tests, responsibilities of medical and non-medical personnel, and use of medications.

a) **Diagnostic and follow-up tests** (in selected patients, see Chapter 2):
   - Chest X-Rays (as required, see Chapter 2)
   - Blood tests, urine analysis, etc. (as required)
   - Viral/Bacterial studies: sputum, cerebrospinal liquid, nasopharyngeal aspirate , blood culture (see Chapter 2).

b) **General management**: The goals of general management are to maintain comfort, to preserve functional status, and to limit complications[60,84,204]. Specific aspects of management for influenza and its complications include:
   1. **Maintenance of hydration**. This may be achieved through oral fluids or if necessary through parenteral fluids. Where parenteral fluids are necessary hypodermoclysis is an option rather than intravenous therapy and may be more practical in the long-term care setting.
   2. **Oxygenation**. Patients with an oxygen saturation of <90% on room air should have oxygen supplementation. This may usually be given by portable oxygen with nasal prongs. Where this is insufficient, patients may require more aggressive efforts of oxygenation including non-intubation methods of respiratory therapy.
   3. **Antipyretics and analgesics** may be required to limit discomfort associated with myalgia and arthralgia. Usually acetaminophen will be sufficient.
   4. **Other therapies** such as antitussives may occasionally be indicated depending on the clinical features of the given patient.

c) **Specific therapy**: Specific therapy is directed at the influenza infection itself and influenza complications including secondary pneumonia and/or aggravation of pre-existing disease. During the early stages of the pandemic, LTCFs should determine access to antivirals and antibiotics. When antivirals/antibiotics are not available, symptom control and oxygenation may be the only management approaches. Strategies to manage patients pending antivirals should be developed.

1. **Antiviral agents** including amantadine (for prevention), zanamivir, and oseltamivir (for treatment) may be given for the prevention and treatment of influenza. Treatment with these drugs is, usually, only indicated if symptoms have been present for less than 48 hours. They may not be available, depending on supplies and on the priorities for the pandemic situation. When amantadine is used, dosage adjustment for renal function is necessary. Zanamivir may be impractical because it requires cooperation from the individual to use an inhaler. This may not be achievable in many long-term care facility patients, especially those who are acutely ill. (See Appendix 5.III)
2. **Antibiotics** should be given only for the management of presumed or diagnosed secondary bacterial pneumonia (see Chapter 2 and Appendix 5.IV).
3. **Management of preexisting disease**: Cardiovascular, respiratory, metabolic, etc.
4. **For patients who are acutely confused** and in whom correction of oxygenation or limitation of fever are not sufficient to control confusion, management for acute confusion may be necessary.

3.2.3 Discharge Criteria: (from the care sector designated for influenza patients)

It is important to define when patients are clinically stable and can be moved back to the usual residential area. Patients will be considered clinically stable when, in the preceding 24 hours[171]:

- They are not acutely confused
- They are able to be fed orally or by naso-gastric tube
- Their vital signs are stable. Values should be established (e.g., O2 saturation > 90%, heart rate < 100/minute, respiratory rate < 24/minute, blood systolic pressure > 90 mm Hg, temperature < 38°C).

Once the patients have been clinically stable for 48 hours and intravenous medication has been switched to oral therapy, the attending personnel should consider discharge from the "acute care area". In the pandemic setting, prioritization for earlier discharge may be necessary due to limitations in resources.

3.2.4 Transfer to and from Acute Care facilities

A goal, in the pandemic situation, will be to manage patients within the same facility. In some special circumstances, however, the transfer to acute care services may be considered and this has to be planned in advance.

3.3 Timely diagnosis and management of an influenza outbreak within the LTCF

The early detection of any outbreak occurring in a LTCF is essential to implement control measures and to stop the diffusion of the disease. In a pandemic situation, the first case of confirmed influenza would likely lead to outbreak management for pandemic influenza.

Every LTCF should have in place surveillance for the early detection and control of an outbreak. This includes[88]:

1) Preparation of a written plan for the management of an influenza outbreak, avoiding unnecessary delays. This will include the identification of diagnostic tests, responsibilities of medical and non-medical personnel, and use of antiviral medication.
2) Identification of personnel responsible for the surveillance and for the transmission of information within the establishment. This will usually be the individual with responsibility for infection control in the facility. The Public Health authorities will inform this individual if influenza is circulating in the community and he/she will report to the authorities when an outbreak has been detected in the facility.
3) Education of all staff and attending physicians in the importance of early identification and notification if a case is suspected.
4) A response capacity maintained 7 days per week.
5) Specific reporting mechanisms and standardized data collection (Appendix 3.I).

Once the outbreak is confirmed, the authorities responsible should take all the measures required to control the propagation of the virus within the facility (among the residents, and to personnel and visitors; see Infection control guideline). Studies and treatment of patients will be done in the area of the facility assigned for this purpose; and prophylactic treatment of some residents may be initiated (following the existing framework for antiviral prioritization during the pandemic).

Unit/ Sector: _____ Date: _____

RESIDENTS or PERSONNEL			Flu Vaccination		Date of onset (m/day)	Signs and symptoms (use letter)			Antibiotics or Antivirals	Diagnostic tests		Comments: death complications, other
Name	Sex	Age	+/-	Date (y/m/d)		(F)	(C)	(M)/(A)/(H)/ (Ch)/(S)	Drug & Date (m/day)	Date	Results	

Legend: Fever = (F); Cough = (C); Myalgia = (M); Arthralgia = (A); Headache = (H); Chills =(Ch); Sore throat = (S)

Note: If a resident appears with an ILI (fever of acute onset with cough), start with the infection control measures and inform the individual responsible for the influenza surveillance.

Completed by: _____ Date: _____

Management of patients in Non-traditional Facilities and Telephone advice

4.1 Non-traditional facilities (NTF)

Definition

A Non-Traditional Site is a site that is:

a) currently not an established health care site, or

b) is an established health care site that usually offers a different type or level of care.

The functions of an Non-Traditional Site will vary depending on the needs of the community but will focus on monitoring, care and support of influenza patients during an influenza pandemic. (see annex on Non-Traditional Sites and Workers).

It is expected that the number of individuals requiring care during pandemic influenza will exceed the number of beds available in health care institutions. Admitting to hospitals only the seriously ill requiring specialized medical care (Chapter 2), and making use of alternative centres (such as rehabilitation facilities, community centres, schools, churches and hotels) for less ill patients, will optimize the provision of care.

Non-traditional health care facilities will be used for two main purposes:

a) As an extension of overloaded hospitals and clinics, for the care of influenza patients that are not critically ill or not yet well enough to return home, and

b) As domiciliary care, for individuals unable to care for themselves at home.

Rehabilitation facilities, hotels, and other sites, should be provided with additional basic support equipment (like oxygen therapy supplies). Community halls and schools are equipped with toilets and have some cooking facilities; they may be an alternative to hospitals in case of need.

4.2 Telephone advice

Section to be developed.

Hospital Management: Emergency Room, Short-term observation and Ward management, Intensive Care Unit

Patient management in the hospitals will be similar to interpandemic- influenza care. Changes may be required, however, to operate with limited resources, or if the pandemic strain shows an unusual pattern of disease. Prior planning should consider actions to follow in the event of insufficient resources (beds, personnel, equipment and/or drugs), and alternatives. Cancellation of non-urgent admissions and elective surgery will help to relieve pressure for supplies. Unnecessary admissions of influenza patients should be avoided, and alternative community services should be used appropriately. The pandemic influenza committee and the communications network will activate the influenza contingency plan after the WHO informs them of the onset of the pandemic, and will update the provinces about the evolution of the pandemic[206,223].

5.1 Emergency Room

A separate assessment/admission area should be identified for patients with suspected influenza. These patients should be rapidly diverted there to minimize disease transmission. Admission forms will be completed at this point[171] (Appendix 5.I). Patient-triaging and initial assessment are discussed in Chapter 2.

If the patient is not admitted to hospital and is sent home, or to an alternative care centre, provide the patient a copy of:

a) Assessment sheet

b) Instructions for self-management

c) Contact names/numbers to notify if they deteriorate clinically

d) Arrangements for follow-up as required: usually 48 hours later for adults and 24 hours for children.

5.2 Short-term observation

A special area of the hospital should be assigned for "short-term" observation of those patients whose clinical assessment does not lead to a definitive admission (see patient-triaging in Chapter 2).

5.3 Ward management

Standard ward management of influenza patients should occur. Local plans to address potential shortages of beds, personnel, equipment and/or drugs should be in place.

5.3.1 Diagnostic and follow-up tests

The following tests and criteria for patient management, based on clinical assessment of each case, should be considered on admission to hospital. Availability of resources and the pandemic guidelines must be considered. Tests may include (as required, see Chapter 2)

- Chest Radiograph
- Blood cells count
- Urea, creatinine, electrolytes
- Nasopharyngeal aspirate, sputum, cerebrospinal fluid for viral studies (antigen/nucleic acid determination, virus culture), and/or bacterial Gram stain and culture
- Blood culture
- Electrocardiogram, urine analysis, blood glucose.

5.3.2 Specific management

5.3.2.1 Anti-viral therapy (see pandemic guidelines)

Antivirals are most efficient when started within 48 hours of onset of symptoms. Since supply is expected to be limited, drugs may be reserved for patients severely ill or those with high risks for influenza-related complications (for priority groups, see section Antivirals in the pandemic guidelines). Clinical guidelines for the use of antivirals are in Appendix 5.III.

5.3.2.2 Antibiotics

Antimicrobial therapy is indicated for treatment of patients with secondary bacterial pneumonia (Appendix 5.IV)[130,140,63]. In any upper respiratory tract infection, runny nose and sinus inflammation (Rhinosinusitis) are common. In some cases, when severe symptoms are present or persist for more than 10-14 days, a bacterial sinusitis may be present. Acute sinusitis presents clinically with purulent nasal discharge, maxillary tooth or facial pain (especially unilateral), unilateral sinus tenderness, and worsening of these symptoms after initial improvement of influenza. In children, suspected sinusitis at 10 days to 2 weeks of symptoms would likely be treated, although it may not be in adults. Antibiotics may also be needed to treat bacterial otitis media, which is uncommon in adults but can complicate influenza in children younger than 12 years[36,101]. Clinical guidelines for the use of antibiotics are in Appendix 5.IV.

5.3.3 General management

- Fluid therapy. Ensure adequate fluid intake (fluid management in patients with primary viral pneumonia must be well assessed and closely monitored, because some of these patients may develop adult respiratory distress syndrome (ARDS), and under these circumstances restricted intake of liquids may be indicated[171].
- Oxygen therapy based on pulse oximetry
- Management of associated cardiovascular illness

5.3.4 Symptom control

5.3.5 Discharge Criteria and follow-up

A shortage in hospital beds is anticipated; therefore identification of patients who can be discharged or transferred to an alternative care centre must be timely. Patients will be considered clinically stable when, in the preceding 24 hours[171]:

- Their mental state returned to normal (or baseline)
- They are able to maintain oral intake
- Their vital signs remained within a specified threshold. Cut-off values should be established (e.g., O_2 saturation $>$ 90%, heart rate $\leq$ 100/minute, respiratory rate $\leq$ 24/minute, blood systolic pressure $\geq$ 90 mm Hg, temperature $\leq$ 38°C).

Once the patients are clinically stable for at least 24 hours, symptoms and signs have improved, oral therapy is being given, and they are functionally independent, discharge from the hospital with designated follow up may be considered. The use of an alternative centre of care (domiciliary care) should be contemplated if more prolonged observation is necessary for patients with pneumonia, co-morbidities, or for individuals who are not functionally independent.

Release and follow-up:

If the patient is sent home, provide a copy of:

a) Assessment sheet

b) Instructions for self-management

c) Contact names/numbers to notify if they deteriorate clinically

d) Arrangements for home care/follow-up as required: usually 48 hours later for adults and 24 hours for children.

e) Arrangements for alternate care may be required by some patients

5.4 Intensive Care Unit (ICU)

Management of patients in the ICU will be similar to interpandemic influenza care. The clinical presentation of the disease and the availability of resources will determine which changes may be desirable throughout the pandemic. Infection control in the ICU, on the other hand, will be essential to avoid transmission of the virus to critically ill, non-influenza, patients. The isolation of influenza patients should be planned in advance .

5.5 Death Registration

(see Infection control guideline for information on mortuary care)

A substantial increase in mortality throughout the pandemic is anticipated. To ensure appropriate handling of bodies, a plan for death registration must be developed beforehand.

Death registration is a provincial/territorial (P/T) responsibility and each P/T has its own laws, regulations, and administrative practices to register a death. Therefore, provincial regulations must be followed.

In the pandemic situation, each jurisdiction should have a body collection plan in place to ensure that there is no unnecessary delay in moving a body to the (temporary) morgue. If the person's death does not meet any of the criteria for needing to be reported to a coroner, then the person could be moved to a holding area soon after being pronounced dead. Then, presumably on a daily basis, a physician could be found to complete the death certificate.

Funeral directors generally have standing administrative policies that prohibit them from collecting a body from the community or an institution until there is a completed certificate of death. In the event of a pandemic with many bodies, it seems likely that funeral directors could work out a more flexible practice if directed to do so by some central authority (e.g., provincial attorney general). These special arrangements must be planned in advance of the pandemic and take the regional differences in resources, geography, and population into consideration.

Appendix 5.I. Admission form[171]

Identification

Health Care Number:	Hospital:
Name: _____ Surname/Family Name First Name	
Age _____ (yrs)	DOB ____/____/____ DD MM YYYY
DATE OF THIS ADMISSION ____/____/_____ DD MM YYYY	

Risk Assessment for Complications of Influenza[152,1,171,29]

- Does this patient fall into a "high risk group" for complications of influenza? **Y/N**
- Tick all relevant conditional/groupings.

High-Risk Groups (adult/children)	Tick all relevant
Chronic cardiac disease (hypertension is not enough)	
Chronic pulmonary disease - asthma	
Chronic pulmonary disease - COAD or emphysema	
Chronic pulmonary disease - other than asthma, COAD or emphysema	
Chronic renal disease	
Non insulin dependent diabetes mellitus	
Insulin requiring diabetes mellitus	
Child with cyanotic congenital heart disease	
Adult/child receiving immunosuppressive therapy, AIDS patients	
Neoplastic disease	
Hepatic disease	
Anemia, Hemoglobinopathy	
Children or adolescent (<18 years) treated for long periods with ASA	
Women in the second or third trimester of pregnancy	
Resident of nursing home	
Resident of other chronic care facility	
≥ 65 year old or ≤ 2 years old	

Details of vaccination	Yes	No	N/A	Batch number	Date given DD/MM/YYYY	Tick if given >14 days ago
INFLUENZA vaccine within the last 12 months?						
PNEUMOCOCCAL vaccine within the last 5 years?						

Details of antivirals: Within last 3 months?	Yes	No	N/A	Date commenced DD/MM/YYYY	Date ceased DD/MM/YYYY	Tick if still taking	Dose
AMANTADINE				/ /	/ /		
RIMANTADINE				/ /	/ /		
ZANAMAVIR				/ /	/ /		
OSELTAMAVIR				/ /	/ /		

Current Medications

Drug	Details

Symptoms

Date and time of onset of first symptoms _____

Clinical features on history	YES	NO	N/A	DETAILS: e.g., Date of onset, symptoms that predominate
In contact with someone with influenza in the last 3 days?				
Fever				
Chills				
Myalgia				
Arthralgia				
Headache				
Runny/stuffy nose				
Fatigue				
Cough				
Purulent sputum				
Pleuritic chest pain				
Retrosternal soreness (tracheitis)				
Breathlessness				
Anorexia				
Vomiting				
Diarrhea				
Fluid intake				
Rash				
Other symptoms				

Examination Findings

Date _____/_____/_____ **Time:** _____:_____
DD MM YYYY HH MM

Vital signs

Description	Vital signs for this patient	Outside Boundaries	Values for this patient
Temperature		<35°C or ≥ 39°C	
Respiratory Rate		≥ 24/minute	
Heart rate		≥ 100/minute (>16years)	
Blood pressure		Systolic BP <100 mmHg	
Altered mental status			
Oxygen saturation		<90% on room air	
Total score			

Respiratory examination

	Left		Right	
	Yes	No	Yes	No
Reduced chest expansion				
Wheezes				
Crackles				
Bronchial Breathing				
Increased vocal resonance				
Reduced breath sounds				

Investigations

(Not all tests will be needed for all patients, and clinical judgement should be used, particularly if resources are scarce. Under optimal circumstances, blood work and CXR should be obtained before admission).

Description	Detailed findings	Outside Boundaries	Values for this patient
Chest radiograph		Pleural effusion Consistent with pneumonia Congestive heart failure	
Arterial Blood Gas[a]	pH $p0_2$ $pC0_2$	PH <7.35 < 90% room air > 45 mm Hg	
Pulse oximetry		< 90% room air	
Chemistry	Na K Creatinine Urea	Na ≤ 125meq/l or ≥ 148meq/l K ≤ 125meq/l or ≥ 5.5meq/l Creatinine ≥ 150mmol/l[b] BUN ≥ 10.7mmol/l[b]	
Liver function	Albumin ALT (alanine minotransferase) AST (aspartate aminotransferase)	< 35 g/l > 35 U/L > 35 U/L	
Glucose		Glucose ≤ 3mmol/l or ≥ 13.9mmol/l	
CBC	Hgb WBC[c] Platelets	Hgb ≤ 80g/l; Haematocrit <30% WBC ≤ 2,500 or ≥ 12,000 Platelets ≤ 50,000	

[a] Usually not required, except in COPD.

[b] One of these tests is enough

[c] Laboratories will do cell differentiation only on request.

Other investigations

Investigation	Requested Y/N	Specimen collected Time/date	Result
Sputum Gram stain			
Culture			
Acute serology			
Blood culture X 1			
Rapid viral test NPA			
Viral culture NPA			
Viral culture nasal swab			
CK total			
Electrocardiogram			

Microbiologic diagnostic tests (bacteriologic and/or virologic) will be performed depending on the clinical presentation and availability of resources. Once the pandemic strain is confirmed in a community, virologic tests will be needed only to confirm diagnosis in atypical cases and for surveillance purposes. Rapid tests are useful for diagnostic and treatment decisions (see Appendix 5.II). Isolation and culture of the virus is needed for surveillance purposes.

Ideally, all purulent sputum will be analysed by Gram staining and culture (and in some cases, sensitivity tests), to identify infecting bacteria and their susceptibility. If culture is not possible, at least Gram staining should be attempted.

Ideally, blood cultures should be obtained when the white blood cell number is over 12,000/ml, or less than 3,000/ml, the percentage of bands is higher than 15%, or if pneumonia is suspected. If resources are scarce, blood cultures will be reserved for patients who are very ill, with toxic signs and low blood pressure; for patients who fail to recover after 48 hours of treatment with antibiotics; or for patients admitted to intensive care units.

Provisional Diagnosis

Please tick all that apply

	Yes	No
Influenza		
Confirmed (by rapid viral test, other)		
Suspected		
Recent contact (could be incubating)		
Unlikely but at risk of complications and not immunized		
Unlikely but at risk and immunized		
Unlikely (recovered from documented influenza)		
Influenza Pneumonitis		
Confirmed (by chest radiograph and oxygen transfer)		
Suspected (by oxygen transfer)		
Unlikely		
Bacterial Pneumonia		
Confirmed		
Suspected		
Unlikely		
Other		
Pregnant		
Breastfeeding		
Other diagnosis		

Disposition

Admitted

- ICU
- General Ward
- Other

Not admitted

Sent to:

- Hospital in the Home
- Home care with self-care
- Health worker/Volunteer contacted
- Not Traditional care centre: Hotel, School, Community Centre, etc.

Provide copy of:

- Assessment sheet
- Instruction sheet
- Contact names/numbers (if get more breathless/deteriorate)

Appendix 5.II. Rapid Virologic Diagnostic tests

After the first isolation of the pandemic strain in Canada, diagnostic tests will be needed to follow the course of the pandemic in the country and for the timely detection of the virus in different communities. Early diagnosis will direct prophylaxis and may allow limiting the pandemic spread until vaccines are available. Similarly, in isolated rural areas and in northern communities as well as in semi-closed groups in urban areas (e.g., jails and long term care facilities), the early detection of the virus will permit the institution of appropriate measures to control the spread of the outbreak and to start prophylaxis and/or treatment of high-risk contacts and of indispensable individuals.

Once the pandemic strain has been isolated in a community, virologic tests will be required only for surveillance purposes (virus isolation), and to test atypical cases if the result of the test will change the management of the patient and/or contacts (rapid tests and, in some cases, virus isolation).

Rapid diagnostic tests detect influenza antigens or viral nucleic acids in nasopharyngeal secretions or swabs, nasal wash, or sputum (see Table). Rapid tests for novel viruses of pandemic potential should be developed during the inter-pandemic period. At the time of a pandemic, rapid methods that will detect the new pandemic strain will have to be identified; information regarding the reliable and affordable methods should be communicated to the front-line diagnostic laboratories. Samples should be collected within the first 4 days of illness. The quality of the sample is critical for the sensitivity of the test, and nasopharyngeal aspirates are the best samples.[226,31].

Using culture as the gold standard, the sensitivity for most rapid tests that can be done in a physician's office is approximately 70% and the specificity is about 90% (i.e., that ~ 30% of samples that will be positive by viral culture may give negative results by rapid tests, and about 10% of positive tests will be false-positives[31]).

Point-of-care tests have a role in the timely diagnosis of outbreaks and in providing guidance for antiviral treatment or prophylaxis. However, rapid tests cannot replace culture but need to be used in combination with viral culture. This is because presently only culture can identify subtypes and aid with surveillance and vaccine planning.

Table 5.1. Diagnostic tests for influenza[a]

Procedure	Influenza types	Specimens	Time for results	Point-of-care
Viral culture	A and B	NP[b] swab, throat swab, nasal wash, bronchial wash, nasal aspirate, sputum	5-10 days[c]	No
Immunofluorescence	A and B	NP[b] swab, nasal wash, bronchial wash, nasal aspirate, sputum	2-4 hours	No
Influenza Enzyme Immuno-Assay (EIA)	A and B	NP[b] swab, throat swab, nasal wash, bronchial wash	2 hours	No
Directigen Flu-A Bencton-Dickinson	A	NP[b] swab, throat swab, nasal wash, nasal aspirate	< 30 minutes	Yes
Directigen Flu-A+B Bencton-Dickinson	A and B	NP[b] swab, throat swab, nasal wash, nasal aspirate	< 30 minutes	Yes
Flu OIA (Biostar)	A and B[d]	NP[b] swab, throat swab, nasal aspirate, sputum	< 30 minutes	Yes
Quick Vue (Quidel)	A and B[d]	NP[b] swab, nasal wash, nasal aspirate	< 30 minutes	Yes
Zstat Flu (Zyme Tx)	A and B[d]	Throat swab	< 30 minutes	Yes
RT-PCR[e]	A and B	NP[b] swab, throat swab, nasal wash, bronchial wash, nasal aspirate, sputum	1-2 days	No
Serology: Hemag-glutination Inhibition (HAI)/ Complement fixation (CF)	A and B	Paired acute and convalescent serum samples	> 2 weeks	No

[a] List published by the CDC[31], it may not include all test kits approved in Canada.

[b] NP = nasopharyngeal

[c] Shell vial cultures, if available, may reduce the time for results to 2 days

[d] Does not distinguish between influenza A and B

[e] RT-PCR = reverse transcriptase polymerase chain reaction

Appendix 5.III. Antiviral Drugs for preventing and treating influenza

Refer to Annex E: Planning Recommendations for the Use of Anti-Influenza (Antiviral) Drugs in Canada During a Pandemic, for the latest information on antiviral drugs and the strategic use of these drugs during a pandemic.

Appendix 5.IV. Antibiotics

Antimicrobial therapy will be indicated for treatment of patients with secondary bacterial pneumonia[130,140,63]. Acute bacterial sinusitis is another secondary bacterial infection, but antimicrobials are not indicated for this complication unless symptoms are severe. Otitis media, another potential bacterial superinfection, is uncommon in adults but very common in children. Diagnosis of secondary bacterial pneumonia should be considered with:

1. Clinical deterioration after a period of clinical improvement following the initial onset of influenza; especially if there is a new onset of purulent sputum or dyspnea.
2. Radiographic consolidation.

Purulent sputum without radiographic consolidation is not an indication for antimicrobial therapy, unless the patient has pre-existing chronic obstructive pulmonary disease. Expectoration of purulent sputum with a normal chest radiograph, concomitant or shortly after the onset of influenza (up to 14 days), however, suggests bacterial bronchitis. If it is severe, or occurs in individuals vulnerable to superinfection, the use of antibiotics should be considered[171].

In any upper respiratory tract infection, runny nose and sinus inflammation (Rhinosinusitis) are common. In some cases, when severe symptoms are present or persist for more than 10-14 days, a bacterial sinusitis may be present. Acute sinusitis presents clinically with purulent nasal discharge, maxillary tooth or facial pain (especially unilateral), unilateral sinus tenderness, and worsening of these symptoms after initial improvement of influenza. In children, suspected sinusitis at 10 days to 2 weeks of symptoms would likely be treated, although it may not be in adults. Acute bacterial sinusitis does not require antibiotic treatment if symptoms are mild or moderate. Most patients with a clinical diagnosis of rhinosinusitis improve without antibiotic treatment and, therefore, only appropriate doses of analgesics, antipyretics and decongestants should be offered. Only patients with severe or persistent symptoms and clinical findings specific for bacterial sinusitis should be treated with antimicrobials. Narrow spectrum antibiotics are reasonable first line agents for these patients.

Issues to be considered in providing antimicrobial therapy in the pandemic influenza setting include:

- The availability of antimicrobials during a pandemic may be limited because of increased demand. Provincial and federal governments should have antibiotics stockpiled for such a contingency. However, the potential limited supply means antimicrobials should be prescribed judiciously. Influenza infection, by itself, without secondary bacterial complications, should not be treated with antimicrobials.
- A wide variety of antimicrobial agents will be effective for the treatment of secondary bacterial pneumonia. As a general rule, it is not desirable to treat all individuals with the same antibiotic, as this may promote resistance to that antimicrobial and limit efficacy. A variety of antimicrobials that are effective are listed in Table 1. **Antimicrobials for empiric treatment should be reviewed and updated regularly, considering the availability of new antimicrobials and the evolution of bacterial resistance among respiratory pathogens**.
- *Staphylococcus aureus* is a pathogen isolated frequently in secondary bacterial pneumonia and initial antimicrobial therapy should include coverage for methicillin

susceptible *Staphylococcus aureus*. Other common bacteria include *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Moraxella catarrhalis*, and group A streptococcus. Antimicrobials which provide a broader coverage for resistant organisms should be considered in selected circumstances: patients known to previously have had infection with a resistant organism; patients who have failed or recurred following initial antimicrobial therapy; and patients who have severe clinical presentations including respiratory failure or hemodynamic instability.

- Antimicrobial resistance is a consideration in antimicrobial selection. Current levels of resistance are low but increasing, and the clinical impact of antimicrobial resistance in respiratory infections remains controversial. The prevalence of antimicrobial resistance in common respiratory pathogens should be monitored in the pre-pandemic period and during the pandemic in patients with bacterial pneumonia. This information must be provided to practicing physicians in a timely manner.
- For adult patients hospitalized with a diagnosis of bacterial pneumonia, a sputum specimen for culture and susceptibility testing should be obtained, whenever possible. Once culture results are available, usually in 48-72 hours, antimicrobial therapy should be reassessed and modified based on these results. Sputum specimens from ambulatory patients would not be routinely recommended, but should be obtained if patients have recently received antimicrobial therapy, or if the clinical response to initial antimicrobial therapy is sub optimal.
    - Patients not admitted to hospital may be treated with oral therapy. Patients admitted to hospital will usually require parenteral therapy, but oral therapy may be considered for selected cases. Parenteral therapy should be modified to oral therapy once the patient has stabilized. The selection of an antimicrobial agent will be based on sputum and blood culture and sensitivity results, patient tolerance, local prevalence of antimicrobial resistance, and availability.

Table 5.6. Suggested empiric antimicrobial therapy for the treatment of acute secondary bacterial pneumonia (adults ≥ 18 years)

Please refer to the current product monograph for the most up to date recommendations on antibiotic dosage, precautions and side effects.

Oral: First line
› Second generation cephalosporin (e.g., cefuroxime, cefaclor) › clarithromycin* › azithromycin* › erythromycin* › doxycycline › trimethoprim/sulfamethoxazole (TMP/SMX)
Increased likelihood of high level resistance
› Amoxicillin/clavulanic acid › levofloxacin › moxifloxacin › gatifloxacin
Parenteral
› Second generation cephalosporin (e.g., cefuroxime) › Third generation cephalosporin if septic (e.g., ceftriaxone, cefotaxime) › piperacillin/tazobactam › levofloxacin › gatifloxacin › imipenem (if septic) › meropenem (if septic)

* Macrolides should only be used as a first line agent when bacteremia is unlikely.

Table 5.7. Antimicrobials for the treatment of secondary bacterial pneumonia in patients with influenza where the infecting organism and susceptibility are known from sputum or blood culture (adults ≥ 18 years)

Please refer to the current product monograph for the most up to date recommendations on antibiotic dosage, precautions and side effects.

Organism	Antimicrobial
Streptococcus pneumonia	
› penicillin susceptible	penicillin G, amoxicillin, erythromycin*, clarithromycin*, azithromycin*, doxycycline
› penicillin high level resistance	amoxicillin (high dose), levofloxacin, gatifloxacin, moxifloxacin, third generation cephalosporin (e.g., ceftriaxone, cefotaxime)
Haemophilus influenzae	
› beta lactamase negative	amoxicillin, ampicillin (IV), cefuroxime , clarithromycin, azithromycin
› beta lactamase positive	TMP/SMX, second generation cephalosporin (e.g., cefuroxime) , third generation cephalosporin (e.g., cefotaxime, ceftriaxone), clarithromycin*, azithromycin*, amoxicillin/clavulanic acid, ciprofloxacin, levofloxacin, gatifloxacin, moxifloxacin
Staphylococcus aureus	
› methicillin susceptible	cloxacillin, TMP/SMX, first generation cephalosporin (e.g., cephalexin, cefazolin), clarithromycin*, azithromycin*
› methicillin resistant	vancomycin, linezolid (use clindamycin or TMP/SMX if sensitive)

Note: when organisms are isolated from cultures, definitive antibiotic therapy will be guided by susceptibility testing (if done) and availablility of specific antibiotics.

* Macrolides should only be used if bacteremia is absent.

Management of Bacterial Pneumonia in children

Once bacterial pneumonia is diagnosed (or strongly suspected), therapy with antibiotics should be initiated without delay. When possible, the Gram stain of sputum or tracheal aspirate should be obtained. If not, an empiric treatment should be started (based on the frequency of pathogens for the different age groups and on the most common agents identified in the community)[121,157,143]. Children with mild disease can be treated at home; however, hospitalization (or alternative centre of care) will be indicated for very young children (first year of life), those children with severe disease, those who look toxic and/or have severe pulmonary dysfunction, and also for those children who may not receive appropriate care at home.

Table 5.8. Suggested empiric antimicrobial therapy for the treatment of acute secondary bacterial pneumonia in children[143]

Age	Outpatient (oral)	Inpatient	Inpatient with signs of sepsis, and/or alveolar infiltrate or pleural effusion
3w- 3m	Afebrile: Erythromycin or Azithromycin Admit if fever or hypoxia	Afebrile: Erythromycin* IV Febrile: Add Cefotaxime	Cefotaxime IV
4m- 4y	Amoxicillin	Ampicillin IV	Cefotaxime IV, or Cefuroxime IV, or Ampicillin IV
5-15y	Erythromycin, or Clarithromycin, or Azithromycin, or Doxycycline (>8 years)	Erythromycin* IV, or Azithromycin* IV, or Doxycycline IV (>8 years)	Cefotaxime IV, or Cefuroxime IV consider adding Azithromycin IV

* Macrolides should only be used as a first line agent when bacteremia is unlikely.

Table 5.9. Antimicrobials for the treatment of secondary bacterial pneumonia in children with influenza, where the infecting organism and susceptibility are known from sputum or blood culture (≤ 18 years)[121]

Organism	Antimicrobial
Streptococcus pneumonia	
› penicillin susceptible	Penicillin G (IV, IM), Penicillin V (oral), azithromycin*, clarithromycin* TMP/SMX
› penicillin high level resistance	third generation cephalosporin (e.g.cefotaxime or ceftriaxone), Vancomycin
Haemophilus influenzae	
› beta lactamase negative	Amoxicillin, ampicillin, azithromycin*, clarithromycin*
› beta lactamase positive	second generation cephalosporin (e.g., cefuroxime,) third generation cephalosporin (e.g., cefotaxime, ceftriaxone), amoxicillin/clavulanic acid, azithromycin*, clarithromycin* and TMP/SMX
Staphylococcus aureus	
› methicillin susceptible	Cloxacillin, first generation cephalosporin (e.g.cephazolin), cephalexin
› methicillin resistant	Vancomycin, linezolid (use clindamycin* or TMP/ SMX if sensitive)

Note: when organisms are isolated from cultures, definitive antibiotic therapy will be guided by susceptibility testing (if done) and availablility of specific antibiotics.

* **Macrolides should only be used if bacteremia is absent**.

The drug of choice for pneumonia due to *S. pneumoniae* is penicillin G. Cefotaxime or ceftriaxone should be used if the isolate is resistant to penicillin, and vancomycin if it is resistant to both[1].

6.1 Remote Rural areas and Aboriginal Communities

The last Census of Population, in 2001, revealed that 79.4% of Canadians live in urban areas with a population of 10,000 people or more[202]. This also means that about 6.2 millions of Canadians live in communities with a population of less than 10,000 individuals, including several communities of less than 1,000 individuals. Although some of these groups live in semi-urban settings adjacent to metropolitan areas in the south of Canada, about 6% of the total Canadian population (i.e., about 1.8 million persons, 30% of them aboriginal people) live in remote areas in the north, "shaped by distances, weather, limited resources, and little backup from urban centres"[139].

Registered Nurses are the predominant primary healthcare providers for remote and isolated communities in the north, and for southern rural areas. They work in community health clinics, outpost nursing stations, small rural hospitals and other facilities. In small towns of less than 5,000 inhabitants, the hospital (if there is one) is usually the only health-care facility available, and nurses (less than three in any shift) manage patients in collaboration with on-call physicians (frequently living 100 km or more away). Patients who cannot be managed in their communities are transported by air or road to secondary or tertiary centres, sometimes located at considerable distances (200 or more kilometres)[139,111].

In some northern First Nations' and Inuit communities, low density of human population has led to regional, instead of community-centred services. While resident nurses and paraprofessionals provide primary health care for larger populations, smaller communities have only a community health representative who works alone, with the support of a nurse visiting once a week and of long distance telephone consultations. In the event of a crisis, patients have to be taken out to larger urban centres. In some areas four out of five communities are accessible only by airplane[20,111].

Co-morbidities

Past epidemics of respiratory illness in remote communities in the north were characterized by high morbidity and mortality. Particularly influenza A has been associated with high attack rates (86-100%) and high case fatality (5-10%, sometimes higher). Improvements in health care decreased the burden of disease, but it remains higher than in the rest of the country[217]. The reasons for that include co-morbidity factors like high prevalence of underlying lung disease, environmental factors like smoking and living under crowded conditions in houses with poor ventilation, and low antibody levels to common pathogens[217,6].

Inuit infants suffer from a high rate of low respiratory tract infections (LRTI) and often require mechanical ventilation. Their rate of admission to hospital for LRTI is one of the highest of the world, and infant mortality in the north is at least twice the Canadian average[6].

First Nations' communities in the north have a high prevalence of coronary disease and type-2 diabetes and the incidence of myocardial infarction is increasing[111].

After the pandemic is declared in Canada, most influenza patients living in remote areas will have to be managed within their communities, without transferring them to larger cities. This requires that each community elaborate guidelines in advance, to direct the appropriate management of patients, medical personnel, and volunteers. The inter-pandemic epidemics suffered almost every year in Canada are an opportunity to develop such strategies and test their efficacy.

Each community will need:

a) A policy for the management of an outbreak, with timely diagnosis and appropriate management of influenza infection in patients.

b) Guidelines for the immunization of citizens, medical personnel, and volunteers once a vaccine is available (in agreement with the national influenza pandemic plan).

c) Guidelines for the use of antivirals if they are available (in agreement with the national influenza pandemic plan). During the early stages of the pandemic, each community should ascertain access to antivirals and antibiotics.

d) Plans to establish an area for triaging patients with respiratory illnesses, with resources and personnel to carry out primary and secondary assessment.

e) To assign a place for the management of more acutely ill patients, where acute care (parenteral therapy and oxygen therapy) and closer monitoring and more intensive nursing care, may be performed.

Emergency preparedness plans for isolated communities are critical, and the influenza pandemic guidelines should be part of these strategies.

6.1.1 Management of an influenza outbreak in isolated communities

The timely detection of an outbreak in a community is essential to implement control measures and to stop the diffusion of the disease. In a pandemic situation, the first case of confirmed influenza would likely lead to outbreak management for pandemic influenza (see Appendix 6.I).

Every community should have in place surveillance for the early detection and control of an outbreak. This includes:

1. Preparation of a written plan for the management of an influenza outbreak, avoiding unnecessary delays. It will include the identification of diagnostic tests, responsibilities of medical and non-medical personnel, and use of antiviral medication.

2. Identification of a person responsible for the surveillance and for the transmission of information in the community. This will usually be the individual with responsibility for infection control; he/she will be also in charge to report to the pertinent authorities when an outbreak has been detected in the area. In an isolated community, the person responsible for surveillance and transmission of information in an outbreak is the Nurse in Charge, the most senior health professional working at the community health centre.

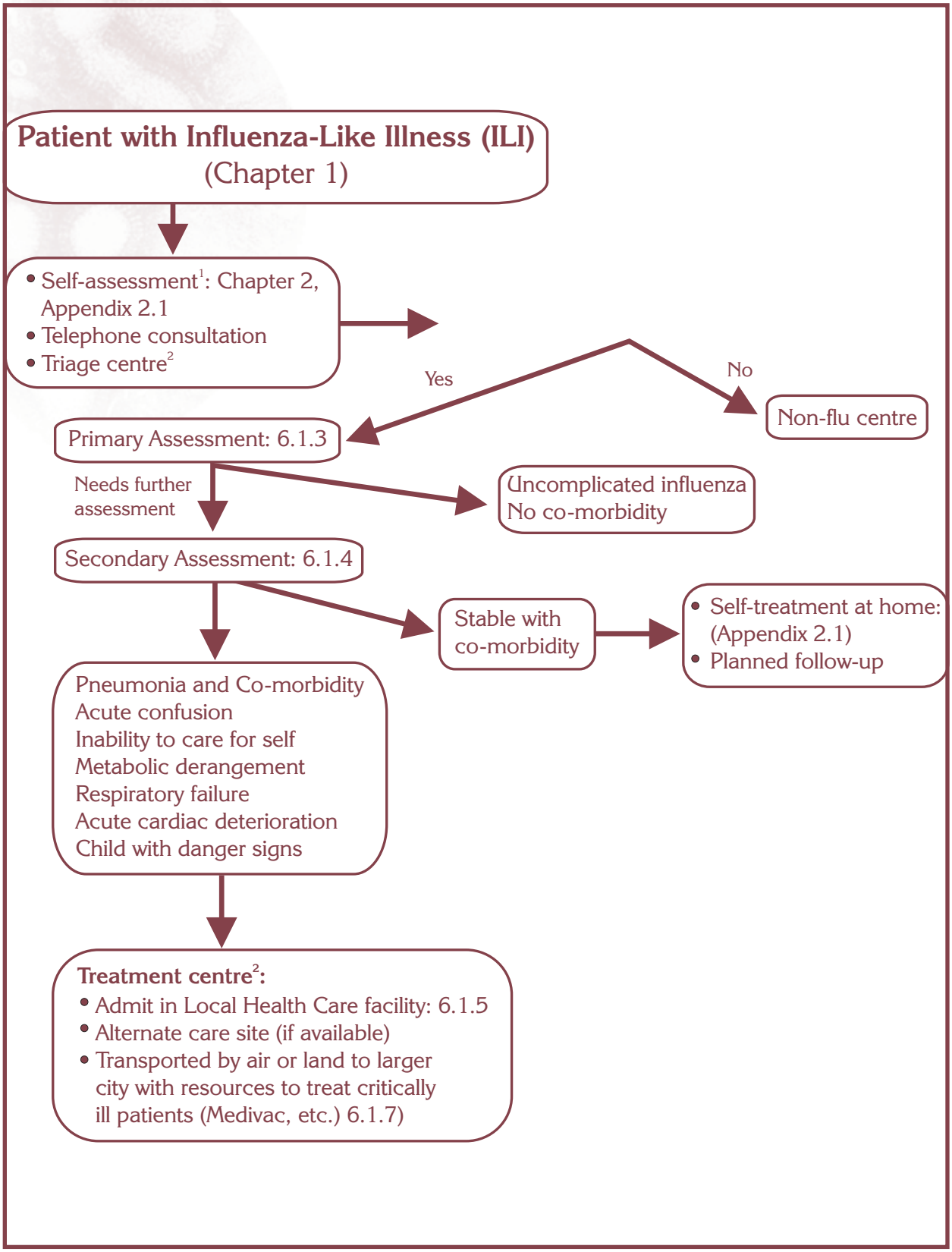
3. Education of all medical and non-medical volunteers of the importance of early identification and notification if a case is suspected.
4. A response capacity maintained 7 days per week.
5. Specific reporting mechanisms and standardized data collection (see appendices in Chapters 2 and 4).

Once the outbreak has been confirmed in the area, the authorities responsible should take all the measures required to control the propagation of the virus within the locality and to neighbour towns (see Infection control document). Studies and treatment of patients will be done in the area assigned for this purpose, and prophylactic treatment of high-risk contacts may be initiated (following the existing framework for antiviral prioritization during the pandemic).

People in rural areas and remote communities usually face unique geographic and resource challenges in the delivery of health care. For these reasons, a pandemic plan that is suitable for urban centres may not be adaptable to rural or remote jurisdictions. The interpandemic period is the best time to plan for health care delivery in an emergency. Each Province and Territory should identify needs, capacity to respond to a pandemic threat, and alternative options in both, large urban centres and in small or remote communities.

The Health Protection Unit, Health and Social Services, in the North West Territories developed a protocol for the management of outbreaks, which is included in their Communicable Disease Manual (February 2000). Appendix 6.I. has a summary of this protocol, adapted to be used in an influenza pandemic.

6.1.2 Triage of patients in small communities[1]



Legend for Table 6.1.2

1) This algorithm would apply to isolated cities or towns with a population of less than 10.000 habitants, where only emergency and sub-acute care services are available. Most rural towns as well as some First Nation and Inuit communities may be included in this group. Individuals living in these communities are usually sent to larger cities/towns when they need acute or chronic hospital services.

   It is advisable that influenza patients, or their relatives, learn to evaluate the seriousness of the disease, and to determine if they can care for themselves at home or need further assessment. Appendix 2.I. contains some helpful self-evaluation criteria and instructions for self-treatment. Basic instruction can be given to the general public by TV (an explanatory video), radio, newspapers, pamphlets, and the Internet. Telephone consultation (or consultation through Internet) with competent personnel or volunteers trained for this purpose, may be provided.

   Triage centres may be located at community health clinics, outpost nursing stations, small rural hospitals and other places like pharmacies, schools, churches, community centres, military field hospitals, etc. A special "emergency" area for the triage, secondary assessment and treatment of influenza patients, should be assigned. This should be different from the area regularly used for the triage and treatment of other emergencies. The Health-Care-Centre may be the only recognized centre of treatment in some areas; to alleviate the burden at these centres, alternative places of triage and care and **appropriate staffing and resources should be planned in advance**. At the triage centre, all patients will be evaluated following the primary assessment algorithms described in section 6.1.2 (see also Chapter 2). Some patients more seriously ill may need further evaluation (secondary assessment, section 6.1.3). Treatment and advice may be given. Some health care sites will be able to handle patients more critically ill as well as providing sub-acute care.

2) For some small communities (some have less than 1000 individuals) it may not be possible to operate an alternate centre of care. In these situations, the triage site may be a designated area close to, or in the health care centre. Additional staff must be trained and dedicated to these designated areas in advance of the pandemic, because one or two nurses constitute all the health-care personnel available in these communities. In some small communities, the only health centre available is designed to house patients for up to four hours, until evacuation to hospital is possible. Those patients requiring attention, who cannot be cared for by family, friends or home support workers, may have to be evacuated to a larger centre in other community.

6.1.3 Initial assessment

The initial assessment and evaluation of respiratory patients should be consistent with advance directives, and may include the following (see Chapter 2):

a) History: age, co-morbid illnesses, respiratory and extra-respiratory symptoms, time of onset.

b) Physical assessment: temperature, skin colour, pulse, blood pressure, respiratory rate, chest auscultation, chest pain on inspiration, peripheral oedema, mental status, function (ability to function independently, continuous vomiting, etc.).

c) For patients who are clinically stable and not judged to be severely ill this may be sufficient.

6.1.4 Secondary assessment

When there are concerns about metabolic status, or the degree of illness of an individual, additional tests may be considered. These may include (see Chapter 2):

- CBC with white cell count,
- Electrolytes,
- Blood glucose,
- CPK,
- BUN and creatinine,
- EKG if there is a history of cardiovascular disease and/or evidence of significant deterioration in cardiac status.

Diagnostic testing should include 0_2 saturation, and a chest x-ray should be considered for patients with an oxygen saturation of $\leq$90% on room air, with new purulent sputum, or respiratory rate $\geq$30 per minute.

A sputum culture may be helpful for patients producing purulent sputum (depending on the availability of resources, see Chapter 2).

Laboratory and radiology testing will be very limited. For most health centres in small communities, routine testing is WBC and blood glucose. Chest X-rays and O2 saturation may be done to those who are suspected to have pneumonia, to confirm diagnosis and to decide if they have to be transferred to a larger centre for treatment. Trained support staff will be needed to help the nurses with the testing and for the care of patients remaining in the community. Other testing will have to be referred.

Portable chest x-rays may be needed in some nursing stations.

6.1.5 Management of influenza patients in local health care establishments

A written plan for the timely management of influenza patients who are more seriously ill, but will be treated in the community, should be prepared in advance. It will include diagnostic and follow-up tests, responsibilities of medical and non-medical personnel, and the use of medications. **Resources and support (by medical personnel and volunteers) should be planned in advance.**

a) **Diagnostic and follow-up tests** (in selected patients, see Chapter 2):

- Chest X-Rays
- Blood tests, urine analysis, etc.
- Viral/Bacterial studies: sputum, nasopharyngeal aspirate.

b) **General management**: The goals of general management are to maintain comfort, to preserve functional status, and to limit complications. Specific aspects of management for influenza and its complications include:

1. **Oxygenation**. Patients with an oxygen saturation of <90% on room air should have oxygen supplementation. This may usually be given by portable oxygen with nasal prongs. Where this is insufficient, patients may require more aggressive efforts of oxygenation including non-intubation methods of respiratory therapy.
2. **Maintenance of hydration**. This may be achieved through oral fluids or if necessary through parenteral fluids. Where parenteral fluids are necessary hypodermoclysis is an option rather than intravenous therapy and may be more practical.
3. **Antipyretics and analgesics** may be required to limit discomfort associated with myalgia and arthralgia. Usually acetaminophen will be sufficient.
4. **Other therapies** such as antitussives may occasionally be indicated depending on the clinical features of the given patient.

c) **Specific therapy**: Specific therapy is directed at the influenza infection itself and influenza complications, including secondary pneumonia and/or aggravation of pre-existing disease. When antivirals/antibiotics are not available, symptom control and oxygenation may be the only management approaches.

1. **Antiviral agents** including amantadine (for prevention), zanamivir, and oseltamivir (for treatment) may be given for the prevention and/or treatment of influenza. Treatment with these drugs is, usually, only indicated if symptoms have been present for less than 48 hours. They may not be available, depending on supplies and on the priorities for the pandemic situation. When amantadine is used, dosage adjustment for renal function is necessary. (See Appendix 5.III)
2. **Antibiotics** should be given for the management of presumed or diagnosed secondary bacterial pneumonia (see Chapter 2 and Appendix 5.IV). It has been reported that First Nations' and Inuit children have more severe low respiratory infections than other children hospitalized for pneumonia; the frequency and severity of upper respiratory infections and otitis media is much higher than in other children[209,6].
3. **Management of preexisting disease**: Cardiovascular, respiratory, metabolic, etc.

6.1.6 Discharge Criteria

Once the patients are clinically stable for at least 24 hours, symptoms and signs have improved, oral therapy is being given, and they are functionally independent, discharge from the local hospital (or designated health care establishment), with follow up, may be considered. The use of an alternative centre of care (domiciliary care) should be contemplated if more prolonged observation is necessary for patients with pneumonia, co-morbidities, or for individuals who are not functionally independent. Domiciliary care may also be used to alleviate local hospitals and care centres; less ill patients that for personal or social reasons are not able to self-care at home will be directed to these places. **Training and support should be planned in advance.**

If the patient is discharged, provide a copy of:

f) Assessment sheet

g) Instructions for self-management

h) Contact names/numbers to notify if they deteriorate clinically

i) Arrangements for home care/follow-up as required: usually 48 hours later for adults and 24 hours for children.

j) Arrangements for alternate care if this is required.

6.1.7 Transfer to and from Acute Care facilities

Severely ill patients may need to be evacuated to larger cities with appropriate services to provided complex or critical care. **Territorial plans need to be established during the interpandemic period to determine evacuation criteria and to designate which hospitals will receive patients from each community.**

6.2 Correctional and penal institutions

6.2.1 Federal Correctional Institutions

Federal correctional institutions accommodate inmates who are serving 2 years plus one day or more and provincial institutions house individuals sentenced 2 years minus one day or less. Federal institutions can be classified as: maximum, medium, or minimum-security institutions, and establishments with multiple levels of security. Maximum-security institutions can generally accommodate up to 400 inmates while medium security institutions can house up to 525 offenders and minimum-security institutions accommodate from 80 and up to 200 individuals. The rated capacity for women's institutions is much lower.

Health resources

Health services in federal correctional institutions are provided by health care professionals who are registered or licensed in Canada. Access by inmates to health services is available on a 24-hour basis. It can be provided through on-site coverage (nursing care coverage fluctuate from eight to twenty-four hours, depending on the institution security level and location), on an on-call basis, or through other CSC institutions or community services. Contracted medical care is provided in every federal correctional facility, either on-site or off-site.

Most inmates residing in high and medium security institutions live in individual cells, where they may be treated in case of influenza infection. The majority of minimum-security institutions, on the other hand, offer either residential style unit accommodation or regular cell units. Most institutions also have a special area, with some "medical beds", for patients who need special attention and may be treated in the same establishment. However, these beds are not used regularly, because of the lack of nursing supervision after regular operational hours. In case of a pandemic, and provided that they receive night care, such beds may be useful to treat more seriously ill influenza patients within the same institutions[39].

6.2.2 Provincial Correctional Institutions

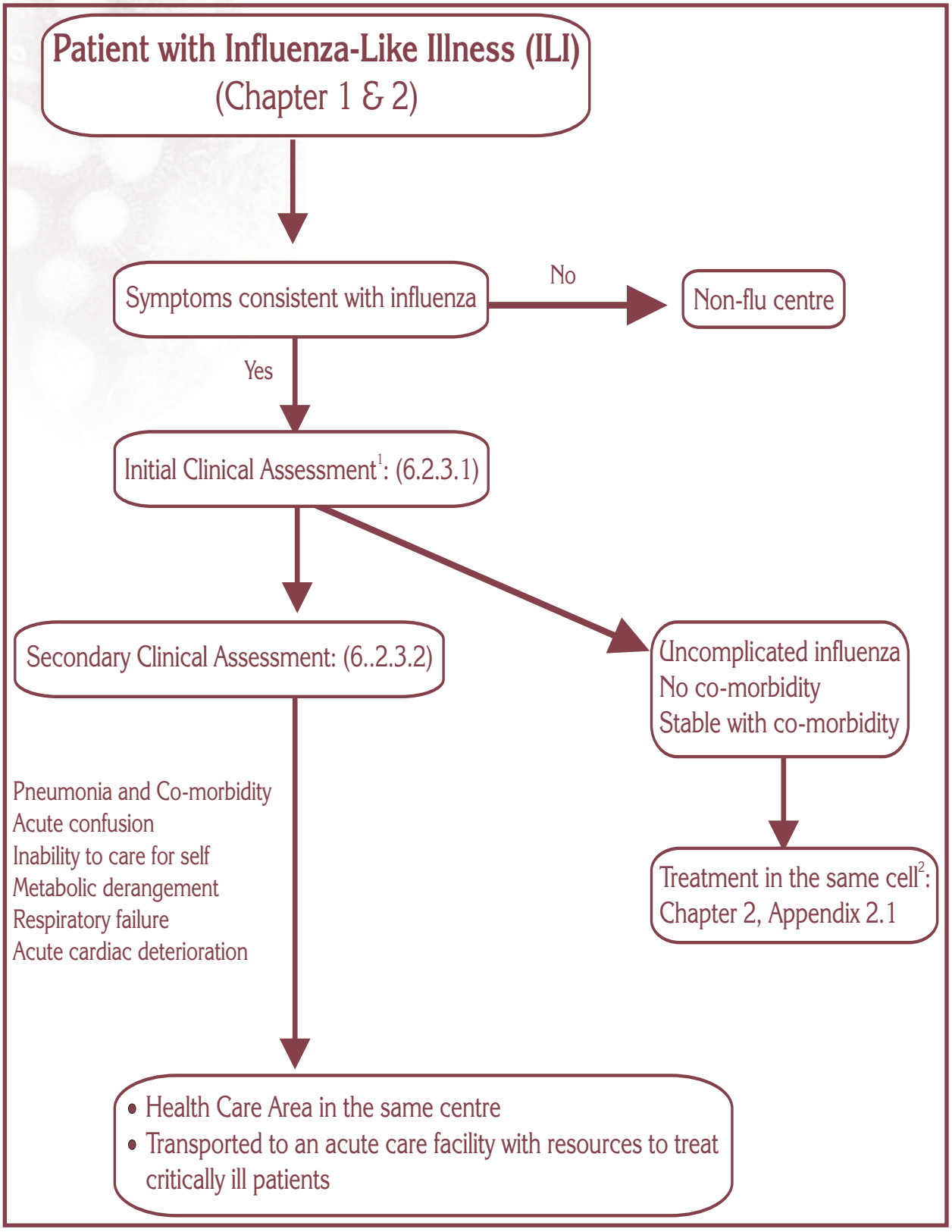
Provincial institutions can also be classified as maximum, medium, or minimum-security institutions; they provide lodging to individuals sentenced 2 years minus one day or less (about 87,000 per year, roughly 8.000 in a given day).

Health resources (this applies only to Ontario)

Provincial correctional institutions receive the regular support of registered nurses (380 nurses in Ontario, about 3 nurses per shift per institution). The number of hours of available on-site nursing care coverage varied from sixteen to twenty-four hours per day, depending on the size and location of the institution. Contracted medical care is provided in an "on call" manner.

Inmates live in cells (2 or 3 individuals per cell) or share dormitories (about 12 individuals each). It would be possible to segregate them to private/semi-private areas where they may be treated in case of influenza infection. Most institutions also have a special "health-care" area, with some beds for patients who need special attention and may be treated in the same establishment. In case of a pandemic, and provided that they receive nursing care, these beds may be useful to treat influenza patients within the same institutions. Emergencies that cannot be treated in the same institution may be referred for treatment to close community hospitals. Provincial institutions count with the same facilities available to neighbour communities.

6.2.3 Triage of patients in correctional institutions*: Federal and provincial correctional institutions



Legend for Table 6.2.3

1. A special "emergency" area should be assigned for the triage, assessment and treatment of influenza patients. All patients will be evaluated following the primary assessment algorithms described in Chapter 2, and some patients more seriously ill may need further evaluation (secondary assessment, Chapter 2).
2. Some influenza patients will be able to care for themselves in their cells; Appendix 2.I. (Chapter 2) contains some helpful self-evaluation criteria and instructions for self-treatment. Other patients, however, may need more intensive care in a special area assigned for this purpose. Only critically ill patients may be transported to an acute care centre.

A goal, in the pandemic situation, will be to manage patients within the same institution without transferring them to an acute care facility. This will require that each institution designate an area for the acute care of inmates, with some monitoring and nursing care. Most large federal institutions, and some provincial institutions, already have an area for sub-acute care that can be used for this purpose in case of a pandemic.

Prior to any pandemic, correctional institutions should develop policies that will support appropriate management of inmates and personnel. The inter-pandemic epidemics suffered almost every year are excellent opportunities to develop such policies and test their efficacy. Non-compulsive vaccination of inmates in federal correction centres is performed every year, before the beginning of the "flu-season".

Pandemic preparedness should include:

a) An institutional policy for the management of influenza outbreaks.

b) Implement immunization of inmates and personnel when/if vaccine is available.

c) Plans for the establishment of an area within the facility for management of more acutely ill patients. These plans should also include 24 hours of nursing care for influenza patients who require close observation or care.

6.2.3.1 Initial assessment of patients with an influenza like illness: The initial assessment and evaluation of the inmates will include (see also Chapter 2, Table 2.1.1)

d) History: age, length of residence in the detention centre, co-morbid illnesses, documentation of previous influenza vaccinations, time of onset of symptoms.

e) Physical assessment: temperature, skin color, pulse, blood pressure, respiratory rate, peripheral edema, chest auscultation, chest pain on inspiration, mental status, function (vomiting, etc.).

f) For individuals who are clinically stable and not judged to be severely ill this may be sufficient.

6.2.3.2. Secondary assessment (Chapter 2, Table 2.1.3)

If there are concerns about metabolic status, or the degree of illness of an inmate, additional tests may be done, as required by the clinical presentation (ideally CBC with white cell count, electrolytes, blood glucose, CPK, BUN, creatinine, an EKG if there is a history of cardiovascular disease and/or evidence of significant deterioration in cardiac status). Some correctional institutions have the facilities to do blood work regularly - in some institutions it can be done daily or biweekly (depending mostly of the size and location of the institution).

Depending on the availability of resources, the determination of 02 saturation in patients severely ill will be desirable. Individuals with an oxygen saturation of (90% on room air, with new purulent sputum, or respiratory rate (30 per minute should have a chest X-Ray performed. A sputum culture may be obtained from patients who are producing sputum and appear to be severely toxic or who have pneumonia (see Chapter 2 for further guidelines).

Most federal maximum and medium institutions have X-Ray equipment and technician in place (the number of clinics per week depends of the size of the institution). Minimum-security institutions are affiliated with larger institutions with which they share the ground and some health care services such as radiography and laboratory services. Some provincial institutions also count with X-Ray equipment.

Correctional centres should have in place arrangements by which timely chest X-Rays and laboratory results may be obtained (conditional upon availability and pandemic guidelines, see Chapter 2), and should also consider a phone reporting system to ensure that results are returned promptly and in a standardized fashion.

6.2.3.3 Co-morbidities

Some inmates may suffer from diseases that will increase their risk for complicated influenza, like diabetes, COPD, asthma, etc. (see Chapter 1). In addition, the percentage of offenders who smoke is very high and high rates of infectious diseases such as hepatitis C (up to 22% in some federal jails), HIV/AIDS (≥ 1.6% in some federal jails), tuberculosis, etc. are frequently observed in this population. The presence of one or more of these co-morbidities should be considered when treating or preventing influenza infections in inmates.

6.2.3.4 Instructions for the management of subjects remaining in correctional establishments

A written plan for the management of more seriously ill influenza patients who stay in the establishment should be in place in each institution. This will include diagnostic and follow-up tests, responsibilities of medical and non-medical personnel, and use of medication (consistent with the national pandemic plan).

a) **Diagnostic and follow-up tests**: as required (conditional on availability and the national pandemic guideline, see Chapter 2):
   - Chest X-Rays
   - Blood tests, urine analysis, etc.
   - Viral/Bacterial studies: sputum, nasopharyngeal aspirate.

b) **General management**: Specific aspects of management of influenza and its complications may include:

1. **Oxygenation**. Patients with an oxygen saturation of <90% on room air should have oxygen supplementation. This may usually be given by portable oxygen with nasal prongs. Where this is insufficient, patients may require more aggressive efforts of oxygenation including non-intubation methods of respiratory therapy.
2. **Antipyretics and analgesics** may be required to limit discomfort associated with myalgia and arthralgia. Usually acetaminophen will be sufficient.
3. **Maintenance of hydration**. This may be achieved through oral fluids or if necessary through parenteral fluids.
4. **Other therapies** such as antitussives may occasionally be indicated depending on the clinical features of the given patient.

c) **Specific therapy**: Specific therapy is directed at the influenza infection itself and influenza complications including secondary pneumonia and/or aggravation of pre-existing disease. When antivirals/antibiotics are not available, symptom control and oxygenation may be the only resources.

1. Antiviral agents including amantadine (for prevention), zanamivir, and oseltamivir (for treatment) may be given for the prevention and treatment of influenza. Treatment with these drugs is, usually, only indicated if symptoms have been present for less than 48 hours. They may not be available, depending on supplies and on the priorities for the pandemic situation. When amantadine is used attention to renal function must be assured (See Appendix 5.III).
2. Antibiotics should be given only for the management of secondary bacterial pneumonia (abide by availability and pandemic guideline, see Appendix 5.IV).
3. Management of preexisting disease: Cardiovascular, respiratory, metabolic, AIDS/hepatitis C, etc.

6.2.3.5 Transfer to and from Acute Care facilities

A goal, in the pandemic situation, will be to manage patients within the same correctional institution; however, some patients may need to be moved to an acute care facility for more intensive treatment. The regulation of these transfers should be planned in the interpandemic period.

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Annex H

Resource Management Guidelines For Health Care Facilities During an Influenza Pandemic

Date of Latest Version: *February 2004*

Note:

- *This annex may not contain up-to-date information on the antiviral strategy. Refer to the Preparedness section of the Plan and Annex E for this information.*
- *See Background section of the Plan for information on the latest pandemic phase terminology.*
- *This annex may be out-of-date with respect to other planning activities and policy decisions.*
- *This annex is expected to be updated in 2007.*

H Resource Management Guidelines For Health Care Facilities During an Influenza Pandemic

Table of Contents

Introduction

During influenza epidemics and pandemics when the overall attack rate is relatively high, even a low frequency of complications will result in marked increases in rates of hospitalizations. Pandemic influenza usually occurs in waves lasting 6 to 8 weeks in any one location. Therefore the demand on health care services provided at health care facilities can be expected to increase, peak and decline during the weeks in which any one location is affected.

It is estimated that between 34 thousand and 138 thousand people will need to be hospitalised in Canada during the next pandemic if the attack rate is between 15% and 35%. This will put enormous stresses on all aspects of the medical system and medical resources will be stretched beyond capacity.

This document is divided into a background section and two main guidelines sections - guidelines regarding the management of resources in health care facilities, and guidelines on the need for and identification of additional human resources as part of pandemic planning activities involving health care facilities. These guidelines identify activities for the interpandemic, pandemic and post-pandemic periods.

Although these guidelines focus on resource management in health care facilities, health services are delivered in many other settings, including: triage centres; telephone health support; physician clinics; ambulance/paramedical services; patient transport services; home care; long term care facilities, and public health. In addition, "non-traditional" health care sites may be set up for the pandemic response (e.g., mobile health units, acute /subhealth care facilities). Regional and local planners will need to address resource management issues for all health services settings. Guidelines for resource management in non-traditional sites are considered in another annex of the *Canadian Influenza Pandemic Plan* — Annex J - Guidelines for Non-Traditional Sites and Workers.

1.0 Background

1.1 Planning Assumptions

Current disaster plans primarily address multi-casualty, short-term, localised emergency situations. In a pandemic the impact is virtually world-wide and the duration of the "emergency" will be longer. Since multiple jurisdictions will be affected simultaneously, the sharing and exchange of resources may not be possible between jurisdictions.

For the purposes of resource planning for pandemic influenza the following assumptions have been made.

a) **It is unlikely that there will be a "Declaration of Emergency".**

Regional Pandemic Plans should not assume that a National or Provincial Emergency will be "declared", as this is unlikely to occur in the event of a pandemic.

b) **The health care system may be overwhelmed.**

There will be an increase in physician visits, hospitalizations and deaths putting the health care system under extreme stress.

- Canadian institutions are presently running at or close to maximal bed capacity and budget cutbacks and staff shortages have meant that many jurisdictions have already reduced elective admissions.
- Increasing or even maintaining existing bed capacity requires committed human resources. During a pandemic, shortages of personnel, supplies and equipment can be expected to limit the ability of institutions to respond to a significant increase in patient volume.

c) **The best use of resources will be achieved through system-wide prioritization.**

A pandemic will require a regional prioritization of needs and resources, across the health care system, not just a review of resources at a single institution. For example, in terms of human resources, health care professionals may need to be moved from vaccination clinics to hospitals or from one hospital to another. Beds, ventilators and other equipment may need to be moved to non-traditional sites. This will require a review of logistical, ethical and practical issues throughout the region.

d) **There will be limited transfer of resources.**

The global nature of the crisis will mean that resources from other jurisdictions cannot be depended upon for meeting additional requirements during a pandemic.

e) **The usual supply lines will be disrupted.**

The demand for medications, medical/surgical and other supplies will increase substantially around the world and across the country. Suppliers may experience difficulties responding to increased demand, due to staff shortages, raw material shortages and transportation disruptions. Additionally, because most medications, equipment and supplies are produced outside of Canada, there will be barriers to obtaining supplies which include embargoes of medications, cross border issues and transportation issues due to staff shortages.

f) **A pandemic vaccine may be unavailable.**

There will likely be no vaccine available until well into the first wave of a pandemic or later, depending on the time necessary to find a suitable vaccine seed strain, and for development, testing and production. When a vaccine does become available, immunization clinics targeting health care workers may need to be established inside health care facilities.

g) **Anti-influenza drugs will be in short supply.**

Currently no raw materials for anti-influenza drugs are produced in Canada. Existing supplies are very limited and insufficient to form the basis for an effective antiviral response strategy. Stockpiling of these medications is being considered.

When and if antivirals drugs are made available, treatment and prophylaxis for people seeking health care services at health care facilities will need to be prioritised according to national recommendations.

h) **The number of essential service workers will be reduced.**

The availability of health care workers, and service providers essential to limiting societal disruption during a pandemic, may be reduced due to illness in themselves or family members.

i) **The pandemic will occur in waves.**

The pandemic will likely occur in successive waves of approximately 6 to 8 weeks duration in any one community followed by a recovery period of unknown duration. Between the waves substantial resources will be required to "catch up" with elective procedures, delayed treatments for cancer or cardiac care and other treatments. Maintenance on equipment, restocking of supplies, and other activities necessary to recover and prepare for another pandemic wave will need to occur during this time frame.

1.2 Projecting the Impact

No one can predict how serious the impact of the next influenza pandemic may be. Current Canadian estimates have been calculated based on attack rates for symptomatic illness of 15% and 35%, however, higher attack rates are possible. Local estimates of the potential impact of a pandemic (the number of ill persons, the number of hospitalisations, number of deaths, etc.) can be projected using software programs, e.g., the "FluAid" software developed by the Centers for Disease Control and Prevention in the U.S. (http://www2.cfdc.gov/bd/fluai Hlt13977776d Hlt13977776/default.htm).

This software presents some challenges and has some limitations based on the fact that it is geared to the U.S. health care system and health seeking behaviours, which may be quite different from Canada. Currently there are no reliable tools for estimating rates of intubation, which would assist in planning for equipment such as ventilators. An example of how one province, Alberta, has used FluAid is provided as Annex A in the Preparedness Section of the Plan.

2.0 . . . . . Resource Management in Health Care Facilities

2.1 Resource Management During the Interpandemic Period

The following activities should take place during the interpandemic period. Further detail is provided below this list.

- Review emergency preparedness legislation
- Identify triggers for intervention
- Planning for increased bed capacity
- Plan for patient prioritisation
- Plan for critical equipment and supplies

2.1.1 Review Emergency Preparedness Legislation

Emergency Preparedness Legislation makes many provisions for the management of a crisis, obtaining and accessing materials, and other resources, implementation of crisis plans and also provides for a crisis management structure. This includes the recruitment of professional and other paid staff as well as volunteers, managing human resources and protection of people who volunteer. Pandemic planning should be integrated with the emergency legislation as well as emergency plans of the jurisdictions in order to make best use of existing plans and resources.

Important Note: Regional Pandemic Plans should not assume that a National or Provincial Emergency will be "Declared", as it is highly unlikely to occur in a pandemic. Provincial and territorial planners should assess issues such as workers compensation and liability insurance, maintaining and supporting workers and other aspects of the plan that may arise without such a declaration.

The national support framework is not contingent upon a declaration of a national emergency. It is recommended that all provincial and territorial planners review both the Federal and the Provincial/Territorial Emergency legislation to determine how to integrate plans within the framework of emergency legislation.

For example it is important to identify what provisions of legislation are particularly applicable to obtaining use of property and materials in a crisis. These provisions would include but likely not be limited to:

- the ability and responsibility of authorities to requisition property for use as non-traditional sites,
- access to transportation, materials, administrative staff and other resources, and
- compensation for requisitioned property.

2.1.2 Identify Triggers for Implementation

Existing legislation and emergency plans at the government and institutional level already identify criteria that would trigger the implementation of specific plans. The *Canadian Pandemic Influenza Plan* will also describe general points of action.

In co-ordination with existing legislation and plans, provincial/territorial, regional and local authorities and institutions should identify key criteria and methodologies that would trigger the phased implementation of plans regarding resource management activities in their jurisdiction. The local medical officer of health, together with the local pandemic response team, will decide when to initiate the pandemic influenza plan for their jurisdiction.

Since it is unlikely that the pandemic will start in Canada, the first trigger may be reports of the severity and epidemiology of the pandemic from other countries. This will likely be the first indicator of what to expect when the pandemic reaches Canada in terms of demand for health care services.

Local health care resources and local disease epidemiology, for example, the number of confirmed influenza cases in the community, or data on the impact of pandemic influenza on other Canadian jurisdictions, will determine the triggers for health services emergency plans. These triggers may include:

- The proportion of emergency room visits attributable to influenza.
- The proportion of influenza cases requiring hospitalisation.
- The capacity of the hospital to accommodate influenza cases.

Other triggers may include reports from sentinel physician or walk-in clinics that they cannot accommodate all of the patients requesting appointments for influenza-like-illness. Ambulance re-routing to other acute care setting due to full emergency rooms may serve as another trigger for reallocation or acquisition of resources. The trigger points and surveillance protocols should be defined during the interpandemic period.

Federal, provincial/territorial, regional and local authorities and institutions may designate points at which the following specific actions are taken.

- Changing staffing ratios, job duties
- Reducing surgical slates, admissions
- Consolidating services
- Procuring additional supplies
- Calling on alternative staff
- Re-routing of ambulances

2.1.3 Planning for Increased Bed Capacity

In any institution a “bed” includes infrastructure support, including staffing, which is required to care for the patient in that “bed”. Therefore the requirements for a “bed” in an intensive care unit, for example, include all the support required for a patient to be cared for at that level.

Planning to increase bed capacity during a crisis includes:

- identifying the strategies in advance,
- planning for the consequences of these strategies, and
- identifying trigger points at which the options will be implemented.

Various options to increase bed capacity have been identified, including:

- reducing elective admissions and surgeries to maximise medical bed capacity, and to maximise critical care beds,
- changing protocols or requirements for early discharge,
- increase home care staffing,
- increase the number of residential beds, long-term care and hospice beds,
- re-opening capacity currently closed,
- using reserved critical care capacity,
- using emergency ventilation facilities in recovery and operating rooms,
- assessing associated sites such as clinics, extended care facilities and psychiatric facilities for use by non-influenza patients, and
- creating "flex" beds during the influenza season.

Programs that track and manage Bed Capacity such as the Ontario Critical Program and Ontario Resource Registry, British Columbia's "Bedline" and Alberta's Call Centre System play a key role in the transfer/placement of critical care patients across the province, thus ensuring that staffed beds are used to maximum advantage. The Resource Management subgroup has recommended that each province/territory create a centralized bed registry, call centre and centralized ambulance dispatch.

Appendix A of this document includes checklists to assist in evaluating bed capacity in health care facilities.

2.1.4 Plan for Patient Prioritization

During a pandemic it will be a challenge to manage high ward and intensive care unit censuses, and high emergency department volumes in the face of reduced availability of health care workers and limited respiratory support equipment.

The pandemic may have a first wave of approximately 6 to 8 weeks and there may be one or more subsequent waves. Cancellation of elective admissions and surgeries, as a way of managing limited resources, could have serious consequences for some patients, including cancer and cardiac patients. Since elective surgeries are not all equivalent in terms of necessity and risks of delay, health authorities must consider within their province/territory, region, municipality and/or facility how patients scheduled for elective admissions/surgeries will be prioritized if beds are limited.

Prioritization of health resources at times of critical shortages will also need to be considered. Local community-based centres and hospitals need to take a multi-disciplinary approach and include ethical and legal considerations when developing any prioritization processes. The Clinical Care Guidelines (Annex G in the *Canadian Influenza Pandemic Plan*) provide recommendations on the assessment and management of influenza and non-influenza patients during a pandemic, including algorithms on the triage of adults and children based on their clinical presentation and risk factors or co-morbidities. However, if supplies, equipment, and access to intensive care must be rationed, a fair and equitable prioritization process will need to be established.

A general approach to ethical considerations will be developed by the national pandemic planning working groups. This will require further discussions including ethics and public consultations. With the ethical considerations and goal of the pandemic response in mind, each community will need to make their own decisions on prioritization, depending on the

availability of resources, stage of the pandemic in the community and management decisions made up until the point that rationing/prioritization becomes necessary. Since there are so many variables and contingencies, it is highly unlikely that a nationally developed guideline would be detailed enough to meet the needs of those involved in these types of decisions at the local level.

2.1.5 Plan for Critical Equipment and Supplies

A pandemic will likely result in shortages of medications, medical supplies, and potentially, operational supplies. Since multiple jurisdictions including other countries will potentially be affected by these shortages, the response plan should not rely heavily on outside assistance in terms of the provision of supplies and equipment. Some of the issues directly affecting Canadian supplies will be:

- *Interrupted transportation lines* — Canadian supplies travel long distances by truck train and aircraft. Supplies are often obtained from the U.S. and other nations. Difficulties at border crossings may substantially affect supply lines. In addition, a loss of up to 30% of workers, drivers, and other transportation staff may affect the production and delivery of supplies.
- *Lack of inventory* — In an effort to reduce costs, most health regions have moved to "just-in-time" inventory systems that keep minimal supplies on hand.
- *Embargoes* — The majority of medical supplies are not produced in Canada. Health Canada has made major efforts to establish a domestic infrastructure for the manufacturing of influenza vaccine and has encouraged in-Canada manufacture of some antibiotics. However in many cases supplies are provided by only one or two manufacturers worldwide, or the essential ingredients or components come from a single source. In past pandemics and health crises other nations have banned the export of critical vaccines, medications and supplies.

Recommendations for the use of vaccine and antivirals during a limited supply situation are provided in other annexes. Other resources such as the Infectious Diseases Society of America (IDSA) Guidelines lists medications considered to be critical in the treatment of influenza and pneumonia. These guidelines should be distributed to and reviewed by health care facilities during the interpandemic period since these issues will affect the management patients and resources, including medications, within the facility.

Stockpiling

Provinces/Territories and local health authorities may wish to review the possibility of rotating stockpiles of critical supplies for health care facilities within their own jurisdictions. Jurisdictions may specifically wish to keep some older equipment such as beds, which need little maintenance and have no specific "shelf life". Appropriate assessment should be made of the maintenance and training required to ensure the safety and effectiveness of older equipment, training needed by staff to use unfamiliar equipment, etc. (See Appendix B for supply management checklist)

After such a critical assessment, institutions and health authorities may consider maintaining certain critical pieces of older equipment such as ventilators.

The stockpiling of antiviral drugs will be discussed at the national level, however, the need to and feasibility of stockpiling critical medications for the management of patients with influenza and secondary pneumonia, should be address at the P/T and local levels. In

addition, provinces and territories will have to discuss with local pandemic planners the need to stock larger quantities of medications and equipment to manage persons with co-morbidities, e.g., chronic cardiac and respiratory disease, diabetes, renal failure, that may be exacerbated by influenza infection. The Clinical Care Guidelines (Annex G) provide guidance on antibiotics for the treatment of secondary pneumonia. The antibiotics currently stockpiled at the national level will be reviewed to determine whether these can be utilized in a pandemic, in addition to, further discussions on the need for additional national stockpiles.

Local Production

During a crisis some items, which are usually ordered from centralized sources, may be produced locally. Procurement specialists may wish to review which supplies could be obtained or produced locally if prior arrangements are made. Possible suppliers and suppliers of alternative products should be contacted to explore this possibility.

2.2 Resource Management During the Pandemic Period

Prior to the onset of the pandemic it not known which populations will be most affected by the novel virus, and what the prominent symptoms of the disease, and the most common complications will be. Once the WHO has identified a "Novel Virus" and confirmed "Human to Human Transmission", this information will gradually become available. Planners should review the epidemiology of the disease in light of the demographics of their own population and in terms of their existing resources and revise plans for the allocation of resources based on this information.

The following activities, with respect to health care facilities, should occur during this phase of the pandemic when the triggers indicate the need for action.

- Implementation of emergency plans.
- Increase bed capacity.
- Review critical equipment and supplies.

2.2.1 Implementation of Emergency Plans

Based on the previously identified triggers for action and existing legislation and plans, the phased implementation of pandemic response plans will be initiated at this time.

2.2.2 Increase Bed Capacity

To increase bed capacity, based on the plans made during the interpandemic period, the following activities may occur during the pandemic:

- re-open closed wards and hospitals,
- cancel elective surgeries and admissions based on the prioritization process determined earlier,
- centralize the tracking of bed capacity,
- use of reserved critical care capacity,
- preparation and use of emergency ventilation facilities in recovery and operating rooms,

- cohorting infectious and non-infectious patients in alternative sites such as clinics or extended care facilities, and
- discharge as many patients as possible based on revised criteria for discharge.

Provinces and territories should review and consider any existing legislation that may put restrictions on patient and staff movement.

2.2.3 Review Critical Equipment and Supplies

Review and revise supply needs and plans based on WHO and Health Canada epidemiologic projections.

- Order additional supplies.
- Establish alternate transportation/distribution arrangements if required.
- Establish domestic production of supplies where possible.

Health Canada or other authorities will notify jurisdictions of the status of stockpiles, embargoes, and emergency production facilities. Vaccine and antiviral supplies and recommendations on their use in times of shortages will be co-ordinated at the national level.

2.3 Resource Management During the Post-Pandemic Period

Activities at health care facilities during this pandemic phase will focus on the implementation of recovery plans to return the facility to its normal, interpandemic, operating state. Beds may be closed and additional supplies acquired during the pandemic may be returned or put into storage. The pandemic response should be reviewed and evaluated so that plans may be revised as necessary during this or the interpandemic period.

3.0 . . . . . Guidelines for Human Resource Management in Acute Care Settings

3.1 Introduction

During an influenza pandemic there will be an increased need for people with health care training to deal with the increased demands on the health care system. This may involve the re-locating of health care workers to different settings within an acute care facility or expansion of the services usually provided at these facilities (e.g., to include immunization clinics for health care workers). In addition, non-health care workers or retired health care workers may need to be hired/contracted to provide supplementary services essential to meet the demand for services at health care facilities. Volunteers will also be a potentially vital source of human resources to facilitate the management of health care services during a pandemic.

During an influenza pandemic the shortage of trained medical staff will be one of many barriers to the provision of adequate care. A significant proportion of the workforce may be unable to attend work for a period of time due to illness in themselves or family members. Communities and health care organizations will need to have specific guidelines in place to address what will be done if the health care system is overwhelmed and non-traditional sites must be established or current service sites expanded. Human resource management at non-traditional sites during a pandemic is addressed in the Guidelines for Non-Traditional Sites and Workers, Annex J of the Plan. This section of the document will therefore focus on human resource issues in acute care settings.

3.2 Human Resource Management During the Interpandemic Period

Health authorities may make preliminary estimates of staffing needs based on estimates of the impact of a pandemic and the demographics of the region (see Section 2.1).

The following list of activities is provided to assist with planning for the optimal use of human resources, including health care workers, trainees, retirees and volunteers, at health care facilities. Further details are provided in the following sections.

- Plan for optimal use of health care workers and volunteers
- Review emergency legislation pertaining to health care workers and volunteers
- Provide training
- Consider insurance and licensing issues
- Immunization of health care workers, including volunteers
- Plan for support for health care workers, including volunteers

3.2.1 Plan for Optimal Use of Health Care Workers

The work involved in identifying current health care workers who could be re-located within an institution and recruiting additional health care professionals, other health care workers and volunteers that could offset some of the increased demands on health care workers that will occur during a pandemic, should be initiated during the interpandemic period.

a) **Appoint a human resource management team**

Identifying current health care workers; recruiting additional professionals, non-professionals and volunteers; and managing the training, assignment and support of health care workers to various locations and tasks will be some of the most important pandemic preparedness tasks. Establishment of a team or subcommittee that could take on these responsibilities in each jurisdiction is an important first step. A combination of professionals with expertise in human resource issues, pandemic planning, health care administration, infection control, occupational health and safety, and volunteer organizations would be desirable for this planning team/subcommittee.

b) **Placement of personnel**

During a pandemic, health care workers may need to be reallocated from their usual roles and settings. For example, trained health care professionals, may be required to expand their role to include the supervision of volunteers and other staff in the acute care settings, affiliated clinics and non-traditional sites.

While it is likely that all health care workers will be needed at their usual acute care facility, consideration should be given as to the source of staff for other sites including:

- Triage Sites – community triage sites: at clinics, non-traditional sites, attached to an existing hospital.
- Non-Traditional Sites – including emergency care centres, emergency hospitals, support hotels, nursing stations, etc.
- Vaccination Clinics –clinics in acute care sites, etc.

The Guidelines for Non-Traditional Sites and Workers (Annex J) address many of the human resource issues involving these sites. However, it is important to recognize that the expertise needed for the clinical management of influenza patients predominantly resides within the health care facilities. Positioning some staff at these sites may offset the

demands on the health care facilities and ultimately lead to the optimal use of human resources.

Health authorities must review the needs of their own communities to determine whether more emphasis should be placed on supporting community care options and which staff will be needed where.

c) **Review scopes of practice**

Even in acute care settings, delegation of tasks and authority will, by necessity, change during a pandemic. A shortage of staff and increase in the number of patients may necessitate cancellations of surgery, tests and other procedures. Staff may be reassigned from their usual roles to make best use of their skills. Retired and foreign-trained personnel may be asked to step in.

Negotiations and planning must take place within each province and territory, with existing colleges, associations and insurers in order that the process of reassignment and delegation may take place quickly and as smoothly as possible. (See the section on Emergency Preparedness Legislation.) Prior negotiation with licensing bodies and bargaining units to facilitate changing of job descriptions and the use of alternative workers during a pandemic will ease the transition and make the process more efficient. In the interpandemic period we recommend the jurisdictions take the following actions:

- Establish a process, in conjunction with existing emergency plans, to assess the work needed and skills required for each task. Jurisdictions need to look at the process of intake, reception, triage, clinical care, clean up, etc. and assess additional workers or sources of workers who already have the skills to be slotted into these jobs.
- Review the recommendations on patient assessment and management in the Clinical Care Guidelines which will indicate the needs for various skills at various points in patient care, and determine who may provide those during a pandemic.
- Communicate with health care professionals about pandemic needs.

d) **Recruit professional staff for the pandemic response**

Within facilities, consideration should be given to reassigning medical and nursing personnel with administrative, research and educational assignments to clinical duties.

Alternate sources of HCW would include, but are not limited to:

- retired physicians/nurses (need to be assurance that work during a pandemic would not affect their pension plans)
- physicians/nurses currently not working in clinical health care (i.e., working in education, administration, research, private industry)
- trainees (i.e., medical students and nursing students)
- registered nursing assistants
- patient care assistants
- emergency medical technicians
- veterinarians
- pharmacists
- therapists (respiratory/occupational/physio)

- technicians (laboratory, radiography)
- health care aides

Consider how best to recruit persons with health care qualifications but not currently working in the health services. Work with professional associations to determine how to communicate with their members prior to the pandemic about pandemic issues, and how they might communicate during the pandemic.

Provinces/territories may work with professional associations to ensure that persons with health care qualifications but not currently working in the health services maintain their qualifications and competencies. It is also important to establish a method for assessing professional qualifications and competence during the pandemic when people are being hastily recruited.

Developing and maintaining databases of staff is a time consuming and expensive task. Databases are only useful if kept up to date with licensing, skill set and contact information.

Most health care facilities will already have some type of database of their staff. Local facilities or authorities may wish to develop databases of workers with specific training (through licensing bodies and associations) or establish a co-operative arrangement with licensing bodies, associations or volunteer agencies that already maintain these lists.

Provinces/territories are encouraged to review professional and privacy legislation to determine how best to maintain such lists. It may be most appropriate both legally and effectively to ask professionals to volunteer their names as pandemic workers. It may also be appropriate to provide some form of incentive in the form of free training, subsidized license fees etc. to encourage professionals to volunteer their names.

Develop methods to ensure:

- Qualified workers can be contacted quickly and easily,
- Workers are placed where they are needed most, and
- Workers' training and qualifications are on record to ensure people have appropriate qualifications.

3.2.2 Review Emergency Legislation Pertaining to Health Care Workers

Emergency Preparedness Legislation makes many provisions for the management of workers during a crisis. This includes the recruitment of professional and other paid staff as well as volunteers, managing human resources and protection of people who volunteer. Pandemic planning should be integrated with the emergency plans of the jurisdictions as much as possible, in order to make best use of existing plans and resources. There is no assurance that a national emergency will be declared; jurisdictions should be prepared to operate under either condition. Therefore human resource planning should be based on existing plans without a declaration.

The following provisions of legislation are particularly applicable to human resource issues including:

- authority regarding licensing and scope of practice issues, and the ability of government to make unilateral changes during a crisis;
- safety and protection of workers, (one of the primary responsibilities);
- fair compensation;

- insurance, both site insurance, workers compensation and other forms of insurance;
- training;
- provision of clothing and equipment;
- protection of the jobs of workers who take leave to assist during the crisis.

Compelling Workers

Under Emergency Legislation provinces/territories may have the authority to designate "Essential Services" and workers and have the ability to compel people's time or property with due compensation *as a last resort*.

This issue has been raised both because of the existing shortage of health care workers and concerns that health care workers and others may refuse to work during a pandemic due to changed job responsibilities, fear of infection, family responsibilities or other reasons. However, the Subgroup notes the extreme difficulty of enacting or enforcing such legislation and would strongly encourage the jurisdictions to review all other methods of obtaining health care workers, in advance of a pandemic.

3.2.3 Provide Training

Health care professionals, both those currently working in their fields and those working elsewhere or retired, as well as volunteers may benefit from training and communication regarding pandemic plans. As well as looking at specific skills, training and communication may focus on preparedness, changing roles and responsibilities, supervising volunteers, crisis management and emergency planning.

a) **Start training and awareness building now**

There will be very little time for effective training, once a pandemic is underway. Therefore, training should be incorporated into existing programs provided during the interpandemic period. By incorporating the skills needed during a pandemic into existing training, we reduce costs, improve efficiency and enhance readiness.

Training and awareness building will be needed in order to:

- motivate development of a response capacity, including identification of responsibilities and preparation activities, in acute care settings,
- facilitate an understanding of pandemic consequences, vaccination and ethical issues, among health care providers, prior to the pandemic,
- recruit workers willing to take on new responsibilities during the pandemic,
- encourage health care workers to maintain skills and licensing while working elsewhere, and
- develop specific skills related to pandemic influenza.

b) **Identify skill/knowledge requirements**

Health care workers will need to be skilled and knowledgeable in the fields of infection control, crisis management, worker supervision and working with grieving families, which may not be a significant part of their current responsibilities. In addition, it would be useful to expand and maintain the number of health care professionals and others with training in oxygen therapy and the use of ventilators and care of patients on ventilators.

Clerical skills in terms of patient tracking procedures will also be needed in overwhelmed health care facilities, as will people who can train patients and families in "self-care" thereby facilitating early discharge of patients. Ideally all health care workers should be trained in the principles of self-care, since they will be the primary conduit of information to their patients, families and communities. (See Clinical Care Guidelines and Tools Annex in the Plan for more information on self-care).

However, it is recognized that because of the difficulty of maintaining many of these skills without constant use, training programs targeting these skills should be developed for quick and efficient implementation once a pandemic is declared.

It is also advisable to develop a plan specifically for training or re-training of health care workers who are not currently working in health care, for example retirees.

c) **Train the trainer**

Health authorities and existing volunteer agencies, may establish programs to "train the trainers". Through this process a pool of trained individuals can be maintained, during the interpandemic period, that would be available to implement training programs as quickly as possible at the onset of a pandemic.

To facilitate this process it would be essential to:

- identify and train those with knowledge of the tasks and adequate communication skills to act as trainers during the pandemic,
- identify training resources of use to on-the-job trainers,
- ensure there are adequate, easy to use procedures/instruction manuals for tasks such as admissions, patient tracking, etc., and
- use and share existing training programs and materials which can be adapted for pandemic influenza.

d) **Plan now for training during the pandemic period**

A great deal of training will have to be done once a pandemic is declared. Staff not currently working in health care and volunteers may only come forward once a pandemic is declared. In addition, it may be necessary to update training closer to the pandemic period. In order to ensure that this is done swiftly and efficiently during the pandemic, the following preparations should be made in advance:

- identify training which will take place following the declaration of pandemic,
- identify and obtain training resources which can be tested and used during the pandemic period,
- train the trainers – (see above), and
- plan for where and how training will be delivered during the pandemic.

3.2.4 Consider Insurance and Licensing Issues

Insurance and liability coverage should be provided for trainees, volunteers, retirees and any other workers that are recruited to provide health care services during a pandemic. A more in-depth treatment of insurance and liability issues may be found in the annex on Non-Traditional Sites and Workers (Annex J). While these issues will be investigated at the national level, each province/territory will need to review existing legislation and policies to determine how this might be accomplished in their respective jurisdictions.

a) **Liability insurance for workers and volunteers**

The need to expand scopes of practice may have implications for liability protection/malpractice insurance.

b) **Workers' compensation**

A Memorandum of Understanding (MOU) between the Office of Critical Infrastructure Protection and Emergency Preparedness (formerly Emergency Preparedness Canada), and the provinces/territories asserts that registered volunteers or persons compelled/ conscripted for emergency service work are protected by workers' compensation during emergency response, as long as they are registered. Some volunteer agencies, have a liability policy for their volunteers.

In some circumstances, volunteers who register with designated agencies may be covered by workers' compensation under emergency legislation. However, there are a number of issues to be resolved with workers, compensation boards at the provincial level:

- Does the policy require a declaration of Emergency and, at what level of government, or would the insurance come into effect once the Minister of Health declares a pandemic?
- Definition of health care workers for this purpose.
- Definition of volunteers for this purpose.
- Compensation is usually based on loss of income, however, in some cases volunteers may be retired, homemakers, or self-employed. Would compensation cover costs of the person's other responsibilities, such as family care?
- Would compensation be available if volunteers became ill rather than injured?
- Does this include Death and Dismemberment insurance?

Ensure such insurance is available independent of the need for a "Declaration of Emergency."

c) **Transfer of licensing between jurisdictions**

(This section is under review pending discussion with provincial and territorial licensing organizations.)

Each province/territory needs to liase with professional licensing bodies in their jurisdiction during the interpandemic period regarding licensing issues. In addition, professional licensing bodies may be asked to liase and extend privileges to out of province professionals, based on their standing in another jurisdiction.

3.2.5 *Immunization of Health Care Workers*

While it is unlikely that a vaccine for the pandemic strain of influenza will be available in advance of the arrival of the pandemic in Canada, health care workers should be up-to-date with the other routinely recommended immunizations. Because immunizations require varying amounts of time and some require more than one dose for a person to develop immunity, it will likely be impossible to provide all of these once a pandemic is declared, or to provide them within an appropriate time frame given the lack of supplies and human resources.

Once a pandemic vaccine becomes available the vaccine will be distributed according to nationally agreed upon recommendations for prioritisation of vaccine recipients. A preliminary list of priority groups has been developed by the Vaccines Sub-group and is provided in Annex D of the Plan. The priority and composition of these groups may change based on the epidemiology of the pandemic. However it is widely recognized that health care workers are critical to the pandemic response and should be considered high priority for immunization during a pandemic.

3.2.6 *Supporting Health Care Workers*

During a pandemic, health care workers will need considerable personal support in order to keep working. During the interpandemic period, it is important to plan for how these services may be provided. Some strategies may require changes in policy, or even in legislation to ensure the availability of health care workers during the pandemic. Support provided to health care workers may include:

- Basic personal support – ensure food and services are available to HCWs on the job.
- Emotional support/grief counselling (aimed at permitting workers to continue to work and reduce loss of staff due to grief or traumatic stress).
- Family care (for children, seniors, sick family members who do not require hospitalization). This poses significant infection control concerns if gathering children or the elderly together for group care.
- Job protection for HCWs who move from other jobs during pandemic.
- Job protection for spouses who do family care to allow HCWs to work in health care.

In order to develop crisis programs, health authorities may build on existing employee support programs. This may involve:

- contacting existing support services,
- working with chaplains, counsellors and grief counsellors to develop crisis support programs including grief support and traumatic stress counselling,
- determining whether child, or family care, programs would be appropriate for the site(s) and where and how they would be set up (e.g. Contract with YM/YWCA), and
- reviewing legislation to determine if there is protection for spouses who take on child care responsibilities to permit HCWs to continue to work.

3.3 Human Resource Management During the Pandemic Period

If the pandemic arrives in other countries prior to arriving in Canada, information on the epidemiology of the pandemic strain will be circulated internationally as it becomes available. Planners will need to consider each piece of new information in terms of how this might impact their own population and potentially revise plans for the allocation of human resources based on this information.

The following steps/actions will need to occur during the pandemic period to optimise the human resource dependent response:

- organize the deployment of health care workers
- work with emergency management personnel and use emergency preparedness legislation as required
- implement training and communication plans
- manage insurance and licensing issues
- address immunization needs
- support health care workers

3.3.1 Organize the Deployment of Health Care Workers

At this point it will be necessary to activate the Human Resource Planning Team and recruit new members that may be vital to the implementation of previously developed plans. This will facilitate the coordinated management of human resource issues. Next steps are listed below.

- Identify key and supervisory positions and the people to fill them.
- Based on current staffing levels, and assuming a similar attack rate for staff as for the rest of the population, estimate additional staff needs for each region.
- Reassign staff where necessary.
- The Team, in conjunction with the local health authority, should update the inventory of current staff, number of beds, and acute care settings.
- Review worker and volunteer databases established in the interpandemic period.
- Call for staff – Communicate with the public and with health care workers that are not currently working, regarding the possible need for additional staff.
- Screen additional staff.
- Train – existing staff in special tasks and train additional staff.
- Deploy staff.

3.3.2 Coordinate Response with Emergency Management Personnel

During a pandemic the relationship between emergency measures organizations and personnel, and medical authorities and personnel will determine the overall response to the crisis. The best deployment of health care workers and other essential workers will result from well established, coherent communication between emergency preparedness personnel and health authorities.

Advance planning should focus on establishing communication strategies and protocols which will permit on-going direct, daily integrated communication during the period of the pandemic. Knowledge and implementation of existing legislation, strategies and resources and a transparent means of communicating with health care workers and other essential

workers, as well as the public will permit authorities to efficiently implement adequate human resource management strategies during the crisis.

3.3.3 Implement Training and Communication Plans

During the pandemic period staff and volunteers will be identified who need additional training. This will include training such as: working with ventilated patients, and basic support skills such as sterilization procedures, management of admissions etc. to permit licensed trained health care workers to take on additional tasks. It is vital that the training be quickly and easily available in formats that are short, manageable and preferably "on-the-job" where possible.

- Identify experienced people, those with knowledge of the tasks and adequate communication skills and provide them with resources to permit them to train others. (See Train the trainers above.) Ensure trainers and experienced people remain available for consultation and training on an on-going basis.
- Review training programs and emphasize skill sets based on the epidemiology of the disease.
- Use the time between the WHO/Health Canada declaration of pandemic, and the arrival of the first wave in the jurisdiction to train as many staff and volunteers as possible in general and specific tasks.
- Call on existing agencies such as St. John Ambulance and the Red Cross to ramp up existing training programs with an emphasis on tasks required to treat influenza patients.
- Maintain records of trained individuals to ensure best deployment of those individuals.

3.3.4 Manage Insurance and Licensing Issues

It will be important to communicate any necessary changes to licensing and insurance provisions to all stakeholders. This will require a thorough review of provisions for insurance in the provincial/territorial emergency plan, a review of licensing issues and communication with licensing bodies, associations, colleges, etc. regarding this issue.

If insurance and/or licensing arrangements require activation of some form of legislation, bylaw or declaration, inform the Minister of Health and other appropriate authorities.

Inform chiefs of staff, managers, supervisors and human resource professionals in health care settings, of changes in licensing and insurance and what that will mean for flexibility in staff deployment, additional staffing, requirements for deployment, or any other provisions of legislation, licensing or insurance with which the institution must comply.

3.3.5 Address Immunization Needs

Health care facilities may have to provide qualified personnel capable of administering immunizations, under the guidance of public health authorities, to staff clinics targeting staff and volunteers at their site.

3.3.6 Support Health Care Workers

Review plans made during the interpandemic period to provide support to all health care workers including volunteers and retired persons, to enable them to continue working. During the pandemic authorities may:

- Establish personal support services providing on-site food delivery, nap rooms, etc.
- Set up counselling services (find an office, determine a schedule).
- Call in additional counsellors, grief counsellors, chaplains, clergy, clerical support.
- Set up child/family care services.
- Notify staff of how to access these services.
- Notify staff of legislated protections such as protection for job of spouse while caring for children.

3.4 Human Resource Management During the Post-Pandemic Period

Activities during this period will focus on the demobilization of staff and volunteers. The pandemic response, in terms of human resources, should be reviewed and evaluated so that plans may be revised as necessary during this or the interpandemic period.

Consideration should be given to methods to formally recognize the efforts of all workers involved in the pandemic response.

Appendix A
Evaluation of Bed Capacity

These worksheets have been designed to assist facilities in planning for an influenza pandemic. It can be used to complement centralized bed management systems, or used on their own to evaluate bed capacity and how to achieve maximum bed utilization. Facilities should determine the maximum number of beds available and the numbers of hours of care needed to staff the beds. During an influenza pandemic there would most likely be a change in acuity of beds.

Who has responsibility for collecting this information? (Check your facility's emergency plan.)
Position Title

Who will have authority and responsibility to apply this information during a Pandemic?
Position Title

1. What is the total number of non-ventilated beds, **without** oxygen supply, which are:

a) Currently open and staffed?		
b) Which could be available during an emergency if extra resources were available in the short term?	In 72 hours	In 7 days

What are the limiting factors (staffing, equipment, physical space, other)?

2. What is the total number of non-ventilated beds, **with** oxygen supply, which are:

a) Currently open and staffed?		
b) Which could be available during an emergency if extra resources were available in the short term?	In 72 hours	In 7 days

What are the limiting factors (staffing, equipment, physical space, other)?

3. What is the total number of ventilated beds which are:		
a) Currently open and staffed?		
b) Which could be available during an emergency if extra resources were available in the short term?	In 72 hours	In 7 days
What are the limiting factors (staffing, equipment, physical space, other)?		

4. If a directive came to stop all elective surgery/admission:	In 72 hours	In 7 days
a) How many beds would become available?		
b) How many beds, with oxygen supply, would become available?		
c) How many ventilated beds would become available?		

5. How many extra emergency ventilatory beds could your hospital create? [NB. Consider use of all ventilator capacity, including time-cycled ventilators, anaesthetic machines, CPAP, BiPAP, and the availability of oxygen/suction and air-supply, recovery and operating rooms and neuroscience beds.]	In 72 hours	In 7 days
a) Assuming current staffing levels (redeployment of staff permitted)		
b) Assuming additional resources for staffing:		
What are the limiting factors (staffing, equipment, physical space, other)?		

6. Does your hospital have any excess capacity to assist other health care facilities or the community, such as provisions of meals, sterilization capacity?

7. Does your hospital have an affiliation with a Health Care Facility, which may have extra bed capacity?

Affiliation	Number of Beds
› Long-Term Care Facility	
› Acute Detoxification Unit	
› Rehabilitation Facility	
› Crisis Unit	
› Other Type	

Inventory of Beds (Work Sheet)									
Type of bed	Total number of physical beds in facility	Number of physical beds with oxygen supply	Number of currently operating beds (opened and staffed)	Number of currently operating beds with oxygen supply	Estimate current proportion of elective vs emergency cases/beds	Number of beds able to be staffed using current resources	Space for beds available, with oxygen outlet, no physical bed available	Space for beds available, no oxygen outlet no physical bed available	Comments (e.g., unique equipment, special purpose)
Medical									
Special medical/step-down									
Surgical									
Special surgical									
Coronary care*									
Intensive care*									
Paediatric									
Obstetric									
Special care nursery									
NICU									
Day ward									
Recovery room*									
Sleep laboratory									
Closed wards									
Other									
TOTAL									

* denotes areas currently used for ventilation which could be used for emergency ventilation

Inventory of Ventilators (Work Sheet)											
Types of ventilators	Intensive care	Coronary care	Special medical/ step-down	Recovery room	Operating room	Emergency department	Storage	In repair	Sleep study laboratory	Physio-therapy	Other
Oxylog											
Bird											
CPAP spont. breathing											
BiPAP spont. breathing											
TOTAL											

Emergency Ventilatory Capacity Considerations (Work Sheet)									
Property	Intensive care	Coronary care	High dependency	Recovery room	Operating room	Emergency department	Neuro-science	Sleep study laboratory	Other
Suction									
Oxygen outlet									
Medical air outlet									
Airflow (negative pressure)									
Airflow (positive pressure)									
Room monitoring									
Physical bed									
Space, but no physical bed									

Operational Period _____ Date Prepared _____ Prepared By _____

Location required	Facility	Item and unit size	Shelf life	Have	Need	Stockpile/ location	Supplier name/ location	Issues affecting supply* & alternate arrangements

***Issues Affecting Supply**

Interrupted transportation lines — Canadian supplies travel long distances by truck train and aircraft. Supplies are often obtained from the U.S. and other nations. Difficulties at border crossings may substantially affect supply lines. In addition, a loss of up to 30% of workers, drivers, and other transportation staff may affect supplies.

Special storage or transportation requirements (e.g., Cold Chain).

Just-in-time Inventory — Supplies can be obtained but may take some time.

Embargo — If the item is not produced in Canada is it an item which is likely to be embargoed.

Single supplier or limited number of suppliers — if there are a limited number of suppliers or sources of the essential ingredient or component, note that there are no alternate suppliers.

Annex I

Guidelines for the Management of Mass Fatalities During an Influenza Pandemic

Date of Latest Version: *February 2004*

Note:

- *See Background section of the Plan for information on the latest pandemic phase terminology.*
- *This annex may be out-of-date with respect to other planning activities and policy decisions.*
- *This annex is expected to be updated in 2007.*

Table of Contents

During a pandemic, local authorities will have to be prepared to manage additional deaths due to influenza, over and above the number of fatalities from all causes currently expected during the inter-pandemic period. Within any locality, the total number of fatalities (including influenza and all other causes) occurring during a 6- to 8-week pandemic wave is estimated to be similar to that which typically occurs over 6 months in the inter-pandemic period. This guideline aims to assist local planners and funeral directors in preparing to cope with large-scale fatalities due to an influenza pandemic. A number of issues have been identified, which should be reviewed with coroners/medical examiners, local authorities, funeral directors, and religious groups/authorities.

1.0 Planning for Mass Fatalities

In order to identify planning needs for the management of mass fatalities during a pandemic, it is important to examine each step in the management of a corpse under normal circumstances and then to identify what the limiting factors will be when the number of corpses increase over a short period of time. The following table identifies the usual steps. Possible solutions or planning requirements are discussed in further detail in the sections that follow this table.

Table 1: Usual Process for Corpse Management

Steps	Requirements	Limiting Factors	Planning for Possible Solutions/Expediting Steps
Death pronounced	› person legally authorized to perform this task	› if death occurs in the home then one of these people will need to be contacted › availability of people able to do this task	› provide public education re. how to access an authorized person › consider planning an on call system 24/7 specifically for this task
Death certified	› person legally authorized to perform this task	› legally, may not necessarily be the same person that pronounced the death	› consider "collecting" corpses and having one authorized person perform this task en masse to improve efficiency
Body wrapped	› person(s) trained to perform this task › body bags	› supply of human and physical (body bags) resources › if death occurs in the home: the availability of these requirements	› consider developing a rotating 6 month inventory of body bags, given their shelf life › consider training or expanding the role of current staff to include this task › provide this service in the home in conjunction with pronouncement and transportation to morgue

Steps	Requirements	Limiting Factors	Planning for Possible Solutions/Expediting Steps
Transportation to the morgue	› in hospital: trained staff (orderly?) and stretcher › outside hospital: informed person(s), stretcher and vehicle suitable for this purpose	› availability of human and physical resources	› in hospital: consider training additional staff working within the facility › consider keeping old stretchers in storage instead of discarding › look for alternate suppliers of equipment that could be used as stretchers in an emergency e.g., trolley manufacturers › outside hospital: provide public education or specific instructions through a toll-free phone service re. where to take corpses if the family must transport
Morgue storage	› a suitable facility that can be maintained at 4 to 8 degrees Celsius	› capacity of such facilities	› identify and plan for possible temporary morgue sites
Autopsy if required/ requested	› person qualified to perform autopsy and suitable facility with equipment	› availability of human and physical resources › may be required in some circumstances	› ensure that physicians and families are aware that an autopsy is not required for confirmation of influenza as cause of death
1) Cremation*	› suitable vehicle of transportation from morgue to crematorium › availability of cremation service › a cremation certificate	› capacity of crematorium/speed of process › availability of coroner or equivalent official to issue certificate	› identify alternate vehicles that could be used for mass transport › examine the capacity and surge capacity of crematoriums within the jurisdiction › discuss and plan appropriate storage options if the crematoriums become backlogged › discuss and plan expedited cremation certificate completion processes
2) Embalming**	› suitable vehicle for transportation from morgue › trained person › embalming equipment › suitable location	› availability of human and physical resources › capacity of facility and speed of process	› consult with service provided regarding the availability of supplies and potential need to stockpile or develop a rotating 6 month inventory of essential equipment/supplies › discuss capacity and potential alternate sources of human resources to perform this task e.g. Retired workers or students in training programs › consider “recruiting” workers that would be willing to provide this service in an emergency

Steps	Requirements	Limiting Factors	Planning for Possible Solutions/Expediting Steps
Funeral service	› appropriate location (s), casket (if not cremated), funeral director	› availability of caskets › availability of location for service and visitation	› contact suppliers to determine lead time for casket manufacturing and discuss possibilities for rotating 6 month inventory › consult with the FSAC to determine surge capacity and possibly the need for additional sites (e.g., use of churches etc. for visitation)
2a) Transportation to temporary vault or burial site	› suitable vehicle and driver	› availability of human and physical resources	› identify alternate vehicles that could be used for this purpose › consider use of volunteer drivers
2b) Temporary vault storage	› access to and space in a temporary vault	› temporary vault capacity and accessibility	› expand capacity by increasing temporary vault sites
2c) Burial	› grave digger, space at cemetery	› availability of grave diggers and cemetery space › extreme cold and heavy snowfall	› identify sources of supplementary workers

* cremated bodies are not usually embalmed; families may choose to have a funeral service followed by cremation or to have the body cremated first and a memorial service later.

** bodies to be buried may be embalmed and may need to be stored in a temporary vault prior to burial.

1.1 General Planning Considerations

In order to develop guidelines or adjust existing plans to suit the pandemic situation, local pandemic planners should ensure that the following persons are involved in mass fatality planning:

- the Coroner Office/Branch,
- the Medical Officer of Health,
- the Emergency Response Team,
- representatives of the Funeral Services Association of Canada (FSAC) and/or the local funeral director,
- representatives from local health care facilities, and
- representatives of local religious and ethnic groups.

Existing disaster plans may include provisions for mass fatalities but should be reviewed and tested regularly, to determine if these plans are appropriate for the relatively long period of increased demand which may occur in a pandemic, as compared to the shorter response period required for most disaster plans. There are currently no plans to recommend mass burials or mass cremations. This would only be considered in the most extreme circumstances.

Since it is expected that most fatal influenza cases will seek medical services prior to death, hospitals, nursing homes and other institutions (including non-traditional sites) must plan for more rapid processing of corpses. These institutions should work with the pandemic planners and the FSAC and coroner office to ensure that they have access to the additional supplies (e.g., body bags) and can expedite the steps, including the completion of required documents, necessary for efficient corpse management during a pandemic.

In order to deal with the increase in fatalities, some municipalities will find it necessary to establish temporary morgues. Plans should be based on the capacity of existing facilities compared to the projected demand, for each municipality. Local planners should make note of all facilities available, including those owned by religious organizations. Some religious groups maintain facilities including small morgues, crematoria and other facilities that are generally operated by volunteers. Access to these resources should be discussed with these groups as part of the planning process during the interpandemic period.

In the event that local funeral directors are unable to handle the increased numbers of corpses and funerals, it will be the responsibility of municipalities to make appropriate arrangements. Individual municipalities should work with local funeral directors to plan for alternate arrangements.

Planning should also include a review of death documentation requirements and regulatory requirements that may affect the timely management of corpses.

1.2 Role of the Funeral Service Association of Canada (FSAC)

It is recommended that all funeral directors contact their Medical Officer of Health to become involved in their disaster and pandemic planning activities with respect to the management of mass fatalities at the local level. The national Mass Fatalities sub-group for pandemic influenza planning has recommended that funeral directors consider it a part of their professional standards to make contingency plans for what would happen if they were incapacitated or overwhelmed. This recommendation is being taken forward to the association, which has an established disaster planning committee. It is expected that this committee will put forward a recommendation to the provincial/territorial associations to set up disaster plans.

Currently, FSAC is planning to set up three containers to be placed at three military bases across Canada (probably Edmonton, Toronto area and Halifax). Each container would be a fully organized temporary morgue with all necessary equipment. These are intended for use in such disaster scenarios as major fire, flood or aircraft crash but might be useful as adjuncts to large auxiliary hospitals in a pandemic. FSAC and funerary supplies companies are setting up these containers; any materials used would be re-supplied by the user.

Members of the FSAC board are on the Funeral Supply Coalition Council of Canada. FSAC is likely to take a role in supply (e.g., fluids, body bags and caskets) management for mass fatalities related to a pandemic.

The FSAC is currently updating information regarding health concerns and funeral service issues, which will be available through a publicly accessible web site.

1.3 Autopsies

Many deaths in a pandemic would not require autopsies since autopsies are not indicated for the confirmation of influenza as the cause of death. However, for the purpose of public health surveillance (e.g., confirmation of the first cases at the start of the pandemic), respiratory tract specimens or lung tissue for culture or direct antigen testing could be collected post-mortem. Serological testing is not optimal but could be performed if 8-10 mL of blood can be collected from a subclavian puncture post-mortem. Permission will be required from next-of-kin for this purpose.

Any changes to regular practices pertaining to the management of corpses and autopsy requirements during pandemic situations, would require the authorization of the Chief Medical Examiner or Coroner.

If a physician requires that an autopsy be performed, normal protocols will be followed, including permission from the next-of-kin. In cases where the death is reportable to a Medical Examiner or Coroner, the usual protocols prevail based on provincial legislation.

1.4 Preparations for Funeral Homes and Crematoria

In a pandemic, each individual funeral home could expect to have to handle about 6 months work within a 6- to 8-week period. That may not be a problem in some communities, but funeral homes in larger cities may not be able to cope with the increased demand.

Individual funeral homes should be encouraged to make specific plans during the interpandemic period regarding the need for additional human resources during a pandemic situation. For example, volunteers from local service clubs or churches may be able to take on tasks such as digging graves, under the direction of current staff.

Crematoriums will also need to look at the surge capacity within their facilities. Most crematoriums can handle about one body every 4 hours and could probably run 24 hours to cope with increased demand. Cremations have fewer resource requirements than burials and, where acceptable, this may be an expedient and efficient way of managing large numbers of corpses during a pandemic.

1.5 Planning for Temporary Morgues

Additional temporary cold storage facilities may be required during a pandemic, for the storage of corpses prior to their transfer to funeral homes. A emporary morgue must be maintained at 4-8° C. However, corpses will begin to decompose in a few days when stored at this temperature. If the body is not going to be cremated, plans to expedite the embalming process should be developed since in the case of a pandemic, bodies may have to be stored for an extended period of time. In jurisdictions where a timely burial is not possible due to frozen ground or lack of facilities, corpses may need to be stored for the duration of the pandemic wave (6 to 8 weeks).

Each municipality should make pre-arrangements for temporary morgues based on local availability and requirements. The resource needs (e.g. body bags) and supply management for temporary morgues should also be addressed. The types of temporary cold storage to be considered may include refrigerated trucks, cold storage lockers or arenas.

Refrigerated trucks can generally hold 25-30 bodies without additional shelving. To increase storage capacity, temporary wooden shelves can be constructed of sufficient strength to hold the bodies. Shelves should be constructed in such a way that allows for safe movement and removal of bodies (i.e., storage of bodies above waist height is not recommended). To reduce any liability for business losses, municipalities should avoid using trucks with markings of a supermarket chain or other companies, as the use of such trucks for the storage of corpses may result in negative implications for business.

Arenas and curling rinks, where the required temperature of 4-8° C can be maintained, are other options for temporary morgues. Using local businesses for the storage of human remains is not recommended and should only be considered as a last resort. The post-pandemic implications of storing human remains at these sites can be very serious, and may result in negative impacts on business with ensuing liabilities.

1.6 Capacity of and Access to Vaults

A vault is a non-insulated storage facility for remains that have already been embalmed, put into caskets and are awaiting burial. In most places in Canada extra corpse storage facilities already exist, as they are often needed from January to April when the ground is frozen and burials are difficult to perform. Although larger cities may be able to open burial plots in winter, smaller communities do not have the equipment or permanent staff to do this.

The accessibility of vaults during the winter should be assessed. A vault may be situated in the back of cemeteries, with entrances that are partially below ground level or in close proximity to headstones, so that a snow blower or plough would have difficulty creating a path of access without damaging some headstones.

In preparation for a pandemic each community should identify the capacity of existing vaults and address access issues for temporary storage. In addition, the need for the creation of new temporary vaults, to meet the increased demand during a pandemic should be addressed. This temporary vault should be non-insulated, have some security features such as covered windows and locks on doors.

2.0 Other Technical Considerations

2.1 Death Registration

Death registration is a provincial/territorial (P/T) responsibility and each P/T has its own laws, regulations, and administrative practices to register a death. Moreover, there is a distinction between the practices of pronouncing and certifying a death. For example, in Ontario physicians, nurses, and in some circumstances police and ambulance attendants may pronounce a person dead. Only physicians, and a small group of designated nurses in narrowly defined circumstances may certify death.

In the pandemic situation, with the increased number of deaths, each jurisdiction must have a body collection plan in place to ensure that there is no unnecessary delay in moving a body to the (temporary) morgue. If the person's death does not meet any of the criteria for needing to be reported to a coroner, then the person could be moved to a holding area soon after being pronounced dead. Then, presumably on a daily basis, a physician could be designated to complete the death certificate.

Funeral directors generally have standing administrative policies that prohibit them from collecting a body from the community or an institution until there is a completed certificate of death. In the event of a pandemic with many bodies, it seems likely that funeral directors could work out a more flexible practice if directed to do so by some central authority (e.g. provincial attorney general, registrar of vital statistics). These special arrangements must be planned in advance of the pandemic and should include consideration of the regional differences in resources, geography, and population.

2.2 Infection Control

The Infection Control and Occupational Health Guidelines (Annex F of the *Canadian Influenza Pandemic Plan*) provide general recommendations on infection control for health care facilities and non-traditional sites during a pandemic. However, special infection control measures are not required for the handling of persons who died from influenza, as the body is not "contagious" after death. Funeral homes should take special precautions with deaths from influenza. Training in the routine infection control practice and additional precautions is available through the FSAC. <http://www.fsac.ca/>.

Visitations could be a concern in terms of influenza transmission amongst attendees, particularly in smaller communities. For example, in P.E.I., the average attendance at a visitation is 1,000 to 1,400 people; visitations in larger centres are typically a fraction of that size. The Guidelines to Infection Prevention and Control and Occupational Health (Annex F of the Pandemic Plan), lists several recommendations regarding public gatherings. It is the responsibility of the Medical Officers of Health to place restrictions on the type and size of public gatherings if this seems necessary to reduce the spread of disease. This may apply to funerals and religious services. Medical Officers of Health should plan in advance for how such restrictions would be enacted, and enforced, and for consistency and equitability of the application of any bans.

Families requesting cremation of their deceased relative are much less likely to request a visitation, thus reducing the risk of spreading influenza through public gatherings.

2.3 Transportation

No special vehicle or driver licence is needed for transportation of a corpse. Therefore, there are no restrictions on families transporting bodies of family members if they have a death certificate.

Transportation of bodies from their place of death to their place of burial in northern and isolated communities may become an issue, especially if this requires air transport. Local pandemic planners should consult existing plans for these communities and determine what changes can be made to meet the increased demand during a pandemic.

2.4 Supply Management

FSAC is recommending to funeral directors that they not order excessive amounts of supplies such as embalming fluids, body bags, etc., but that they have enough on hand in a rotating inventory to handle the first wave of the pandemic (that is enough for 6 months of normal operation). Fluids can be stored for years, but body bags and other supplies have a limited shelf life. A supply list for temporary morgues will be accessible through FSAC. Cremations generally require fewer supplies since embalming is not required.

A list of current suppliers is provided in Appendix 1.

Families having multiple deaths are unlikely to be able to afford multiple higher-end products or arrangements. Funeral homes could quickly run out of lower-cost items (e.g. inexpensive caskets such as cloth and some wooden caskets) and should be prepared to provide alternatives.

3.0 Social/Religious Considerations

3.1 Special Populations

A number of religious and ethnic groups have specific directives about how bodies are managed after death, and such needs must be considered as a part of pandemic planning. First Nations, Inuit, Jews, Hindus, Muslims, all have specific directives for the treatment of bodies and for funerals. The wishes of the family will provide guidance, however, if no family is available local religious or ethnic communities can be contacted for information. For example, in the case of First Nations peoples, mechanisms currently exist to communicate with band councils for this purpose (established to deal with archeological issues) and medical examiners should contact the band council of the individual where this is possible.

As a result of these special requirements, some religious groups maintain facilities such as small morgues, crematoria, and other facilities, which are generally operated by volunteers. Religious groups should be contacted to ensure these facilities and volunteers are prepared to deal with pandemic issues.

Religious leaders should be involved in planning for funeral management, bereavement counselling, and communications, particularly in ethnic communities with large numbers of people who do not speak the official languages.

3.2 Northern and Isolated Communities

Northern and isolated communities face particular issues in dealing with large numbers of fatalities. The following issues make the preparation, storage and burial/disposal of large numbers of corpses very challenging in such communities.

- The lack of funeral service personnel and other resources.
- The extreme cold weather and heavy snowfalls in winter result in difficulties with burials, and in difficulties with the transportation of corpses.
- In remote areas where families live vast distances apart, corpses may have to be transported a long way for burial/disposal. This may be challenging for areas with few plane flights and no road access or poor road surface conditions. The large distances also pose a challenge for the transportation of funeral directors and funeral supplies.
- Permafrost, boggy land and other geographical features also pose a challenge to transportation and burial.

Planners responsible for these jurisdictions should ensure that local pandemic plans address these issues.

Appendix 1: List of Current Suppliers

Embalming fluids and suppliers:

- H.S. Eckels and Company, Guelph, Ontario
- Esco of Rexdale, Ontario
- Les Fournitures, J.C.R. Inc., Vanier, Québec
- Dodge Chemical, Mississauga, Ontario

Casket suppliers:

- Alton Caskets
- J.I. Astley & Associates
- Batesville Canada
- Bernier Caskets Inc./Cercueils Bernier Inc.
- Classic Casket Distributors, Limited.
- Colonial Caskets Limited
- Cercueils Concept Inc/Concept Caskets Inc.
- Cormier & Gaudet
- Exquisite Enterprises, Inc.
- Imperial Evergreen Casket Corporation
- Imperial Casket (Calgary) Limited
- Imperial Casket (Saskatchewan) Limited
- Imperial Casket (Manitoba) Limited
- Imperial Legacy Caskets Limited
- Industries Maximel Inc.
- Cercueils Magog Caskets
- Northern Casket (1976) Limited
- Cercueils South Durham Caskets
- St. Lawrence Casket Co. Inc.
- Trans-Global Casket
- Victoriaville Funeral Supplies, Inc.
- Winkler Caskets Co. Limited

Annex J

Guidelines for Non-Traditional Sites and Workers

Date of Latest Version: *February 2004*

Note:

- *This annex may not contain up-to-date information on the antiviral strategy. Refer to the Preparedness section of the Plan and Annex E for this information.*
- *See Background section of the Plan for information on the latest pandemic phase terminology.*
- *This annex may be out-of-date with respect to other planning activities and policy decisions.*
- *This annex is expected to be updated in 2007.*

J Guidelines for Non-Traditional Sites and Workers

Table of Contents

Section 2: Human Resource Issues

Introduction

In influenza pandemics over 50% of persons may be infected and the majority of illnesses and deaths will tend to occur over a period of six to eight weeks in any one location. Epidemiologic data from influenza epidemics and past pandemics show that 15% to 35% of the population could become clinically ill. Consequently, even a low frequency of complications result in marked increases in rates of hospitalizations. An estimate of the health and economic impact of a pandemic in Canada has been performed using a model developed by Meltzer and colleagues, CDC, Atlanta (<http://www.cdc.gov/ncidod/eid/vol5no5/meltzer.htm>). Based on this model it is estimated that between 2.1 and 5.0 million people would require outpatient care, between 34 thousand and 138 thousand people would require hospitalization and between 11 thousand and 58 thousand people would die in Canada during an influenza pandemic.

Due to the large number of patients who would require medical services during an influenza pandemic, communities and health care organizations must have guidelines in place that will address what will be done if health care organizations are overwhelmed. The use of non-traditional sites (NT sites) for the provision of medical care and the need for additional human resources, including volunteers and other health care or non-health care workers, must be considered as a strong possibility and planned for accordingly. Legislative, management and professional authorities will have to be clearly defined at the local level.

This document is divided into two main sections. The first section provides guidelines regarding the utilization and administration of NT sites, and the preparedness and operational activities that should take place with respect to NT sites during the interpandemic, pandemic and post-pandemic periods. The second section focuses on the need for and identification of additional human resources as part of pandemic planning, and also identifies activities by each pandemic period.

1.1 Definition of a Non-Traditional Site

The following is a definition of a non-traditional site (NT site) for the purposes of planning for an influenza pandemic.

A non-traditional site is a site that is:

a) currently not an established health care site, or

b) is an established health care site that usually offers a different type or level of care.

The functions of a non-traditional site will vary depending on the needs of the community but will focus on monitoring, care and support of influenza patients during an influenza pandemic.

1.2 Potential Roles of Non-Traditional Sites

The role of any NT site will depend on the needs of the community and the resources available. It is expected that NT sites will be used during a pandemic for three main purposes:

- the care of patients who are not critically ill when hospitals are overloaded,
- as domiciliary care for individuals unable to care for themselves at home, and
- as a "step-down" unit for the care of stable patients that have been transferred from acute care hospitals.

Where possible care at non-traditional sites should be limited to supportive care or palliation for influenza patients. Critical care would likely not be possible within these sites and should remain in the acute care setting. Persons with immunosuppressive illness or communicable diseases other than influenza (e.g. tuberculosis) should not be admitted to these sites.

In communities with a high proportion of elderly or high risk persons, the role of the NT site may need to be expanded to include the provision of health care services specifically related to dealing with the exacerbation of co-morbidities (e.g. chronic heart or lung disease, diabetes) in these groups.

Depending on the impact of the pandemic and the health care resources available in the community, NT sites may serve several functions. They may be set-up as triage centres, mobile health units, acute care or sub-acute care providers, clinics, or emergency residential facilities for those that cannot care for themselves at home or for cases that usually live with a high-risk individual.

1.3 Administrative Options for Non-Traditional Sites

NT sites may be established as a "satellite site" of an acute care facility or other health care facility, or as a "free-standing site". The "satellite site" model is advantageous since it does not require establishment of a separate administrative structure. Specifically, linkage with an existing acute care facility or other health care facility would facilitate the following:

- prompt implementation of an administrative structure,
- ordering, tracking and maintenance of equipment and supplies,
- implementation of record keeping and patient tracking systems,
- implementation/establishment of nursing protocols and patient care guidelines,
- sharing of expertise and human resources between sites,
- access to services such as sterilization, laboratory services, pharmacy services, laundry, food services,
- referrals between the site and the affiliated health care facility, and
- extension of liability, workers compensation and other insurance programs to the satellite site.

The satellite site is the recommended administrative option, however, where it is not possible to set-up a "satellite site" the establishment of "free-standing sites" will be necessary. Planning for the administration of "free-standing sites", including how the issues listed above will be dealt with at the site, will need to be completed during the inter-pandemic period. It is recommended that pandemic planning be incorporated into the existing emergency response plan.

Triage, transfer and transport agreements between the NT site and the affiliated health care facility or referral hospital need to be established.

Regardless of the administrative structure of the site, an individual or team needs to be designated to oversee the care provided in each NT site. This person/team should monitor patient flow, maintain a log of patient activity including patient outcome, and monitor availability of supplies. Delegation of these responsibilities to ensure ongoing and consistent administration of the site needs to be planned for in advance.

1.4 Insurance Issues

In planning for the establishment of NT sites during a pandemic it is important that insurance needs are considered and that provisions for appropriate insurance are made. Do not assume that the insurance covering the site for its usual use will extend to cover its use as an emergency medical site. Specifically, fire/damage/theft insurance and site liability insurance will be required for NT sites.

1.5 National Emergency Stockpile System

The National Emergency Stockpile System (NESS) was primarily developed for use in crises such as natural disasters, earthquakes, or other emergencies in which there is a sudden need for supplies and equipment to deal with a large number of people with varying medical needs. The program involves the purchase, packaging, shipping and storing of supplies and equipment organized into "kits" designed to meet specific emergency medical needs. The components of the "kits" are packaged and stored in warehouses across Canada to facilitate

timely distribution. The NESS should not be confused with emergency stockpiles that may exist within each province or territory.

In the event of a pandemic, specific kits or units from the stockpile could potentially be used to facilitate reception, intake, triage and provision of medical and social services at a NT site. The following is a brief description of the types of kits/units available through the NESS.

Emergency Hospital - capable of providing support to the existing health care system by the provision of acute and short term medical care for up to 200 patients. Also has the adaptability to support social services functions (i.e., evacuation centres, reception areas, shelters, etc).

Advanced Treatment Centre - capable of providing early medical and limited surgical procedures in a 'field' or operational environment; also used to support the movement of patients to other health care facilities. Can also support the movement of evacuees and the operations of shelters, evacuation centres, reception areas, etc.

Casualty Collecting Unit - capable of providing immediate first aid care and movement of patients to other health care facilities. Also can support the movement of evacuees and the operations of evacuation centres, shelters, reception areas, etc.

Reception Centre Kit - provides supplies, and registration and inquiry materials for the set-up and operation of reception functions for evacuation centres/shelters.

Mobile Feeding Unit - provides an emergency feeding capability in a 'field' environment, or where normal food services are not available (equipment and supplies, not food).

Trauma Kit - consists of first aid, intubation equipment, IV solutions and medical components to support first line response, patient triage and stabilization. Is useful in a patient staging facility (mini clinics, advanced treatment centres, etc.).

Mini Clinic - intended to supplement existing medical care facilities in a disaster situation that overwhelms their system (e.g. a hospital emergency room). It would be located adjacent to these facilities to triage and treat the less seriously injured, so that the main facility remains clear to accept and treat the seriously injured.

The equipment supplied is older but well maintained. New equipment is being added to certain units and others are being reconfigured to be more effective. Transportation of these materials is dependent upon commercial or military vehicles and requires access by road or, for some items, an airport that will accept a Hercules aircraft.

In the event of a local emergency that overwhelms available municipal resources, the protocol for accessing the NESS program is that the municipality contacts the provincial/territorial emergency management authorities. Release of equipment or supplies must then be coordinated through the Provincial/Territorial Health, or Social Services Director. In certain cases the distribution of drugs is handled directly by provincial Chief Medical Officers of Health.

The NESS equipment and supplies are owned by the Office of Emergency Services, Health Canada and are made available to the provinces/territories on a loan basis. The province/territory administers this Federal program under guidelines established by the Office of Emergency Services and through 'Memoranda of Agreement' between the Minister of Health, Health Canada and the Provincial/Territorial Health and Social Services Minister(s). In a national emergency or large-scale disaster, the authority for the release and use of the stockpile equipment remains with the Director of Emergency Services, Health Canada. To

obtain an Emergency Hospital or other unit, a Provincial Emergency Services Director must apply to the Director, Centre for Emergency Preparedness and Response, Health Canada.

For more information on the National Emergency Stockpile System contact your provincial/territorial Emergency Services Directors

1.6 NT Site Planning During the Interpandemic Period

The following activities should take place during the interpandemic period. Further detail is provided below the list.

- Review emergency preparedness legislation
- Identify triggers for implementation
- Plan for the triage process
- Assess locations for potential NT sites
- Planning for critical equipment and supplies

1.6.1 Review Emergency Preparedness Legislation

Emergency preparedness legislation makes many provisions for management of a crisis including: obtaining and accessing materials and other resources, implementation of crisis plans and a crisis management structure. Pandemic planning should be integrated with the emergency plans of the jurisdictions in order to make best use of existing plans and resources.

Important note: Regional pandemic plans should not assume that a national or provincial emergency will be "declared", as this is unlikely to occur during a pandemic. Provincial and Territorial planners should assess issues such as workers compensation and liability insurance, maintaining and supporting workers and other aspects of the plan without, such a declaration.

The national support framework is not contingent upon declaration of a national emergency. The resource management and non-traditional sites working groups recommend all provincial and territorial planners review both federal and provincial/territorial emergency legislation to determine how to integrate plans within the framework of emergency legislation.

For example it is important to identify what provisions of legislation are particularly applicable to obtaining use of property and materials in a crisis. These provisions would include but likely not be limited to:

- the ability and responsibility of authorities to requisition property for use as NT sites,
- access to transportation, materials, administrative staff and other resources, and
- compensation for requisitioned property.

1.6.2 Identify Triggers for Implementation

Existing legislation and emergency plans at the government and institutional level already identify criteria that would trigger the implementation of specific plans. The *Canadian Pandemic Influenza Plan* and the pandemic phases will also describe general points of action.

In co-ordination with existing legislation and plans, provincial/territorial, regional and local authorities and institutions should identify key criteria and methodologies that would trigger the phased implementation of plans regarding NT sites in their jurisdiction. Local authorities,

most likely the local medical officer of health, together with the local pandemic response team, will decide when to initiate the pandemic influenza plan for their jurisdiction, including recommendations regarding the establishment of NT sites.

Since it is likely that the pandemic will not start in Canada, the first trigger for the consideration of establishment of NT sites may be reports of the severity and epidemiology of the pandemic from other countries. This will likely be the first indicator of what to expect when the pandemic reaches Canada in terms of demand on traditional health care services.

In each locality it will be important for the local pandemic response team to be monitoring the availability of resources in their local acute care facilities and projections regarding when capacity may be exceeded (especially if there will be "free-standing sites"). Therefore potential triggers include:

- The proportion of emergency room visits attributable to influenza.
- The proportion of influenza cases requiring hospitalisation.
- The capacity of the hospital to accommodate influenza cases.
- The proportion of cases who normally live with high-risk individuals or who have no support at home and cannot care for themselves.

Other triggers may include reports from sentinel physician or walk-in clinics that they cannot accommodate all of the patients requesting appointments for influenza-like-illness (ILI). Ambulance re-routing to other acute care setting due to full emergency rooms may serve as another trigger for further implementation of plans for NT sites. These triggers should be established during the interpandemic period.

1.6.3 Plan for the Triage Process

> ***Definition of Triage***:
>
> A process whereby a group of casualties or patients is sorted according to the seriousness of their illness or injuries, so that treatment priorities can be allocated between them. In emergency situations it is designed to maximize the number of survivors.

In order to reduce demand on hospital emergency departments and potentially on family physicians and walk-in clinics, it may be necessary to perform triage at NT sites during the pandemic. The use of such a system will require a significant public awareness campaign since ill people will tend to seek services at their usual health care providers.

The Clinical Care Guidelines and Tools (Annex G) provide recommendations on the assessment and management of influenza and non-influenza patients during a pandemic, including algorithms on the triage of adults and children based on their clinical presentation and risk factors or co-morbidities. The guidelines on initial assessment and management assist healthcare staff, as well as volunteers with minimal expertise, to rapidly evaluate the needs of each individual and to sort patients efficiently in a crisis situation (i.e., to decide when patients can be treated as outpatients, or if they need to be redirected or admitted to a hospital). In larger communities, patients who required further assessment by a physician, X-rays and laboratory tests (secondary assessment) would likely be transferred to an acute care facility. Some NT triage centres, however, may have the facilities to perform secondary assessment and treatment without moving the patients.

Designation of NT sites as triage centres specifically for ILI has the added advantage of potentially reducing the exposure of other patients to influenza, consistent application of current recommendations through the use of patient care protocols and control over the number and type of other services, such as laboratory testing and chest x-rays, that are being ordered.

Non-traditional triage sites may be established at public health clinics/units, specifically identified walk-in clinics or triage centres adjacent to or associated with acute care institutions.

Triage sites will need to be organized to provide streamlined and efficient service. The following table is provided for planning purposes and suggest how a site might be organized.

Zone	Service	Training Required
Registration zone	Register in-coming patients	Trained non-medical workers
Waiting zone	Awaiting primary assessment	Medical professionals with trained non-medical workers
Primary assessment zone	Vital signs Chest auscultation & assessment	Trained non-medical Medical professional (physician or nurse)
Secondary assessment zone	On-site lab tests Secondary assessment	Trained non-medical workers Physician
Advanced first aid & transfer zone	Service to patients who arrive in distress includes oxygen, suction, etc. while they await transfer to emergency department	Advanced first aid
Education zone	Education resources and advice	Trained non-medical workers
Discharge zone	Follow up or transfer	

The Infection Control and Occupational Health Guidelines (Annex F) lists some guidelines for the set up of triage and preliminary treatment sites including:

- If possible, separate those with ILI and those without ILI by: minimizing time spent in waiting rooms; providing separate entrance/waiting areas for patients with ILI; placing patients with ILI directly into a single room; separate patients as quickly as possible by placing ILI patients in an area of the waiting room separated from non ILI patients by at least one metre.
- Remove magazines and toys from the waiting rooms.
- Clean equipment and environmental surfaces in examination/treatment rooms potentially contaminated by coughing patients as frequently as possible, preferably after each patient.

1.6.4 Assess Locations for Potential NT Sites

It is recommended that a multidisciplinary team approach be used to assess potential NT sites in a jurisdiction, to ensure suitability of a potential site. Ideally the assessment team should include:

- emergency personnel/police/fire,
- health care personnel, and
- engineering/maintenance/public works staff.

This team should conduct a community-wide space and site inventory to determine the location and availability of potential sites for NT hospitals and vacant land for possible mobile hospital installations. This assessment should be repeated at regular intervals during the interpandemic period to ensure that identified sites remain suitable. Potential locations for NT sites include, but are not limited to:

- schools
- hotels
- community halls
- banquet facilities
- arenas
- churches
- closed hospitals or hospital wards
- day care centres

For each location the feasibility of its use as a NT site should be determined based on the information below and the intended use of the facility.

Since a site at which inpatient care will be provided will have the most stringent and demanding requirements, it might be reasonable to assess each location for this type of service provision. Locations that are not found to be suitable for provision of inpatient care may be considered for another purpose such as triage or provision of education/counselling services.

Characteristics and Services Required for an Inpatient Care Setting

Each building under consideration should meet the National Building Code standards for its currently designated building type.

Once the building code standards have been assessed, the following issues need to be considered:

- Adequacy of external facilities:
  - public accessibility (including public transport, parking, directions) off-loading, traffic control, assistants for elderly, etc.
- Adequacy of internal space:
  - washrooms and sinks: number m/f; amenities, function
  - kitchen: refrigeration, dishes, dishwashing capability, food preparation areas etc.
  - secure space for administration/patient records

- space for reception, waiting, patient care, patient/family education, counselling/support, and any other services defined by the planning process
- secure storage capacity for pharmacy and other supplies
- mortuary space

- Adequacy of critical support systems required for the site to provide patient care:
  - ventilation system (adequate air flow, air conditioning)
  - physical plant/ building engineering
  - electricity - power for lighting, sterilizers, refrigeration, food services.
  - natural gas supply – e.g., for heating or electricity or cooking
  - water supply
  - sanitation (including number of toilets, showers or washing facilities)
- Arrangements to provide essential support services required for the provision of in-patient care:
  - security
  - communications capability
  - maintenance
  - laundry
  - environmental/cleaning services
  - sterilization services – Sterilization of equipment should be provided by trained and experienced personnel using certified equipment. Appropriate arrangements for sterilization services, e.g., with a hospital, may be required
  - pharmaceutical services
  - medical waste disposal/storage
  - mortuary/funeral services
  - food services
  - facilities for staff lodging and feeding

Infection Control

When planning for a NT site it is important to establish whether the site will focus only on the care of influenza patients or whether other types of patients will be receiving services at these sites. Infection control issues will be greater if transmission of influenza to other patients is a possibility.

All patient beds should be separated by at least one metre; as is the norm for patients with any medical condition. If non-influenza patients will be seen at these sites separate waiting areas should be considered for potential influenza patients. For NT sites focussed on influenza, there appears to be no infection control basis for segregating people at various stages of illness. In either situation health care workers and visitors to the site will need to be educated regarding appropriate infection control practices.

Infection prevention and control issues are addressed in detail in Annex F of the Plan.

Security and Safety

The safety of buildings will be based on National Building Code and CSA standards. "Security" includes security of access, security of medications, and the security of patients. Security issues must be considered in choosing sites as well as when planning for staffing needs.

Upgrade Facilities

Some facilities may need to be upgraded, in order to be used as a medical site. Local authorities may wish to upgrade designated facilities in order to ensure they are adequate. Upgrades such as improving power supplies and upgrading washing facilities may be considered as an investment in emergency preparedness and part of overall emergency planning for the community.

As it is much less expensive to build in facilities at the time of construction then to add them later, emergency planners and pandemic co-coordinators may work with local authorities, school boards, etc. to add facilities to buildings that are under construction. .

1.6.5 Planning for Critical Equipment and Supplies

During the interpandemic period planners should identify critical equipment and supplies necessary for the establishment and operation of NT sites. Sources of supplies need to be identified; expected needs during an influenza pandemic and ability to meet those needs should be discussed with all possible suppliers. Potential access to the NESS should also be addressed.

A pandemic will likely result in shortages of medications, medical supplies and potentially operational supplies. Since multiple jurisdictions including other countries will potentially be affected by these shortages, the response plan should not rely heavily on outside assistance in terms of the provision of supplies and equipment. Some of the issues directly affecting Canadian supplies will be:

Interrupted transportation lines — Canadian supplies travel long distances by truck train and aircraft. Supplies are often obtained from the U.S. and other nations. Difficulties at border crossings may substantially affect supply lines. In addition, a loss of up to 30% of workers, drivers, and other transportation staff may affect the production and delivery of supplies.

Lack of inventory — In an effort to reduce costs, most health regions have moved to "just-in-time" inventory systems that keep minimal supplies on hand. Consideration should be given to the purchase of products made in Canada to avoid potential supply problems due to border crossing restrictions implemented at the time of the pandemic.

Embargoes — The majority of medical supplies are not produced in Canada. Health Canada has made major efforts to establish a domestic infrastructure for the manufacturing of influenza vaccine and has encouraged in-Canada manufacture of some antibiotics. However in many cases supplies are provided by only one or two manufacturers worldwide or the essential ingredients or components come from a single source. In past pandemics and health crises other nations have banned the export of critical vaccines, medications and supplies.

Recommendations for the use of vaccine and antivirals during a limited supply situation are provided in other annexes.

Transportation and Supply Logistics

Transportation planning for NT sites should include consideration of the types of supplies and products (e.g., dangerous goods such as oxygen, biomedical waste, equipment for sterilization) that will need to be transported to and from NT sites, who will provide these services (i.e., will volunteers need to be trained) and whether the site has appropriate delivery access. The size and types of vehicles and other mechanisms of transport have been identified for each "kit" that is available through the NESS.

Stockpiling

Provinces/territories and local health authorities may wish to review the possibility of rotating stockpiles of critical supplies for NT sites within their own jurisdictions. Jurisdictions may specifically wish to keep some older equipment such beds, which need little maintenance and have no specific "shelf life". Appropriate assessment should be made of the maintenance and training required to ensure the safety and effectiveness of older equipment, training needed by staff to use unfamiliar equipment, etc.

After such a critical assessment, institutions and health authorities may consider maintaining certain critical pieces of older equipment such as ventilators.

The stockpiling of antiviral drugs will be discussed at the national level, however, the need to and feasibility of stockpiling critical medications for the management of patients with influenza and secondary pneumonia, should be address at the P/T and local levels. In addition, provinces and territories will have to discuss with local pandemic planners the need to stock larger quantities of medications and equipment to manage persons with co-morbidities, e.g. chronic cardiac and respiratory disease, diabetes, renal failure, that may be exacerbated by influenza infection. The Clinical Care Guidelines (Annex G) provide guidance on antibiotics for the treatment of secondary pneumonia. The antibiotics currently stockpiled at the national level will be reviewed to determine whether these can be utilized in a pandemic, in addition to, further discussions on the need for additional national stockpiles.

Equipment and Supplies

The issue of equipment and supplies has been addressed in other annexes. The Resource Management annex provides information on supplies and equipment issues for acute care facilities that can be extrapolated to identify needs for NT sites. In addition, the treatment protocols in the Clinical Care Guidelines (Annex G) can be used to plan for medical supply and equipment needs. The Infection Control annex will address the use of masks and gowns and other supplies in various settings.

The services offered by each NT site will obviously dictate equipment and supply needs. For example, it is unlikely that NT Sites will be able to provide the expertise and resources required to support intubated patients, however, equipment may be needed to support patients requiring ventilation while they are transported to another facility. Isolated communities may wish to review the possibilities for hand ventilators (Ambubags) for short-term assistance and other equipment that does not require the same expertise or support as for ventilated patients.

The following is a preliminary list of medical equipment and supplies needed to provide medical care in each site.

- beds, bedding
- lights

- intravenous equipment (e.g., needles, intravenous catheters, fluid and tubing, syringes, tape, tourniquet)
- sterilizers
- sphygmomanometer, stethoscopes, thermometers
- miscellaneous supplies (e.g., antiseptics, dressings, bandages, steristrips, gloves, alcohol based hand sanitizers, alcohol sponges, gauze sponges, arm boards, pulse oximeter, extra batteries for equipment needs, flashlights, scissors, tongue blades, portable lamps)
- emergency drugs (e.g., epinephrine, diazepam, salbutamol)
- airway supplies (e.g., bag-valve-mask, oxygen masks, oxygen tubing, oxygen tank, spacer device for aerosolized medication, motor-driven nebulizers, oral airways, suction machines and catheters)
- patient identification tools
- privacy screens
- communications (telephone, fax, cell, radio or alternatives for isolated communities)
- computers and Internet access

Supplies will need to be carefully managed. An example of a supply management form is provided in Appendix A.

Local Production

During a crisis some items, which are usually ordered from centralized sources, may be produced locally. Procurement specialists may wish to review which supplies could be obtained or produced locally if prior arrangements are made. Possible suppliers and suppliers of alternative products should be contacted to explore this possibility.

1.7 NT Site Planning During the Pandemic Period

The following activities, with respect to NT sites, should occur during the pandemic, when there are indications that NT sites will be needed, based on local resource availability and utilization, and projections of disease impact:

- Re-evaluate plans based on WHO and Health Canada epidemiological projections.
- Appoint site administrators/managers or teams
- Implement plans to prepare the site(s)
- Co-ordinate procurement of supplies

1.7.1 Re-evaluate Plans Based on WHO and Health Canada Epidemiological Projections

Based on expected attack rates and the demographic of the groups most affected, local planners may re-evaluate what sites and services may be required. For example, if it appears pregnant women will be seriously affected by influenza as they were in 1918, moving deliveries to birthing centres may not be appropriate.

1.7.2 Appoint Site Administrators/Managers or Teams

Each NT site will require a site administrator/manager or a team of managers to locate the site, set up, manage adaptations, schedule staff, oversee movement of supplies, maintenance etc. and continue to operate the site. Depending on the size of the NT site, what services are offered and the community, this may require on-site management 24 hours a day 7 days a week for the duration of the epidemic wave. The nature of the task and the fact that any one may fall ill or be incapacitated requires that all such managers should have alternative people to whom to delegate authority.

1.7.3 Implement Plans to Prepare the Site(s)

The Centre for Emergency Response and Preparedness (CEPR), Health Canada, has developed outlines for the planning and operation of Emergency Reception Centres and Shelters available through CEPR or the Provincial/Territorial Emergency Services Directors.

- Contact those currently responsible for the site (school board, civic authorities for community centres, etc.)
- Conduct a "walk through" of the site to determine any problems or needed emergency upgrades.
- Ensure heat/light/power/water/telephone is operational.
- Ensure adequate furniture and position.
- Remove any obstructions, tripping hazards, impediments to flow, etc.
- Affix or erect any necessary directional signs, including route to washrooms if unclear.
- Identify various rooms/areas for specific functions (e.g., rest, food service, etc.)
- Ensure adequate hand hygiene stations are available.
- Document and report any:
    - deficiencies in facilities;
    - failure of heat/light/power/water/telephones.
- Arrange to move out and store any equipment that will not be needed (e.g. desks, chairs).
- Clean and disinfect the site.
- Contact any required transportation providers.
- Notify pre-determined media for public direction.
- Determine staff support - electrician/plumber/public health inspector/public health nurse/occupational health and safety personnel.
- Determine municipal support.
- Address financial implications to municipality. Ideally, using previously established accounts.
- Notify garbage removal contractor if required.
- Notify recycling removal contractor if size or duration indicates.
- Notify staff, volunteer agencies, and specialty personnel (see Human Resource Section).

1.7.4 Coordinate Procurement of Supplies

- Contact stationery, office, and support equipment providers; arrange transportation if required.
- Contact identified food suppliers (may be a pre-alert to provide lead time).
- Notify any required food transporters (vehicles).
- Arrange for dishes/eating utensils if not present at identified food serving locations.
- Order additional medical supplies.
- Establish alternate transportation/distribution arrangements if required.
- Establish local production of supplies where possible.
- Evaluate the need to access supplies from the NESS and request if necessary.

1.8 NT Site Planning During the Post-Pandemic Period

The possibility of subsequent waves of the pandemic, and the resources that would be required during those waves, should be considered before decommissioning NT sites.

Activities at NT sites during the post-pandemic period will focus on the discharging or re-locating of patients, storage of medical records and the decommissioning of the NT site(s). Each site should be assessed for damage or necessary alterations to return it to its previous use. Supplies should be redistributed, stored or returned to stockpiles. Insurers will also need to be notified of the date the site was decommissioned in order to discontinue the coverage.

2.1 Introduction

During an influenza pandemic there will be an increased need for people with health care training to deal with the increased demands on the health care system. This may involve the re-locating of health care workers to different settings, including NT sites or to different locations within the same traditional site to provide services that differ from their usual responsibilities. In addition, non-health care workers may need to be hired/contracted to provide supplementary services essential to the establishment and operation of NT sites or the expanded role of current health care sites. Volunteers will also be a potentially vital source of human resources to facilitate the management of health care services during a pandemic.

During an influenza pandemic the shortage of trained medical staff will be one of many barriers to the provision of adequate care. A significant proportion of the workforce may be unable to attend work for a period of time due to illness in themselves or family members. Communities and health care organizations will need to have specific guidelines in place to address what will be done if the health care system is overwhelmed and NT sites must be established or current service sites expanded. Human resource management in the acute care setting during a pandemic is addressed in the Resource Management Guidelines for Health Care Facilities During an Influenza Pandemic, Annex H of the Plan. This section of the document will, therefore, focus on human resource issues outside of the traditional acute care settings.

2.2 Human Resource Planning During the Interpandemic Period

Planning during the interpandemic period for the optimal use of human resources at NT sites and other health care sites involves several steps. The following list of steps/activities is provided to assist with this part of the planning process, details are provided in the following sections.

- Appoint a human resource management team.
- Identification of human resource needs and a database to be used for staff and scheduling.
- Review emergency preparedness legislation.
- Recruitment of health care professionals.
- Plan for salaries or payments to staff not currently employed by the health care system.
- Identify and recruit volunteers.
- Provide training.
- Establish immunization recommendations.
- Supporting health care workers in NT sites.
- Insurance/licensing.

2.2.1 Appoint a Human Resource Management Team

The work involved in identifying current health care workers who could be re-located to NT sites; recruiting additional health care workers, non-medical workers and volunteers; and managing the training, assignment and support of these workers, should be initiated during the interpandemic period.

Establishment of a team or subcommittee that could take on these responsibilities in each jurisdiction is an important first step. A combination of professionals with expertise in human resource issues, pandemic planning, health care administration, and volunteer organizations would be desirable for this planning team/subcommittee.

2.2.2 Identify Human Resource Needs

One approach to identifying the human resource needs for NT and other health care sites is to consider each potential type of site and the services that would be provided at each. From this exercise the number and type of health care workers and non-health care workers that would be required per site could be estimated.

The following is a list of where additional or new human resources will be needed during a pandemic (excluding acute care facilities).

- Triage Sites – community triage sites: at clinics, non-traditional sites, attached to an existing hospital
- Non-Traditional Sites – including emergency care centres, emergency hospitals, support hotels, nursing stations, etc.
- Vaccination Clinics – mobile clinics, clinics in acute care sites, etc.
- Home Care/Community Care – to reduce the pressure on other health care programs
- Long Term Care Facilities
- Telephone Information Services, 24-hour health lines
- Other – doctors' offices, specialty health services (cancer or cardiac treatment centres), etc.

In order to make best use of the skills of various health care workers a pandemic will likely require that health care workers be reallocated from their usual roles and settings. For example, trained, health care professionals, will be required to supervise volunteers and other staff in clinics and non-traditional sites.

Shortages of physicians and nurses will require extensive use of other health care professionals, trained non-medical workers and trained volunteers. Each jurisdictions needs to conduct an inventory of health care personnel and potential volunteers and determine sources from which additional staff could be acquired, assuming that hospitals are using much, if not all, available staff for their own needs. The following list is for reference, and may be adapted and altered to meet various needs.

Health Care Workers (HCWs)

Within facilities, consideration should be given to reassigning medical and nursing personnel with administrative, research and educational assignments to clinical duties.

Alternate sources of HCWs would include, but are not limited to:

- retired physicians/nurses (need to be assurance that work during a pandemic would not affect their pension plans)
- physicians/nurses currently not working in clinical health care (i.e., working in education, administration, research, private industry)
- medical and nursing students
- registered nursing assistants
- patient care assistants
- emergency medical technicians
- veterinarians
- pharmacists
- therapists (respiratory/occupational/physio)
- technicians (laboratory, radiography)
- pharmacists, therapists, technicians in training
- health care aides

Personal Care Services

Personal care services involve those people that provide health care and support services in the home. It is recognized that these organizations already function near capacity and may have limited ability to expand during a pandemic. These services include, but are not limited to:

- VON
- Home Health Agencies

Categories of Workers

In a pandemic, in addition to current health care workers, health care tasks may have to be undertaken by personnel who would not normally perform these tasks. For the purposes of assigning tasks, training, support, insurance and other issues human resource planners and managers must be aware of the following types of workers:

- paid health care professionals
- paid health care workers who are not licensed professionals
- paid non-health care/non-medical staff (support, maintenance, etc.)
- volunteer health care professionals
- volunteers trained in medical tasks, but who are not licensed professionals.
- volunteers not trained in medical tasks, but can provide other essential services to health care sites– e.g. electricians, who help set up the NT site.

For each site the essential functions and the skills required to complete each task should be identified and documented. It will be necessary to establish medical and nursing directives for each NT site (triage, influenza hospital, nursing station, community clinic or support hotel) and to access existing directives for sites that may need to be expanded during a pandemic.

The next step is to list the type of workers/volunteers who already have the skills to carry out these tasks. (In existing institutions these roles are already defined, however they will need to be developed and adapted for use in the non-traditional sites.) Any gaps in required skill sets should be addressed during this planning exercise. It may be necessary to investigate the local availability and access to other types of service providers in this type of emergency situation (e.g., mortuary services).

Checklist of Functions and Personnel at Non-Traditional Sites

This is a checklist of functions that may be required at a non-traditional site. It is an example of how the exercise described above might be documented. Depending on size, number of patients and function of the site, many tasks may be carried out by the same individual. Consider that these functions may be required 24 /7. Some services may be provided by a central hospital or community.

	FUNCTIONS	SKILL SETS/PERSONNEL
A	**Administration**	
	Site administration/management	Management/administration
	Co-ordination of patient care – staff scheduling and support, assessing service demands and supply	Medical training/knowledge (e.g. in-charge nurse), leadership and coordination skills
	Medical management	Physician or nurse with physician backup
	On-site training and orientation of staff, volunteer and family members	Knowledge of basic patient care, patient triage, infection control, occupational health and safety
	Spokesperson	Medical management. If no medical spokesperson refer to hospital or site administrator
	Receptionist	Communication/language skills, public relations
	Health records management	Clerical skills (including computer skills), confidentiality agreement
	Information technology resource	Knowledge of IT systems and problem solving skills

	FUNCTIONS	SKILL SETS/PERSONNEL
B	**Patient Care**	
	Medical triage	Medical training/nurse, ideally with ER training
	Admissions/discharge	Medical training/nurse, ideally with experience in discharge planning
	Patient care - medical	Instructed in nursing care: rehydration, feeding, ambulation, bathing, vital signs monitor, give meds
	Physiotherapy	Trained in chest phyiotherapy and mobilization
	Respiratory care	Trained in oxygen delivery, patient monitoring, equipment monitoring (oximeters) and inventory
	Pharmacy services	Pharmacist at hospital or in community
	Discharge planning	(Refer to community care, self care)
C	**Infection Control**	
	Sterilization of equipment	Trained in sterilization and infection control
	Housekeeping	Basic infection control knowledge
D	**Food Services**	**Hospital or community based?**
	Patient nutrition/therapeutic diets	Dietician at hospital or in community (home care, meals on wheels)
	Food preparation - workers' meals	Basic food safety training
E	**Social Services**	
	Social service/community care	Counselling, accessing community resources/Liaison Social Worker
	Psychology/pastoral care/grief counselling	Social workers, religious leaders, psychologists, local service clubs/support groups
	Care for children/family members of workers	Training or experience in child care, care for elderly, home care/criminal records check

	FUNCTIONS	SKILL SETS/PERSONNEL
F	**Morgue**	
	Transportation of corpses	Driver's license
	Preparation and storage of corpses (see Annex on Mass Fatalities)	Body bagging, shelving corpses
G	**Transportation**	
	Patients, staff	Class 4 license
	Dangerous goods (e.g. oxygen), medical waste	Appropriate licenses and liability insurance
	Supplies, lab tests	Drivers license, criminal records check
H	**Services**	
	Laboratory testing	Laboratory services at hospital or in community
	Maintenance	plumbing, electrical, etc.
	Laundry	local laundry business
	Communication services and equipment support - phone, cells, cable, computer support	Local businesses
I	**Security (Staff ID will be necessary)**	
	Public order and personal safety	Crowd control, traffic control
	Protection of site – fire safety, theft	Trained in building safety and security

Training for health care workers, volunteers, family members may be carried out at the time of a pandemic.

2.2.3 Review Emergency Legislation

Emergency legislation makes many provisions for the management of workers during a crisis. This includes the recruitment of professional and other paid staff as well as volunteers, managing human resources and protection of people who volunteer. Pandemic planning should be integrated with the emergency plans of the jurisdictions as much as possible, in order to make best use of existing plans and resources. Remember, it is unlikely that an Emergency will be "declared". Therefore human resource planning should be based on existing plans without a declaration.

The following provisions of legislation are particularly applicable to human resource issues including:

- authority regarding licensing and scope of practice issues, and the ability of government to make unilateral changes during a crisis;

- safety and protection of workers, (one of the primary responsibilities);
- fair compensation;
- insurance, both site insurance, workers compensation and other forms of insurance;
- training;
- provision of clothing and equipment;
- protection of the jobs of workers who take leave to assist during the crisis.

Compelling Workers

Under emergency legislation provinces/territories may have the authority to designate "Essential Services" and workers and have the ability to compel people's time or property with due compensation *as a last resort*.

This issue has been raised both because of the existing shortage of health care workers and concerns that health care workers and others may refuse to work during a pandemic due to changed job responsibilities, fear of infection, family responsibilities or other reasons. However, the extreme difficulty of enacting or enforcing such legislation and would strongly encourage the jurisdictions to review all other methods of obtaining essential human resources, in advance of a pandemic.

2.2.4 Recruitment of Health Care Professionals

While actual recruitment of health care professionals for the purpose of service provision will not be necessary until the pandemic arrives, it is important to establish an ongoing dialogue with these professionals in the interpandemic period. Communication must take place to inform health care professionals about influenza, influenza pandemic plans and their roles within those plans. It will be important to convey the potential impact of the pandemic on health care service provision and specifically the need for additional human resource and NT sites. Issues regarding licensing and scope of practice expansion during a crisis should be discussed with the goal of addressing any concerns during the interpandemic period rather that at the time of the pandemic. In addition, any potential impediments for recruited/volunteer health worker being able to return to their own workplace following the provision of services in the NT site, will need to be addressed in advance. Education regarding the identification and treatment of influenza and immunization programs should also be ongoing during the interpandemic period.

In order to be able to call on health care professionals, for the purpose of pandemic training or the implementation of the pandemic response, planners should review the logistical and legal issues around developing databases of HCWs who have the training and skills needed during a pandemic. This may be achieved by arranging with the appropriate licensing bodies or associations for the establishment and maintenance of databases of members for use during a crisis. There may be legal requirements that individuals agree to keep their names on a list of professionals available for work in a crisis.

2.2.5 Plan for Salaries or Payments to Staff Not Currently Employed by the Health Care System

Decisions around payment and expenditures will be based on current arrangements and labour agreements in each province, territory or local jurisdictions. Planning must be based on these contractual arrangements or assessment of current local salaries for similar work.

2.2.6 Identify and Recruit Volunteers

Definition of Pandemic Volunteer

The following is a definition of a volunteer for the purposes of pandemic planning and response.

> ***A volunteer is a person registered with a government agency or government designated agency, who carries out unpaid activities, occasionally or regularly, to help support Canada to prepare for and respond to an influenza pandemic. A volunteer is one who offers his/her service of his/her own free will, without promise of financial gain, and without economic or political pressure or coercion.***

A volunteer may be a health care or other professional, or any other person who offers their services freely. Notwithstanding that while a volunteer may not expect financial gain, or remuneration for their time, the agency or government may provide supports such as: insurance protection, family support and job security to facilitate the recruitment of needed volunteers.

Interpandemic Tasks in Volunteer Management

There are several tasks/activities that should take place during the interpandemic period to optimise the use of volunteers in the pandemic response. These include:

a. Communicate with the public and with volunteer organizations.

b. Develop and maintain databases of volunteer organizations.

c. Develop Job descriptions and skill lists for volunteer positions in conjunction with volunteer agencies. (See Checklist of Functions and Personnel)

d. Develop recruitment, screening procedures.

e. Develop training procedures.

f. Monitor and track qualifications.

g. Prepare to manage volunteers.

The time between the WHO declaration of an influenza pandemic, the first wave and analysis of the severity of the pandemic will be very short. There will be a need to recruit, screen, train and deploy volunteers as quickly as possible. Therefore procedures need to be in place in order to best place volunteers in as short a time as possible.

a. **Communicate with volunteer agencies**

Existing volunteer agencies will be the primary source of trained, screened volunteers in most jurisdictions. Developing ongoing communications and planning procedures with these agencies will be essential to the planning effort.

Potential sources of volunteers include, but are not limited to:

- Red Cross
- St. John Ambulance
- Salvation Army
- Volunteer Fire Departments
- Mennonite Disaster Services
- Adventist Disaster Relief Association (ADRA)
- Scouts, Sea/Army/Air Cadets, Guides
- Big Brothers
- Big Sisters
- Community Service Agencies
- Christian Reformed World Relief Committee - Disaster Response Services

Each jurisdiction needs to liaise with non-governmental organizations within their district to determine the approximate number of volunteers who would be available during a pandemic.

During the interpandemic period, recruitment of volunteers, both those with health care skills and those without should take place primarily through existing agencies. These agencies already have recruitment, screening, training programs and management programs in place. It is important that health authorities and emergency planners establish communication with existing agencies to communicate community needs during a pandemic, in order that agencies may recruit and maintain a core group of volunteers with appropriate training. They may wish to add certain types of training to standard training programs in order to address issues regarding pandemic influenza. Specifically, volunteers should be aware that unlike other emergencies such as earthquakes or floods, the duration of the "emergency" will be longer for an influenza pandemic and more than one pandemic wave will likely occur. Since people view the risk of disease differently than the risk of injury, and will be concerned about bringing this disease home to their families, it is important that these issues are addressed during training sessions.

b. **Develop and maintain databases of volunteers**

Because maintaining up-to-date databases of volunteers is time consuming, difficult and expensive, health authorities will likely have to depend on existing volunteer agencies. Such agencies should be encouraged, where possible, to track trained and screened (those that had interviews, reference checks and criminal records checks) volunteers and track records of certificates or diplomas and maintain methods of communication. Health authorities may wish to encourage these agencies to keep their databases current, and to expand the information on their volunteers' skill sets or experiences, to include skill sets that would be required in a pandemic.

c. **Develop job descriptions and skill lists for volunteers**

Develop a list of jobs, job descriptions and skills based on the needs of the region or community and working in conjunction with volunteer agencies. (See Checklist of Functions and Personnel). This list can be used to determine which training programs are necessary and how best to recruit, train and assign volunteers in the interpandemic and pandemic periods.

d. **Develop volunteer recruitment, and screening procedures.**

Develop procedures that can be implemented quickly once a pandemic is declared. (See Pandemic Period – Recruitment, Screening and Deployment.)

e. ***Monitor and track qualifications and certification***

Plan for methods to ensure health care workers, including volunteers are trained and certified for the tasks they are undertaking.

- Review the logistical and legal issues around developing databases of HCW's who have the training and skills to be deployed during a pandemic.
- Arrange with appropriate agencies to maintain databases of members for use during a crisis. There may be legal requirements that individuals agree to keep their names on a list of those available for work in a crisis.
- Plan for a "Quick Check" method of confirming certification or qualification.
- If a volunteer is trained at an NT site during a pandemic, plan for ways to test and record the level of skills.

f. **Prepare to manage volunteers**

During a major crisis many people come forward who wish to volunteer. In some cases managing the numbers of people who come forward to volunteer is a major logistical effort in itself.

During the interpandemic period:

- Review emergency plans for managing an influx of volunteers.
- Plan for a volunteer co-ordinator or team – identify agencies, positions or individuals – to take responsibility for directing the process of accepting, screening, training and placing volunteers.
- Ensure resource information is available to the volunteer co-coordinator/team.
- Plan for a location for volunteer recruitment/management that is separate from existing hospitals or clinics to reduce congestion and security issues.

2.2.7 Provide Training

Both health care professionals and other workers will need training for dealing with pandemic influenza. Professionals may need training or refresher courses in tasks they don't normally perform, including supervision and management. Due to the limited number of health care professionals that will be available in the community, volunteers and other non-medically trained staff will likely be needed to perform direct patient care.

i) **Train the Trainer**

Health authorities and existing volunteer agencies, may establish programs to "train the trainers," to maintain resources to call on during a pandemic. Plan for where and how

training programs will be delivered, ideally during the interpandemic period, but also during the pandemic.

ii) **Train for Self-Care**

All health care workers should be trained in self-care as it pertains to pandemic influenza treatment and symptom control and the ability to communicate the principles of self-care to others. As professionals will likely be required for the provision of medical services, teaching self-care skills may become part of the volunteers' role.

A number of jurisdictions are currently developing "Self-Care" modules designed to improve the quality of home care. (See the Clinical Care annex for more information). Jurisdictions are encouraged to share such resources and to develop other health information services for the public, e.g. 24-hour telephone health information services. Ensure that all those training in self-care are using consistent, accurate and up-to-date information.

Plan for methods to educate health care workers and the public in Self-Care. While some education will be done in advance, much of the education of patients and their families will take place in clinics, NT Sites, vaccination clinics during a pandemic.

iii) **Train Health Care Professionals**

A number of training programs exist which can be adapted for pandemic influenza. Health care professionals may need training for reassignment and training for supervision.

The time for training once a pandemic is underway will be extremely short; therefore training should be incorporated into existing programs now. By incorporating the skills needed during a pandemic into existing training, we reduce costs, improve efficiency and enhance readiness.

Training may include medical training essential to working in a pandemic situation including:

- Infection control procedures
- Use of respirators and care of patients on respirators
- Worker and volunteer supervision
- Working with grieving families

Develop a plan for training/retraining health care workers who have not been working in health care (retirees, etc.) at the time of a pandemic. (See Resource Management Guidelines in Acute Care Settings [Annex H] for lists of Health Care Professionals.)

iv) **Train Volunteers**

During the interpandemic period, volunteer training may be left as much as possible to existing agencies. In areas without well-developed volunteer systems and agencies, planners may wish to review the need for developing, maintaining and funding core groups of volunteers trained for medical emergencies such as pandemic, and trained trainers.

All volunteers should be trained for

- Self-care and
- Infection prevention and control (routine or universal precautions).

Based on the Checklist of Functions for your jurisdiction, volunteers working in direct patient care may also be trained in:

- Basic personal care (bed baths, bed pans)
- Observation of condition (temp, pulse, resp, etc.)
- Case definition, identify the illness
- Giving medications (pills, eye and ear drops, liquids)
- Oxygen administration
- Pressure ulcer prevention – skin care
- Ambulation, mobilization

Volunteers will also be needed who are trained in the following:

- Cleaning in health care facilities
- Records management
- Food preparation (food safety courses)
- Workplace Hazardous Materials Information Systems (WHMIS) protocols
- Security staff trained in working with grief stricken people.

Review the Checklist of Functions for the training required in your jurisdiction. As far as possible, existing agencies should be encouraged to maintain skills in these tasks during the inter-pandemic period.

v) **Training Resources and Programs**

Curricula for the above listed skills are available through existing agencies.

Training programs include, but are not limited to:

- on-line courses, including an Infection Prevention on-line course for infection control issues at www.igc.org/avsc/ip/index.html
- Association for Practitioners in Infection Control and Epidemiology training manual "*Influenza Prevention: A Community and Healthcare Worker Education Program*" < http://www.apic.org/resc/>
- St. John Ambulance Brigade. Brigade Training System. 1997
- St. John Ambulance Brigade. Handbook on the Administration of Oxygen. 1993. ISBN 0-919434-77-0
- The Canadian Red Cross Society. *Yes You Can Prevent Disease Transmission*. 1998
- Nursing colleges training programs (i.e. the basic care programs for health care aides)
- CHICA, APIC and the Infection Control Association in the UK have a "tool kit" with detailed forms and templates that could be used at the NT site, 2002. [reference: "Infection Control Toolkit" - Strategies for Pandemics and Disasters, can be ordered through the Community and Hospital Infection Control Association (CHICA-Canada), Phone: 204-897-5990 or toll free 866-999-7111; Email : chicacda@mb.sympatico.ca]

2.2.8 Establish Immunization Recommendations

While no vaccine for the pandemic strain of influenza will likely be available in advance of the arrival of the pandemic in Canada, health care workers should be up-to-date with the other recommended immunizations. Because immunizations require varying amounts of time and some require more than one dose for a person to develop immunity, it will likely be impossible to provide all of these once a pandemic is declared, or to provide them within an appropriate time frame given the lack of supplies and human resources.

Where possible volunteers already working with existing agencies or recruited in the interpandemic period should be encouraged or required to be up-to-date with respect to the recommended immunization schedule. In addition, depending on type of work they will be doing during the pandemic, it may be appropriate to recommend that volunteers receive the same immunizations that are recommended for health care workers (e.g., hepatitis B vaccine). Volunteer recruiters should also ask for immunization records, where possible, to facilitate identification of individuals who are not up-to-date with respect to the current recommended schedule.

2.2.9 Supporting Workers in NT Sites

Plans to extend support programs for health care workers (including trainees, volunteers and retirees) to all workers at NT sites should also be included in overall plan for the management of human resources. Support should include: provision of food and drink, grief counseling, support for families and job protection.

2.2.10 Insurance/Licensing

In addition to addressing any liability / insurance issues in relation to health care professionals and other non-professional health care workers, these issues must also be addressed for retired/trainee health care professionals and volunteers performing patient care and other non-medical tasks.

There are a number of insurance issues which present major concerns, especially the insurance required for workers at NT sites including volunteers. The Non-Traditional Sites and Workers subgroup has noted that issues around personal liability and workers compensation (including compensation for acquired illness) may present a powerful barrier and disincentive to the recruitment of health care workers, especially volunteers, during a crisis. A recommendation has been put forth, that these issues be addressed on a national basis, and be reviewed by provincial/territorial planners to determine the legislative, administrative, licensing and other options within each province and territory.

The scale of a pandemic may require significant changes to scopes of practice of professionals, and delegation of tasks to non-professional staff and volunteers. These raises many issues regarding insurance and licensing which must be reviewed with respect to existing insurance, licensing practices, cross jurisdictional licensing, labour agreements and Emergency Legislation. The types of insurance which must be reviewed include:

- Malpractice and personal liability
- Transfer of licensing between jurisdictions
- Workers compensation
- Accidental death and dismemberment.
- Directors and officers liability (depending on the administrative authority)

Malpractice/Liability Insurance of Workers and Volunteers

Review liability protection/malpractice insurance coverage to see how it will extend to cover workers in Non-Traditional Sites, professionals, those taking on tasks not usually part of their scope of practice and volunteers.

Transfer of Licensing Between Jurisdictions

Each province/territory must review with its professional licensing bodies (medical colleges, nurses associations) how pandemic workers with varying qualifications, or licensed in other jurisdictions, may deliver some services. Professional licensing bodies may be asked to liaise and extend privileges to out of province professionals, or foreign trained professionals based on their standing in another jurisdiction.

Workers' Compensation

Each province/territory must make appropriate arrangements with their workers' compensation board if pandemic volunteers are to be covered by workers' compensation. A Memorandum of Understanding (MOU) between the Office of Critical Infrastructure Protection and Emergency Preparedness (OCIPEP) Canada and the provinces/territories asserts that registered volunteers or persons compelled for emergency service work are protected by workers' compensation during emergency response, as long as they are registered. Some volunteer agencies have a liability policy for their volunteers. In some circumstances, volunteers who register with designated agencies may be covered by workers' compensation under Emergency Preparedness Legislation. However, there are a number of issues to be resolved with workers' compensation Boards at the provincial level:

- Definition of Health Care Workers for this purpose
- Definition of volunteers for this purpose
- Does the policy require a declaration of Emergency and at what level of government or would the insurance come into effect once the Minister of Health declares a pandemic?
- Compensation is usually based on loss of income, however, in some cases volunteers may be retired, homemakers, or self-employed. Would compensation cover costs of the person's other responsibilities, such as family care?
- Would compensation be available if volunteers became ill rather than injured?

Accidental Death and Dismemberment

Usually a subset of workers' compensation. Ensure that this insurance is available.

Directors and Officers liability

If the health care site or service is a part of an existing institution, hospital, or health authority, determine whether existing insurance can be extended to those managing sites or services elsewhere or obtain this insurance elsewhere.

2.3 Human Resource Planning During the Pandemic Period

Once a pandemic is declared there will be a massive effort required to implement the programs and activities developed during the interpandemic period to manage the human resource issues. Activities will include:

- Activation of the Human Resource Management Team
- Implement Volunteer Management Team
- Provide Human Resource Management Team with lists and job descriptions of personnel required.
- Contact supporting organizations to request additional personnel with special skills, e.g. translation services, churches/counselling services.

2.3.1 Contact Health Care Professionals

By the time a pandemic is declared most existing health care institutions and agencies will be aware that the WHO and Health Canada have been monitoring a growing situation. Communications with professionals is vital at this stage as professionals will be required to take on additional or changed responsibilities and may be reassigned to other sites or activities.

2.3.2 Volunteer Recruiting, Screening, Training, Deployment

a. **Communicate with volunteer agencies**

Communicating with the volunteer agencies to co-ordinate the activities of voluntary efforts will be one of the first tasks of the Volunteer Management Team.

b. **Call for volunteers**

In emergencies often volunteers come forward. This potentially large and commendable response needs to be channelled so that those with needed skills can be placed where they are needed most and their skills can be optimized. However, not all volunteers will have the skills, ability or stability required for the jobs they want to do. Therefore, any calls for volunteers should identify the needed skill sets to streamline the recruitment process.

Volunteer recruitment and screening needs to be considered, including:

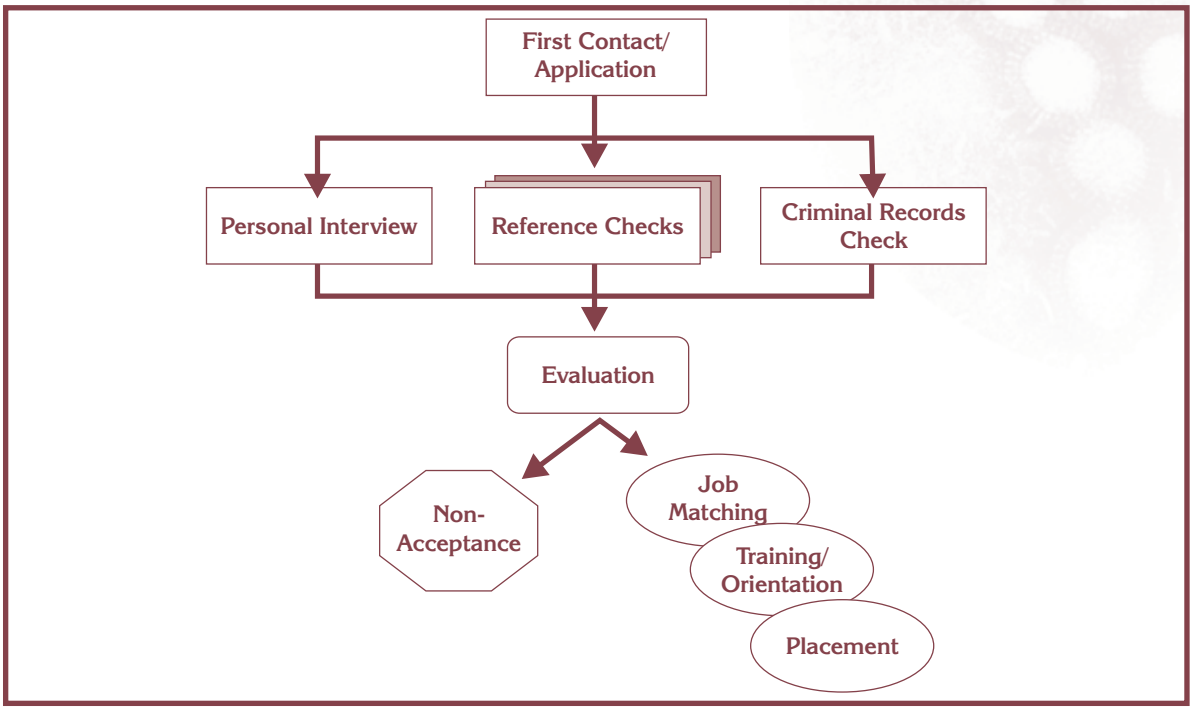
- position descriptions
- advertising the need for volunteers
- screening criteria
- volunteer application forms
- interview
- reference checks
- criminal record check.

Useful resources include, but are not limited to:

- The Canadian Red Cross Society. National Volunteer Policy Manual
- The Canadian Red Cross Society. The 30-Minute Quick-Response Guide. 1995.
- The Canadian Red Cross Society. Disaster Response Team: Participant Attachments. 1996.
- St. John Ambulance Brigade. Screening Brigade Volunteers. 2000.

c. **Volunteer screening**

Volunteers in a pandemic may be placed in positions of significant trust and authority, with vulnerable people. Volunteer positions will vary in nature, in the type of training, skills and abilities required, in the setting and in the level of risk to the volunteer. Volunteer screening must take all of these issues into consideration and provide for interviews, review of qualifications and appropriate assignment. In addition, it is important to ensure that volunteers do not have a personal history, which indicates they are incompatible with the safety and well being of vulnerable people.



Screening processes must review the stability of the individuals and may include criminal record checks. Information on procedures used by the Red Cross, and St. John Ambulance is available through their offices.

The most important part of volunteer recruitment and assignment is the interview process. Reference checks are also a good screening tool. A criminal records check is usually required by law for volunteers who work with vulnerable people. However, during the pandemic, police services may not have the resources due to illness and/or have other high priority duties to provide this service. Therefore more emphasis may need to be placed on conducting a good interview and reference check process. It will be important use trained volunteer recruiters, preferably identified and trained during the interpandemic period.

- Check existing emergency plans, regional or municipal plans for information on recruiting and screening volunteers
- Partner with existing agencies, where possible.
- Review Red Cross, St. John Ambulance and other resource documents

Due Diligence: The volunteer recruitment process should include a briefing meeting on risks and infection control (routine or universal precautions), and should require the individual to sign an agreement acknowledging they have been informed of the risks and protections, prior to being assigned to a placement.

2.3.3 Training During the Pandemic

Training programs developed or planned during the interpandemic period should be "geared up". These will include those programs listed in the interpandemic section of this document.

Training for Families/Caregivers

Family members of patients may stay at the site to help care for a patient or may be asked to take a patient home. In either case, the family member will need some training, especially in the areas of re-hydration, infection control, observation and assessment, and self-care. In addition, families may require counselling to help them support those who are ill or to cope with fear and grief.

Training for Support Tasks

In addition to training for patient care there are needs for training for intake, housekeeping, maintenance and other tasks. There are standards set for training of all workers related to health care, including housekeeping and maintenance staff. In many cases staff associations set these standards.

It is important to note that during a crisis it will not be possible to demand the same level of training for volunteers, which would normally be required of staff. Thus, it will be important to consider what are the minimum standards and basic information that must be communicated on certain issues.

2.3.4 Supporting Workers in NT Sites

Support provided to Workers at Non-Traditional Sites may include:

- Emotional support/grief counselling (aimed at permitting workers to continue to work and reduce loss of staff due to grief or traumatic stress).
- Family care (for children, seniors, sick family members who do not require hospitalization). This poses some questions around infection control if gathering children or others together for group care.
- Job protection for workers who move from other jobs during pandemic.
- Job protection for spouses who do family care to allow workers to work in health care.

2.3.5 Communicate Changes to Licensing and Insurance Provisions

Inform site managers and coordinators, as well as health care professionals in all sites and health care programs of changes in licensing and insurance and what it will mean for flexibility in staff deployment and additional staffing.

2.4 Human Resource Planning During the Post-Pandemic Period

Activities during this period will focus on the demobilization of staff and volunteers. Assessment of insurance claims or claims for assistance will also occur during this period.

Annex K

Canadian Pandemic Influenza Plan for the Health Sector: Communications Annex

Date of Latest Version: *October 2006*

Summary of Significant Changes:

- *Outlines a cascading approach to pandemic communications that is closely aligned with the World Health Organization's pandemic phases.*
- *This annex is more comprehensive than the previous version and reflects recent work at the F/P/T level.*

K Canadian Pandemic Influenza Plan for the Health Sector: Communications Annex

Introduction

The objective of the Communications Annex is to show how Canada's health partners are preparing to respond to the public communications challenges associated with an influenza pandemic. Canadians will need accurate, timely and consistent information so they can take appropriate action to help minimize death, illness and social disruption. The Communications Annex was developed in partnership by federal, provincial and territorial governments through the Pandemic Influenza Communications sub-committee.

The strategies outlined in the Communications Annex provide the framework for consistent and coordinated public communications across all involved organizations. Strategies and tactics outlined in this document provide guidance to the organizations identified and will be implemented pending available resources.

The Annex outlines a cascading approach to pandemic communications that is closely aligned with the World Health Organization's pandemic phases. Roles, responsibilities, and strategies are outlined by jurisdiction and by WHO pandemic phase so that communications are appropriate to the threat level. Currently, activities for the inter-pandemic, pandemic alert and pandemic periods are identified This Annex reflects current thinking on pandemic influenza communications and will continue to be revised as the plans of organizations evolve and new information and research becomes available.

Pandemic influenza communications planning is based on a strategic risk communications approach. This means that we would openly communicate pandemic influenza risks and control options, and that assumptions, values, methods and plans will be clear and accessible. Where facts are uncertain or unknown, the strategic risk communications approach supports transparency about information gaps and efforts to fill them.

The strategies outlined here are designed to promote well- coordinated, effective communications from federal, provincial, territorial governments and other health partners. Each level of government in Canada has unique stakeholders and responsibilities. The Communications Annex acknowledges these differences while reflecting the ongoing need for all levels of government to deliver consistent messages during an influenza pandemic.

Operational plans for public communications will reside within the specific organizations involved in the response to an influenza pandemic. The Communications Annex provides a working tool to ensure that these operational plans are closely tied to the roles and responsibilities highlighted in Annex K.

Provincial, territorial health ministries, and/or local authorities assume lead responsibility for public communications within their jurisdiction. If the pandemic moves beyond a single province or if a national emergency is declared, the Public Health Agency of Canada is the lead organization for national health communications, providing leadership in coordination of communications strategies and activities and in ensuring consistent messaging.

Citizen:	to raise awareness of the threat of pandemic influenza (and other types of influenza) by building on annual influenza campaigns, leading to better self-protective measures.
Stakeholders/partners:	to develop a comprehensive pandemic plan, with clearly identified roles and responsibilities, aligned with risk communications.
Organizational:	to demonstrate leadership and coordination between jurisdictions in influenza and pandemic preparedness.

Public Health Agency

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To co-chair PIC Communications Subcommittee.	To establish and maintain PIC Communications Subcommittee.	Direct.	Proactive.	Formal research into Canadian interests and priorities to develop strategies and messages. Dialogue among key players – fed./P/T. Develop and maintain a network "map" or org chart, plus database. Develop and maintain matrix.
To steward communications plans. To build relationships (federal, provincial, territorial and inter-national) to enhance communications response.	To coordinate federal, provincial and territorial communications response. To develop and maintain Communications Plan. To share information. To seek opportunities to work together.	Direct.	Proactive.	Matrix. Workplan. Message templates and draft messages. Ongoing meetings, workshops to ensure plan and matrix are up-to-date. Media Relations Plan, message development and testing. Research.
To define and establish networks with national stakeholders and partners.	To establish stakeholder networks and roles and responsibilities. To support P/T in their development of stakeholder networks.	Direct.	Proactive.	Teleconferences – PIC tripartite meetings – US, UK and Canada. WHO meetings. Alignment of research. Meetings. NGO Network, consultations on role of stakeholders, matrix to define roles and responsibilities. Tools and information developed with national stakeholders and partners, including matrix, plans and message templates.
To keep ministers and governments informed.	To keep policy decision-makers aware of potential risks and public interest.	Direct.	Proactive.	Regular briefings, speaking engagements, media opportunities.

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To establish link with WHO Communications. To establish and maintain international networks. To source and share primary information.	To work with the WHO to support public health risk communications globally. To provide template materials that can be adapted to local needs. To support global risk communications training through WHO. To ensure alignment with national and WHO plans. To establish primary Canadian communications contact with WHO communicators. To liaise with WHO, US and UK. To provide international perspective back to Canada. To provide federal perspective/key messages to P/Ts.	Direct.	Proactive. Communicate through PIC Communications team and other networks.	WHO pandemic influenza communications framework. WHO Pandemic Influenza Communications Steering Committee. Participation in WHO meetings on risk communications. Ongoing information sharing. Share best practices. Solve problems. Organize regular opportunities for sharing. Document outcomes to ensure continuous learning. Build in ability to detect and correct at all levels – needs to be part of roles and expectations. Protocols for information-sharing between organizations.
To prepare media at national level for their information support role in a pandemic.	To ensure media is prepared and has adequate background information to provide necessary support in case of a pandemic.	Direct, consultative.	Proactive on some aspects, opportunistic on others.	Consult with key media (roles and responsibilities of media, key messages). Provide technical briefings for key national media. Proactive communications to media on pandemic preparedness. Technical briefings. Media backgrounder packages. Provide spokespersons to address media inquiries.
To ensure quality control.	To establish and maintain a comprehensive monitoring system.	Direct, consultative.	Proactive.	Regular (daily) media scans. Feedback to spokespersons.
To ensure all Canadians have access to important background information on pandemic influenza.	To establish pre-tested background information on pandemic influenza.	Direct.	Proactive.	Post information on PHAC website.
To promote business continuity and community planning. To engage the public on pandemic influenza preparedness.	To inform different audiences about threat and implications, and provide information on what they need to do to prepare. To stimulate and support business leader continuity planning. To better understand public's views, help influencers understand challenges of pandemic influenza management.	Direct.	Proactive.	Stakeholder meetings. Document on community planning, tool kits, exercises and scenarios. Expert discussions, town hall meetings.

Health Canada

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To engage First Nations and Inuit stakeholders to prepare for and respond appropriately to avian and pandemic influenza.	To link with national FNs organizations to increase awareness of pandemic influenza and the necessity for planning.	Direct, consultative and through First Nations and Inuit Health Branch regions.	Proactive.	Meetings. Tools and information developed with national aboriginal organizations and partners. Matrix, research, meetings.

Provinces/Territories

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To participate on PIC Communications Subcommittee. Identify one provincial or territorial co-chair of the PIC committee.	To ensure PIC participation. To represent P/T communications interests.	Direct.	Proactive, consultative.	Participation in PIC meetings. Development of communications materials to raise awareness and readiness to act for identified partners, municipalities, provincial employees, stakeholders and public audiences based on message templates and messages developed by the committee. Dialogue amoung key players – fed./P/T.
To provide leadership on P/T plan and national/regional coordination.	To develop and maintain P/T Communications Plan. To ensure alignment of P/T plans with national plan. To ensure alignment with regional health authorities/local municipalities.	Direct, consultative.	Proactive.	Strike provincial communications subcommittee. Conduct formal research aligned with the PHAC Option: self-audit amongst subcommittee members of plan readiness. Workshops, meetings, tele-conferences, subcommittee.
To particiapte in communications planning for populations under provincial jurisdiction	To develop a communications plan for area of responsibility	Direct.	Define roles and responsibilities; develop communications plan. Develop and test messages appropriate to these specific populations.	Matrix, research, meetings.
To communicate with authorities to encourage them to develop their communications plans.	To support the provincial government's response to an influenza pandemic.	Direct.	Develop provincial roles and responsibilities matrix.	Internal provincial/territorial communications strategy to raise awareness of need for emergency planning. Briefings.

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To steward communications plans. To build relationships (federal, provincial, territorial) to enhance communications response.	To liaise with federal, provincial and territorial governments to provide coordinated communications response. To develop and maintain Communications Plan. To share information. To seek opportunities to work together.	Direct.	Proactive.	Matrix. Workplan. Message templates and draft messages. Ongoing meetings, workshops to ensure plan and matrix are up-to-date. Media Relations Plan, message development and testing. Research.
To establish and maintain networks with PT stakeholders & partners.	To communicate directly with Regional/Local Health Authorities. To make sure that the P/T plan is accessible and understood by stakeholders; partners' roles are clear; accountabilities are clear. To ensure health regions have communications plans. To assist with development and maintenance as required. To establish stakeholder networks and roles and responsibilities.	Direct.	Proactive.	Workshops for partners and stakeholders. Email, web messages and teleconferences to partners and stakeholders. Plan to ensure common approach to risk communication and alignment on what to do and how to do it. Protocols for information-sharing between organizations. Orientation and networking workshops. Media relations program. Share pandemic plans. Alignment of research. Consultations on role of stakeholders, matrix to define roles & responsibilities. Tools & information developed with provincial stakeholders and partners, including matrix, plans & message templates.
To share best practices and problem-solve.	To organize regular (at least annual) opportunities for sharing. To document outcomes to ensure continuous learning.		Networking workshops. Provincial communications subcommittee and PIC Communications Subcommittee.	Workshops, email.

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To source and share information.	To organize regular opportunities for sharing. To document outcomes to ensure continuous learning. To provide template materials that can be adapted to local needs. To ensure alignment with national plans. To establish primary provincial communications contact with federal communications. To provide national perspective back to province/territory. To provide provincial perspective/key messages to municipalities.	Direct.	Proactive. Communicate through PIC communications team & other networks.	Workshops, email, PSAs. Info packages out through schools, physicians, hospitals, etc. 1-800 numbers. Self-care info on websites. Organize regular opportunities for sharing.
To prepare media at provincial level for their information support role in a pandemic.	To ensure media is prepared and has adequate background information to provide necessary support in case of a pandemic.	Direct, consultative.	Proactive on some aspects, opportunistic on others.	Consult with key media (roles and responsibilities of media, key messages). Provide technical briefings for key national/provincial media. Proactive communications to media on pandemic preparedness. Technical briefings. Media backgrounder packages. Provide spokespersons to address media inquiries.
To ensure all residents have access to important background information on pandemic influenza.	To establish pre-tested background information on pandemic influenza.	Direct.	Proactive.	Post information on website.
To promote business continuity and community planning. To engage the public on pandemic influenza preparedness.	To inform different audiences about threat and implications, and provide information on what they need to do to prepare. To stimulate and support business leader continuity planning. To better understand public's views, help influencers understand challenges of pandemic influenza management.	Direct.	Proactive.	Stakeholder meetings. Document on community planning, tool kits, exercises and scenarios. Expert discussions, town hall meetings.
To liaise between federal and regional/local.	To ensure that regions have federal and P/T messages, information on actions taken.	Direct.	Proactive.	Regular updates (email, teleconference).

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To keep ministers and governments informed.	To keep policy decision-makers aware of public interests.	Direct.	Proactive.	Regular briefings, speaking engagements, media opportunities.
To ensure quality control throughout the P/T network.	To establish a comprehensive P/T monitoring system. To provide feedback into PIC Committee. To monitor, detect and correct.	Direct.	Proactive.	Media scans, detect-and-correct strategy, regular (daily) media scans. Daily feedback to spokes-persons. Conference calls/emails. Feedback to Committee as appropriate.

Citizen:	to inform citizens that organizations are mobilizing and that there is an elevated/increasing risk. Implementation of self-protective measures (if in Canada) so that they can develop a personal/family plan.
Stakeholders/partners:	to communicate elevated/increasing risk signaling the need to start mobilizing their organizational plans. Alignment of response and messages.
Organizational:	to demonstrate active leadership and alignment of risk minimization – morbidity, mortality and social disruption – and response activities (performance), while assuring readiness to act (in case of escalation). Alignment of response and messages.

Public Health Agency

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To alert provinces and territories of increased pandemic conditions so they can prepare to respond.	To inform provinces and territories of increased risk associated with current situation.	Direct.	Proactive.	Teleconference, email. Share communications products. Verify contact lists.
To provide national spokesperson.	To provide information on national and international situation. To provide guidance.	Direct.	Proactive.	Train key spokespersons.
To activate the communications plan for pandemic alert period.	To update and review communications plans and networks. To provide updates to key stakeholders. To inform the public.	Direct.	Proactive.	Preview and update plan as required. Inform media. Provide info to key national stakeholders (CMA and other health care provider groups). Provide statement to media from CPHO. Deliver media technical briefing. Launch website. Email message to key stakeholders, then statement to media. Share technical briefing materials with PIC Communications Subcommittee prior to technical briefing. Ensure web is updated frequently. Update toll-free line. Verify translation capacity.

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To broaden and intensify communications with ministers and MPs.	To ensure ministers across the government are briefed on the increased risk and the relevance for their departments. To ensure that MPs have accurate and consistent information to provide to their constituents.	Direct.	Proactive.	Update federal ministers. Brief provincial ministers on PHAC activities to facilitate coordinated messaging. Provide briefing updates, media lines through the PIC Communications Subcommittee to be adapted as background for P/T ministers.
To share technical and scientific information.	To lead technical communications about the virus strain and the vaccine strategy. To interpret scientific, laboratory, statistical details.	Direct.	Proactive.	Update communications products: speaking points, factsheets, etc., regularly to reflect changes in scientific data. Deliver technical briefings, news conferences.
To keep key national stakeholders informed (particularly health care provider organizations).	To ensure that key national stakeholders have accurate information to provide to their audiences/media.	Direct.	Proactive.	Inform key stakeholder groups of the current situation. Provide regular updates to key stakeholders to be shared with their specific audiences. Involve key stakeholders in discussions around communications with their stakeholders and audiences, and assessment of the effectiveness of that communication. Reinforce relationships developed through the planning process. Update stakeholder lists/database. Provide email/fax/phone updates. Post brief articles on stakeholder internal websites, or email to subscribers, etc.

Health Canada

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To communicate elevated risk levels to First Nations and Inuit, in partnership with provinces, territories and partners (see Plan, Appendix B).	To ensure consistent messaging from all levels of government to First Nations and Inuit. To ensure federal messages regarding First Nations are communicated clearly to all partner agencies and stakeholders.	Direct, consultative, collaborative.	Work with communications to tailor messages.	Co-ordinate messages with Public Health Agency, provinces and territories. Share consistent and appropriate information with stakeholders and spokespersons. Develop additional communications material to complement provincial /territorial material. Update Web site. Inclusion of FN&I indicators in ongoing surveillance activities.
To communicate elevation of emergency response capacity.	To engage those involved in the emergency response communications team.	Direct and consultative.	Proactive.	Identify surge capacity team, if required. Distribute email message widely to those involved in emergency response process (PIC Communications Subcommittee, key national stakeholders involved in response).
To assess ongoing effectiveness of communications activities.	To monitor and analyze media coverage. To track and monitor effectiveness of communications and public needs (POR, 1-800, web, public enquiries).	NA	Proactive.	Share media coverage analysis summary with P/Ts. Regular media scans. Daily feedback to spokespersons. Media analysis to determine need for additional technical briefings, other forms of media relations. Detect, correct, align. Utilize analysis to determine information gaps and effectiveness of current communications methods and messages (POR, review of correspondence, summary of questions to web, 1-800, etc.).

Provinces/Territories

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To communicate the elevation of pandemic risk to regional/local partners.	To inform regional/local partners of increased risk associated with current situation.	Direct.	Proactive.	Government email, intranet. Distribute message widely to those involved in emergency response process.
To activate the Communications Annex of the provincial plan. To encourage coordination.	To update and review communications plans and networks. Through pre-developed communications networks, to encourage coordinated health region/district plan activation. To provide updates to key stakeholders. To inform the public.	Direct.	Proactive.	Review and update as required throughout this phase. Inform key provincial stakeholders (prior to media). Provide info to key provincial stakeholders. Conduct media technical briefings. Update website frequently. Email message to key stakeholders, then statement to media. Share technical briefing materials with health region/authorities. Provide an interactive website for stakeholders.
To coordinate with other departments on the provincial/territorial communications response to a pandemic.	To ensure a coordinated communications response for the entire government. To identify Government spokespersons and their areas of expertise.	Direct and consultative.	Proactive.	Matrix, meetings, workshops. Key spokespersons coached to communicate technical messages to the public. Risk communications training. Key experts list established/shared with media.
To alert municipalities of increased pandemic conditions so they can prepare to respond.	To inform municipalities of increased risk associated with current situation.	Direct.	Proactive.	Teleconference, email. Share communications products. Verify contact lists.
To identify media spokespersons/experts.	To coach key spokes-persons to effectively communicate technical messages to the public. To provide information on provincial situation	Direct.	Proactive.	Provide media and risk communications skills training sessions and/or mock interviews for spokespersons and key experts.
To assess effectiveness of communications activities.	To monitor and analyze media coverage. To set standards, guidelines and criteria for analyzing communications activities.	Indirect.	Proactive.	Utilize media analysis to determine whether further technical briefings or other forms of media relations are necessary.

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To broaden and intensify communications with ministers. To inform key provincial stakeholders.	To ensure regular briefing updates for Premier's Office and minister(s). To ensure that caucus offices (MLAs) have accurate information to provide to their constituents. To ensure that key provincial stakeholders have accurate information to provide to their audiences/media.	Direct.	Proactive.	Use briefing updates, media lines provided through the PIC Communications Subcommittee as background for P/T ministers. Combine federal updates with provincial/territorial information to provide a complete picture for ministers. Updated stakeholder lists/ database. Email/fax/phone updates. Brief articles to be posted on stakeholder internal websites or emailed to membership, etc. Meetings/conference calls to determine information gaps, next steps.
To share technical and scientific information with health regions/authorities. To encourage coordination of provincial/health region or authority/key stakeholder plan activation.	To provide technical communications about the virus strain and the vaccine strategy received from PHAC to health regions/authorities. To provide the public with consistent and accurate messaging.	Link from provincial website to technical details on PHAC/ national pandemic site. Direct.	Proactive.	Technical briefings, news conferences (daily briefings as required). Web. In-depth interviews by experts with provincial health reporters or radio news magazines. Update communications products: speaking points, fact sheets, etc., regularly to reflect changes in scientific data. Discussions through pre-developed communications networks. Regular meetings/networked conference calls to discuss next steps in plan roll-out.
To design and test public education campaign.	To prepare a public education campaign that resonates with provincial residents.	Direct.	Proactive.	Research, focus groups, one-on-one interviews.

Citizen:	to promote implementation of family/personal plans and encourage people to seek and follow direction from authorities.
Stakeholders/partners:	to mobilize their plan fully and to follow direction from authorities. Alignment of response and messages.
Organizational:	to demonstrate ongoing and effective management. Alignment of response and messages.

Public Health Agency

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To implement Pandemic Phase of National Plan.	To review and update communications plan and make sure it is actionable. To update key stakeholders. To inform the public.	Direct.	Proactive.	Teleconference, emails, web updates, sharing of communications materials.
To inform other government departments of global pandemic activity. To inform other government departments of the health portfolio response.	To provide updates on global pandemic situation. To coordinate HC/PHAC response with OGDs.	Direct, consultative.	Proactive.	Tleconference, emails, web updates.
To inform NGOs of global pandemic activity and health portfolio response.	To provide updates on global pandemic situation. To coordinate health portfolio response with NGOs.	Direct.	Consultative.	Teleconferences, email, sharing of communications products.
To inform provinces and territories of global and Canadian pandemic activity. To inform provinces and territories of health portfolio response.	To provide updates on situation. To coordinate health portfolio response with provinces and territories.	Direct.	Consultative.	Teleconferences, email, sharing of communications products.
To inform ministers and MPs of health portfolio response.	To provide updates on current activities.	Direct.	Proactive.	Briefing materials, media lines, Qs and As.
To fully implement very high profile nationwide public education/ awareness campaign.	To inform public and stakeholders of actions needed to protect themselves.	Direct.	Proactive.	Print ads, national radio ads, national television ads, outlining what to do/what not to do/where to get vaccine, web ads.

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To ensure consistency in messaging with provinces, international community and stakeholders.	To explain, clarify and demystify the crisis. To inform people of self-care steps, progress of pandemic situation (anti-viral/vaccine, etc), and steps taken by the federal government and its stakeholders to provide necessary services to maintain population health/social stability. To keep stakeholders/ partners up-to-date with the latest information, and aware of their roles/ responsibilities.	Direct.	Proactive.	Frequent updating of PHAC website – public and provider pages (fact sheets, Qs and As etc.; educational videos on hand washing.) Relevant links to other sites. Operationalize call center and publicize toll-free numbers where public and providers can call for information or assistance.

Health Canada

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To inform First Nations communities of pandemic activity within Canada and actions needed to protect themselves.	To coordinate response with the Public Health Agency, provinces, territories and First Nations communities.	Direct, collaborative and through First Nations and Inuit Health Branch regions.	Proactive	More intensive communications with partners and stakeholders. Increased co-ordination on public information campaigns with Public Health Agency and partners. Distribution of materials through stakeholders and partners.
Authorizing the sale of drugs and vaccines for flu and flu related illnesses, monitoring their safety, and reporting the appropriate information to the public and stakeholders.	To inform health professionals and general public of the authorization of	Direct	Proactive	The use of Notices to Hospitals, Dear Healthcare Professional Letters and Public Advisories and Warnings as well as other communications vehicles.

Provinces/Territories

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To implement pandemic phase of provincial/ territorial plan.	To mobilize provincial spokespersons (preferably media trained). To ensure they have appropriate training and skills.	Direct.	Proactive.	Daily news conferences. Make technical experts available for media technical interviews/ briefings, local media events, etc.
To ensure timely four-way communications sharing with fed. gov. and agencies, municipalities, stakeholders and providers.	To present a united front with international, federal, municipal and health care partners. To provide updates on situation.	Direct.	Proactive.	Teleconferences, email, sharing of communications products. Joint news conferences with local municipalities, fed. gov. and agencies. Compassionate, caring, empathetic, hard-hitting and forthright communications.
To fully implement very high profile province-wide public education/awareness campaign, aligned with national campaign.	To inform public and stakeholders of actions needed to protect themselves.	Direct.	Proactive.	P/Ts to consider use of: › print ads › local radio ads › television ads outlining what to do/what not to do/where to get vaccine › web ads.
To inform ministers and MPPs of health portfolio response.	To provide updates on current activities.	Direct.	Proactive.	Briefing materials, media lines, Qs and As.
To ensure consistency in messaging with other provinces (use fed. gov. as point of contact), international community and local bodies.	To explain, clarify and demystify the crisis. To keep people informed of self-care steps, the progress of pandemic situation (anti-viral/vaccine, etc), and the steps taken by the provincial government/stakeholders to provide necessary services to maintain population health/social stability. To keep stakeholders/partners up-to-date with the latest information, and aware of their roles/responsibilities.		Mobilize press relations centre. P/T websites.	Frequent updating of ministry website – public and provider pages (fact sheets, Qs and As etc., educational videos on hand washing). Establish relevant links to other sites. Operationalize call center and publicize toll-free numbers where public and providers can call for information or assistance.

Primary Communications Roles	Primary Communications Responsibilities	Communications Options	Communications Strategies	Methods and Tools
To ensure consistency (continued).	To ensure the media has up-to-date information. To demonstrate transparency and accessibility. To select appropriate (trained) spokespersons.	Direct.	Proactive.	Information specific to health and social services workers via websites, intranets, extranets and special bulletins/newsletters. Press releases and press conferences (regular or ad hoc), according to the severity of the pandemic. Translation of public information tools. Choice of spokespersons based on situation severity (from communications advisor to CMOH/CPHO or minister). Fast activation of a telephone line to answer questions from the public and provide reassurance. Leaflets and posters widely distributed. Print and electronic media, through media placements and via public relations (bookings on information programs). Church bulletins. National media. Community television and print media. Mobilize network of those relaying information – as defined in previous phase – through a variety of media identified in the previous phase.
		Public and commercial radio stations as well as community radio stations to transmit messages to specific audiences (regions most affected by the pandemic, etc.). Where applicable, broadcast information on radio networks specializing in health. Amateur radio broadcasters (members can relay information).		Briefing sessions to disseminate specific information. Pre-recorded health advice (what to do) on telephone lines (while callers are on hold) of establishments in the health and social services network.

Annex L

Federal Emergency Preparedness and Response System

Date of Latest Version: **October 2006**

Summary of Significant Changes:

- *Reflects the establishment of the new department Public Safety and Emergency Preparedness Canada and the creation of the new Public Health Agency of Canada.*
- *Specific references to the new National Emergency Response System and the Federal Emergency Response Plan.*

L Federal Emergency Preparedness and Response System

Table of Contents

1. The Federal System

Traditionally, and in accordance with "A Federal Policy for Emergencies," the responsibility to deal with emergencies is placed first on the individual and then on successive levels of government, as the resources and expertise of each are needed. This recognizes that when an emergency occurs people normally see to their own safety to the extent possible, and then they seek assistance from local and provincial or territorial governments if necessary. Those governments in turn seek federal support if an emergency moves beyond their capabilities. This assistance may entail the coordination of supplies and services for response and recovery activities, the deployment of the Canadian Forces to aid civil authorities or the allocation of financial assistance to the provinces and territories (P/Ts).

The Government of Canada also works with local or regional authorities and coordinates the national response when the impacts of an emergency are mainly in areas that are clearly under federal jurisdiction, or when an event is clearly of national interest and interjurisdictional and/or international in nature.

At the federal level, the *Emergency Preparedness Act* establishes the inherent responsibility of each federal minister to develop and implement emergency preparedness measures. This is the basis for the Government of Canada's emergency preparedness and management activities that have resulted in federal departments developing various response plans, such as the National Counter-Terrorism Plan, the Federal Nuclear Emergency Plan, the Canadian Pandemic Influenza Plan and a number of other similar plans.

Each of the P/Ts has its own emergency preparedness legislation that deals comprehensively with emergency management issues within their boundaries.

Based on recent emergencies, including SARS, the terrorist attacks of September 11, 2001, and the 1998 ice storm, the Canadian emergency management community has realized the importance of a "whole of government" response framework. Events in recent years have challenged governments at all levels and the private sector, stretching their abilities to cope with emergencies. These events have been studied extensively to determine the "lessons learned" and propose remedial action. Within this context, Canada has taken a number of initiatives, including the creation of a new department, the Public Safety and Emergency Preparedness Canada (PSEPC), the creation of a new agency, the Public Health Agency of Canada (PHAC), the development of a National Security Policy, and is currently developing a National Emergency Response System (NERS) to better meet the range of events faced by Canadians.

The Public Health Agency of Canada was created in response to growing concerns about the capacity of Canada's public health system to anticipate and respond quickly and effectively to public health threats. The Agency will provide a clear focal point for federal leadership and accountability in managing public health emergencies and improved collaboration within and among jurisdictions.

The National Security Policy recognizes that addressing many threats and emergencies requires a coordinated approach with provinces, territories, non-governmental organizations (NGOs), the private sector and international partners. The policy sets out processes for engaging these partners in the development of coordinated plans to support the overall framework.

Public Safety and Emergency Preparedness Canada is developing the NERS so that Canada is prepared and able to respond to all emerging, imminent or occurring national emergencies and threats in order to ensure the protection and safety of Canadians. As different threats and emergencies arise, either as the result of natural or deliberately caused events or disasters, the NERS is designed to coordinate federal actions and provide an integrated and complementary national response.

Emergencies that are large and/or complex or that transcend provincial or international boundaries, such as a pandemic influenza, call for shared responsibilities. They also highlight the need for different or increased capacities and collaboration on all components of emergency management: mitigation, preparedness, response and recovery.

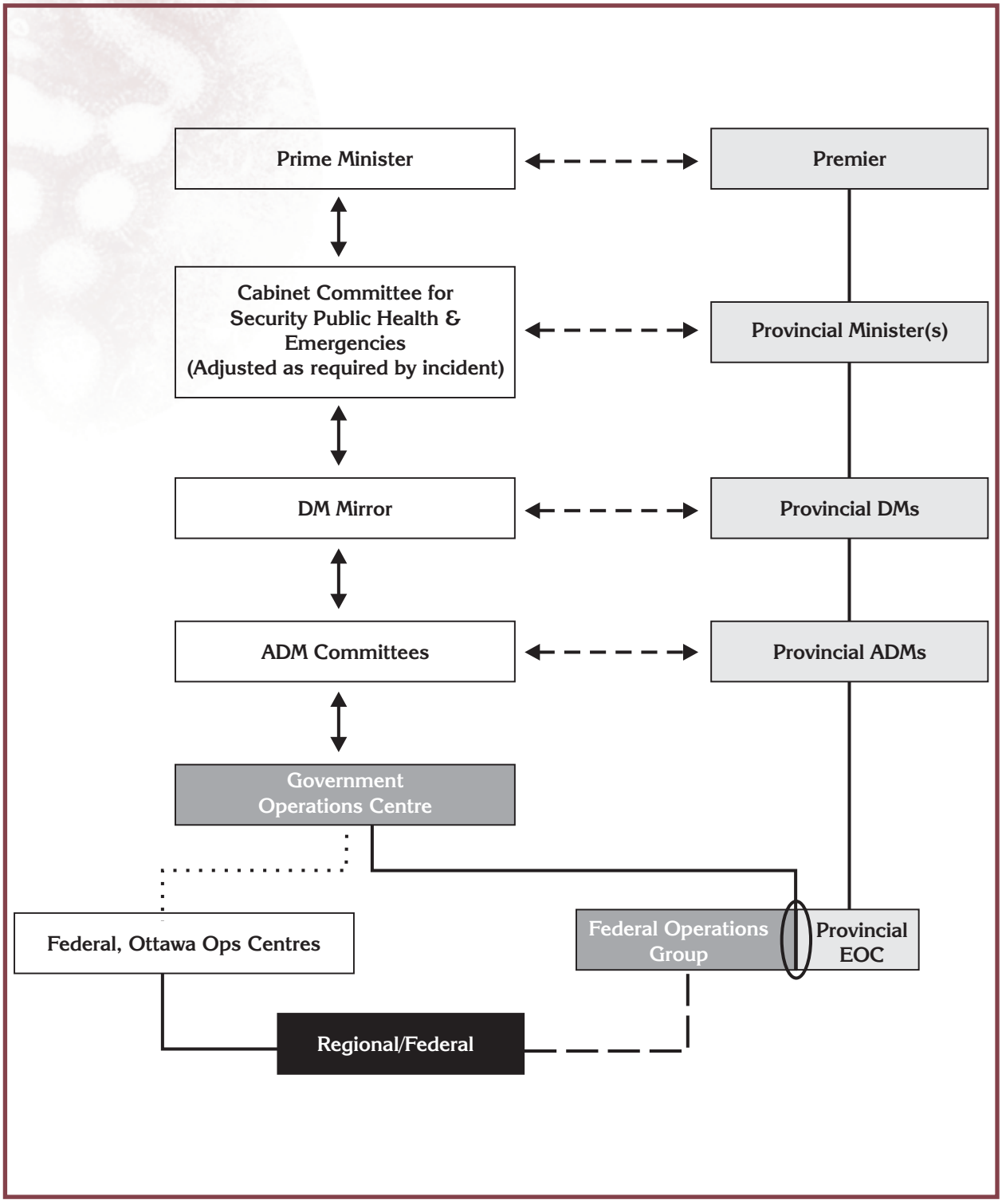
At the federal level, the health response to a pandemic will be mainly the responsibility of PHAC as the lead federal department with the division of provincial and territorial responsibilities as outlined in the current Canadian Pandemic Influenza Plan. An event, such as pandemic influenza, will require a response that goes far beyond the health sector. The government of Canada has created a Deputy Ministers Committee on Pandemic Influenza Planning to examine what is being done in terms of planning for a potential influenza pandemic. The Deputy Minister of Public Safety and Emergency Preparedness Canada co-chairs this committee with Canada's Chief Public Health Officer. The Committee provides direction to six working groups, ensuring that all key issues and gaps are identified and addressed. The six working groups will look at International issues, Federal Business Continuity and Human Resources Public Health and Emergency management, Communications, Economic and Social Impacts, and the Private Sector.

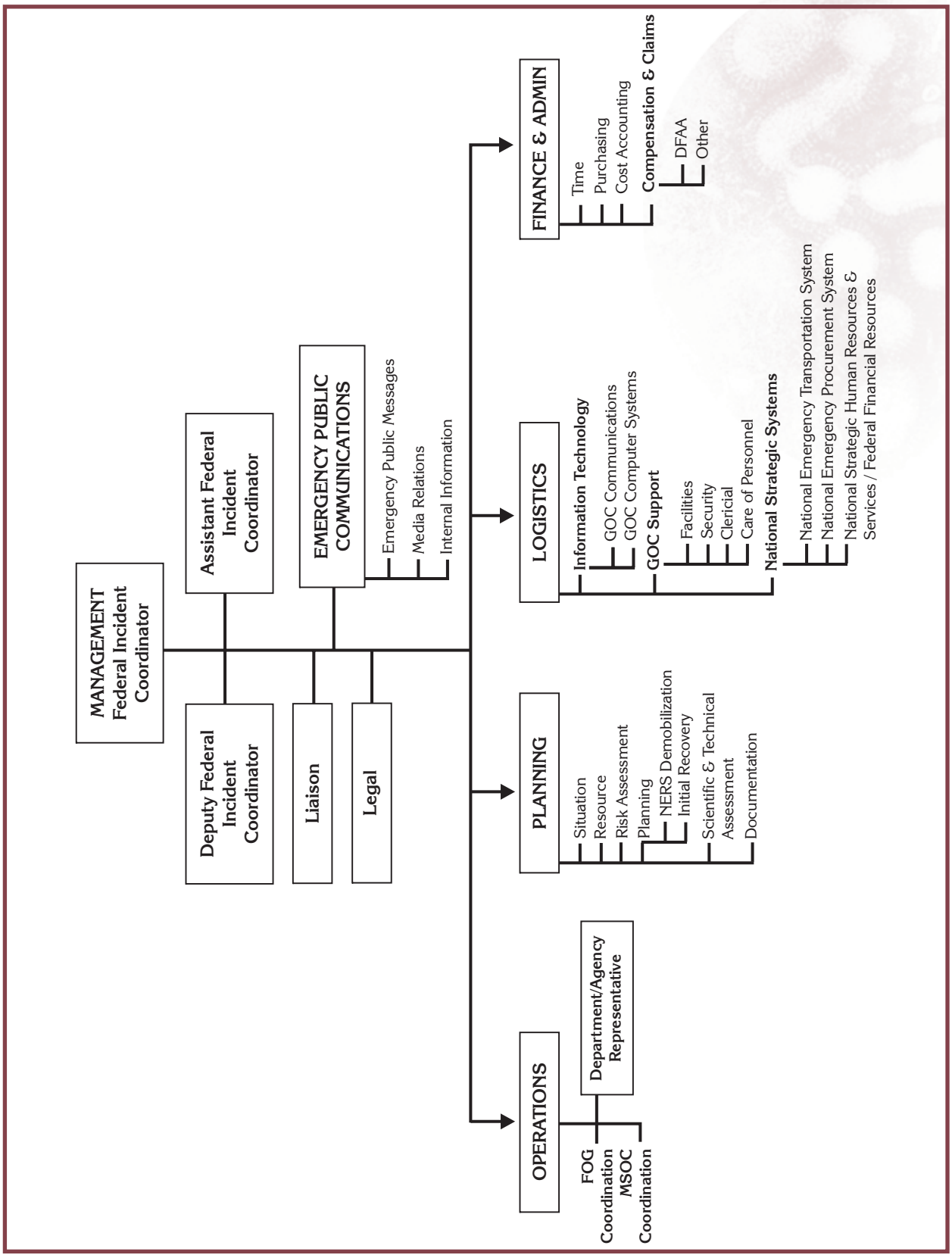
However, the NERS will coordinate the broader federal response. Indeed, the aim of the NERS is to ensure the strategic coordination of federal mandates in a Government of Canada emergency response, concurrent to P/T activities. The NERS is based on the Incident Command System and in an emergency the coordination of federal mandates will be achieved through the Government Operations Centre (GOC). Leading the GOC will be a Federal Coordinating Officer, who will be provided by PSEPC, but there will also be a Deputy Federal Coordinating Officer, who will be provided by PHAC.

At the regional level, a Federal Coordination Group (FCG), acting as an extension of the GOC, will facilitate the regional interdepartmental emergency operational level coordination. The role of the FCG includes the coordination of regional federal resources and emergency response activities, and the coordination between the provincial response centre and the GOC.

These new agencies and systems will help ensure that federal leadership is exercised by making quick decisions, coordinating activities and resources at a strategic level, and communicating effectively with other federal entities, P/Ts, international organizations, NGOs, the private sector and the general public. All this must be accomplished while respecting P/T jurisdictions. From a national perspective, ensuring that authorities at all levels have a complementary framework for dealing with emergencies is a key preparedness objective. This is pivotal to public confidence and international credibility.

National Response Structure
National Emergency Response System (NERS)
Strategic and Federal, Provincial and Territorial Interface




MANAGEMENT
Federal Incident Coordinator
Assistant Federal Incident Coordinator
Deputy Federal Incident Coordinator
Liaison
Legal
EMERGENCY PUBLIC COMMUNICATIONS
Emergency Public Messages
Media Relations
Internal Information
OPERATIONS
FOG Coordination
MSOC Coordination
Department/Agency Representative
PLANNING
Situation
Resource
Risk Assessment
Planning
NERS Demobilization
Initial Recovery
Scientific & Technical Assessment
Documentation
LOGISTICS
Information Technology
GOC Communications
GOC Computer Systems
GOC Support
Facilities
Security
Clerical
Care of Personnel
National Strategic Systems
National Emergency Transportation System
National Emergency Procurement System
National Strategic Human Resources & Services / Federal Financial Resources
FINANCE & ADMIN
Time
Purchasing
Cost Accounting
Compensation & Claims
DFAA
Other

2. Public Health Agency of Canada and Health Canada Emergency Response Plan

The *Emergency Preparedness Act*, 1988, requires all federal ministers to ensure that their departments, agencies or Crown Corporations have emergency preparedness plans to deal with civil emergencies related to their areas of accountability. For the federal health portfolio, the Minister of health is primarily accountable for developing and maintaining civil emergency plans for:

- public health protection, emergency health services and the well-being of Canadians; and
- coordination of the federal preparedness and response to nuclear emergencies not involving the hostile use of nuclear weapons in a declared war.[1]

The Public Health Agency of Canada and Health Canada's Emergency Response Plan (PHAC/HC ERP) identifies the federal health portfolio's functions as either the lead or support role in responding to emergencies, including its role in providing medical, scientific, technical advice, assistance, materiel, advisories, and alerts and warnings to the Canadian public. The Public Health Agency of Canada, Health Canada and the ERP are key elements in federal health portfolio's overall emergency preparedness program.

The Centre for Emergency Preparedness and Response will support organizational units[2] in the development of its plans to address emergencies that fall within its program areas. The PHAC/HC ERP is a key element in the hierarchy of planning and response documents that includes the HC's Emergency Preparedness Policy, and individual organizational unit policies and plans. It represents a step in the development and articulation of the larger process and structure to manage PHAC's and HC's responses to a range of emergencies that could impact on the health and social well-being of Canadians.

The PHAC/HC ERP is an "all-hazards" plan that defines the scope and framework within which the PHAC and HC operate to ensure an appropriate response to any emergency. It also provides connecting arrangements to hazard-specific plans and procedural guidelines for emergency staff. This ERP addresses the scope and nature of relationships at all levels within the federal health portfolio and provides a framework to develop individual plans to address specific issues.

[1] Federal Nuclear Emergency Response Plan

[2] The term "organizational unit" will be used throughout this document to refer to centres, directorates, branches, programs and other equivalent organizations led by a manager at the Director General level.

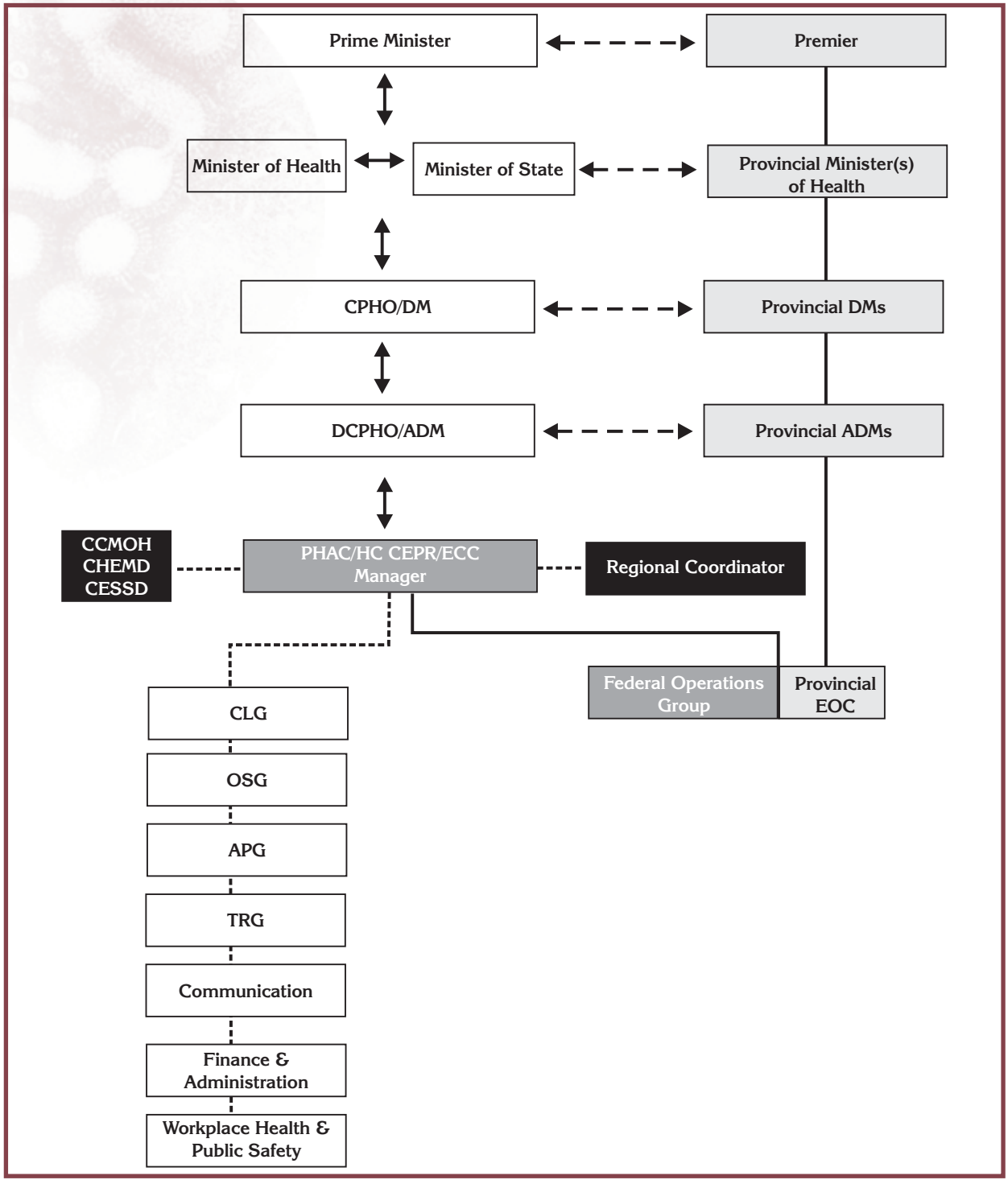
3. The Centre for Emergency Preparedness and Response

The Centre for Emergency Preparedness and Response (CEPR) has unique agency and departmental responsibilities in the areas of emergency preparedness and response, and it acts as PHAC's and HC's "single window" for "all hazards" preparedness and response operations. However, this does not circumvent organizational units from making their branch specific all-hazards preparedness, planning and training, and response operations. The CEPR staff is specifically responsible for interorganization coordination during agency and departmental response operations.

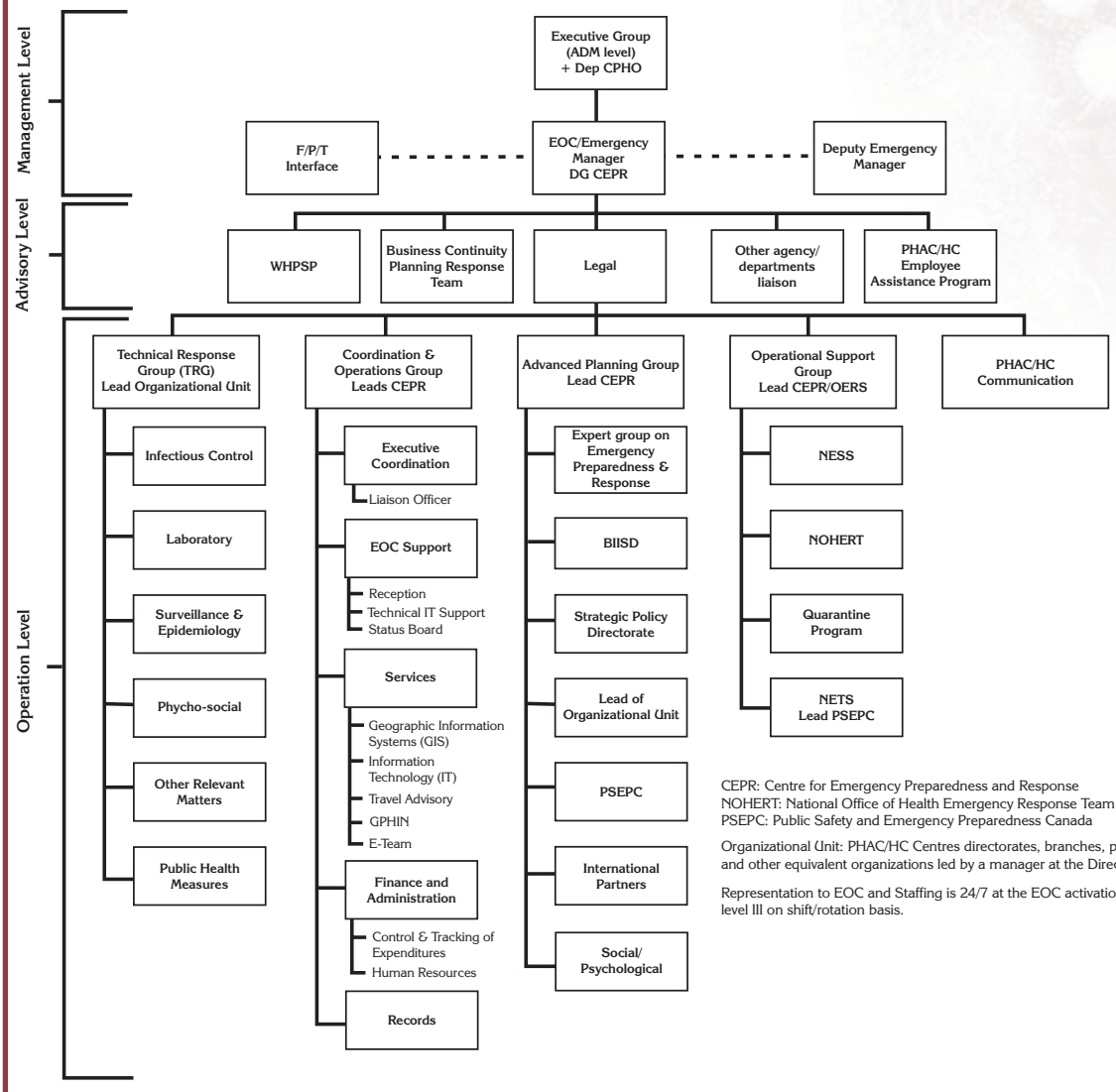
The Director General of CEPR acts as the Emergency Manager, and CEPR provides key staff to the response effort. During responses, the Emergency Manager reports to the Deputy Chief Public Health Officer and the Associate Deputy Minister (ADM) of HC through appropriate channels.

The CEPR manages and maintains the health portfolio's Emergency Operation Centre (EOC), the major infrastructure resource in support of response activities. The CEPR is also responsible for control and maintenance of the National Emergency Stockpile System (NESS). This reserve of medical resources such as hospital equipment and pharmaceuticals could be critically important in a major response effort.

Public Health Agency of Canada, Health Canada, and Federal, Provincial and Territorial Interface



Public Health Agency of Canada and Health Canada
Pandemic Influenza Emergency Response Structure

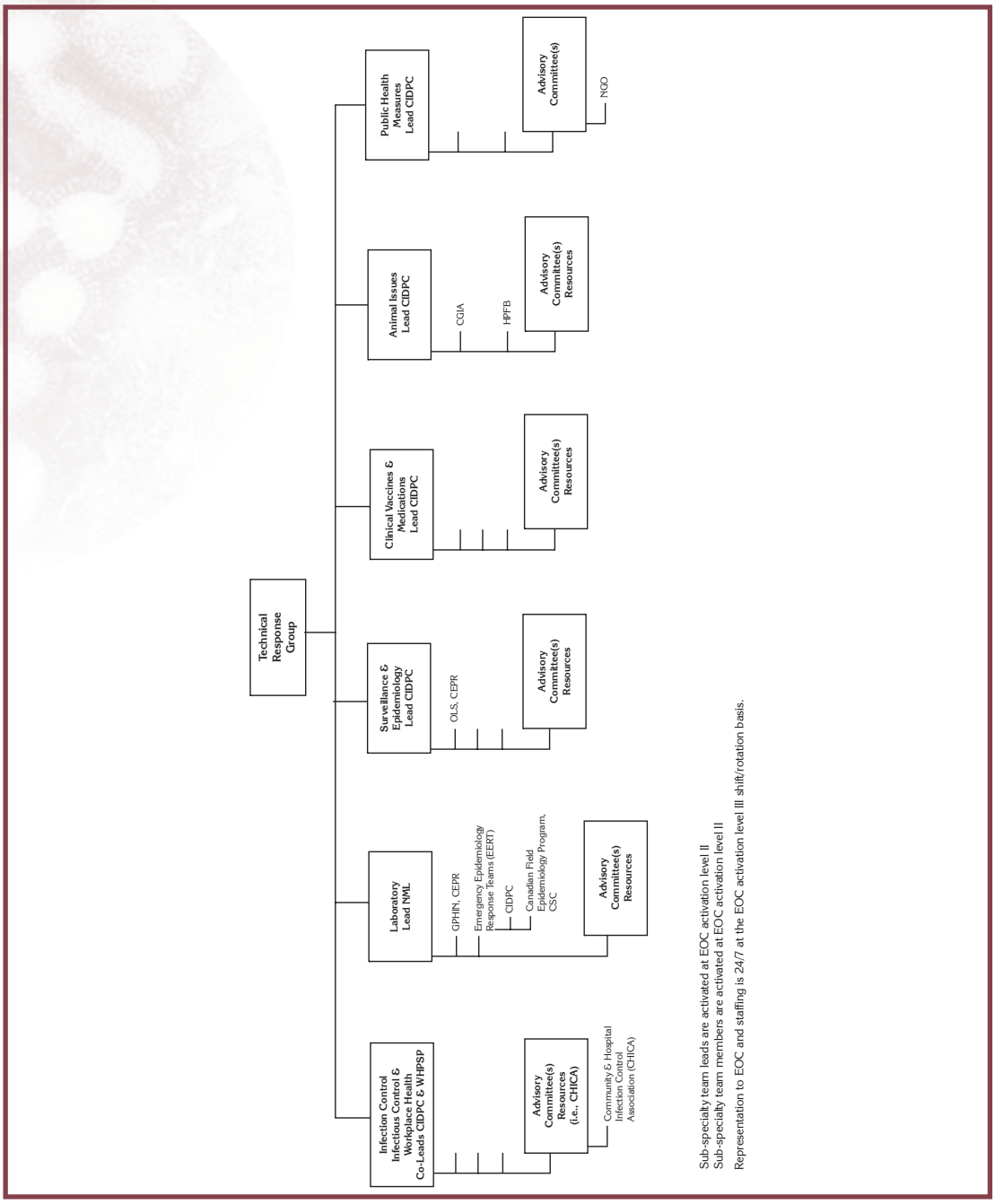


CEPR: Centre for Emergency Preparedness and Response
NOHERT: National Office of Health Emergency Response Team
PSEPC: Public Safety and Emergency Preparedness Canada

Organizational Unit: PHAC/HC Centres directorates, branches, programs and other equivalent organizations led by a manager at the Director General level.

Representation to EOC and Staffing is 24/7 at the EOC activation level III on shift/rotation basis.

Technical Response Group Structure:



For further information on PHAC/HC Emergency Response Plan please contact:

Director
Office of Emergency Preparedness, Planning and Training
Centre for Emergency Preparedness and Response
Public Health Agency of Canada
Ottawa, ON K1A 0K9

Annex M

Public Health Measures

Date of Latest Version: *October 2006*

Note:

- *This is a new annex being released with the 2006 version of the Canadian Pandemic Influenza Plan.*

Table of Contents

1.0 Introduction

As an influenza pandemic evolves, the role of public health and consequently the public health measures put in place will shift as priorities and strategies change. The overall goals of influenza 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.**

The strategies used to reach this goal will vary according to the phase of the pandemic, the availability of resources (e.g. human, vaccine, antivirals) and the epidemiology of the pandemic. Given the many possible combinations of these variables, this document endeavours to provide overall guidance. It is expected that the provided recommendations will be considered and modified as necessary when responding to a specific pandemic or pandemic threat.

Unlike other aspects of this illness (e.g. virologic characteristics), public health measures directed toward community disease control have not been well studied or reported in the scientific literature. Therefore in developing this document, the Public Health Measures Working Group of the Pandemic Influenza Committee (the Working Group) has relied mainly on expert consultation to form the recommendations. The conclusions of this group were compared with the results of an international consultation on public health measures at a March 2004 World Health Organization (WHO) meeting[1] and were found to be consistent. The report from the WHO consultation meeting was also used as a source of additional details that are included in this document, specifically under section 9, Travel and Border-Related Issues, in this annex.

In the absence of scientific efficacy data for many of the potential public health measures, the Working Group presents these recommendations to help facilitate a common approach to community disease control. This will reduce the need to explain and justify divergent approaches at the time of a pandemic and may also optimize public confidence at a time of much uncertainty. Many of the recommendations are contingent upon local triggers; therefore, the timing of their implementation will not necessarily be simultaneous across the country, but ideally the types of measures and public health messages will be consistent. In general, there is global agreement that, when cases infected with a novel virus first appear, aggressive measures will be valuable in delaying the impact or possibly containing an evolving pandemic.

During an influenza pandemic, public health authorities will be involved in a broad range of activities, including but not limited to surveillance, case and contact management, public education, coordination and delivery of vaccine programs, implementation of community disease control strategies, and potentially the organization of a treatment-focused antiviral strategy, and the establishment and administration of non-traditional health care sites. Because surveillance issues, vaccine program considerations and the public health role in non-traditional sites have been addressed in other sections of the Canadian Pandemic Influenza Plan (the Plan) (available at: http://www.phac-aspc.gc.ca/cpip-pclcpi/index.html), this document will focus on the other previously identified public health activities.

2.0 Principles and Assumptions

The recommendations included in this document are predicated on the following principles and assumptions:

- The incubation period, period of communicability and method of transmission for the novel strain will be consistent with other known influenza strains, that is:
  - Incubation period: 1 to 3 days;
  - Period of communicability: 24 hours before to up to 5 days after onset of illness (usually up to 3 to 5 days in immunocompetent adults, up to 7 days in young children);
  - Method of transmission: large droplet and contact (direct and indirect);
  - Possibility of transmission by the airborne route is uncertain[1]; and
  - Transmission while asymptomatic is possible but it is more efficient when symptoms, such as coughing, are present and viral shedding is high (i.e. early in symptomatic period).
- The novel virus will be highly infectious (i.e. transmitted efficiently from person to person).
- The initial clinical presentation will be consistent with known influenza strains.
- Sub-clinical infection will occur.[2]
- It is unlikely that an effective vaccine will be available at the start of pandemic influenza activity in Canada but it may be available for a second wave.
- Public health authorities will play a major role in the distribution and administration of vaccine.
- Mass immunization campaigns will occur when sufficient quantities of the new vaccine are available; this will increase the demand for public health human resources.
- The use of antivirals to decrease the risk of transmission from the first cases infected with a novel virus and their contacts will be considered as a strategy to contain or slow the spread of novel viruses that have pandemic potential and that are identified in Canada. The use of this strategy will be limited to cases identified early in the Pandemic Alert Period[3] in Canada. During the Pandemic Period, this strategy will change to the nationally agreed upon antiviral strategy for the Pandemic Period.
- In the absence of data on duration of shedding and the effect of neuraminidase inhibitors on viral load and shedding of the novel virus, the objective of treatment with antivirals is to improve clinical outcome, which is assumed to correlate with decreased communicability.

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1 An outbreak of influenza on an airliner has been attributed to airborne spread; however, large-droplet spread could have been responsible because the passengers were crowded together and moved about for several hours in a small, grounded airplane. Although experimental airborne transmission of influenza A virus to mice has been reported, there is no evidence of such transmission in humans.

2 In a recent British study, 59% of health care workers with serologic evidence of recent influenza infection could not recall having influenza; this suggests that many experienced sub-clinical cases.(2)

3 The role of antivirals during the Interpandemic Phase has been addressed elsewhere with respect to the response to an outbreak of avian influenza in Canada.(3)

- Individuals who recover from illness caused by the pandemic strain will be immune to further infection by that strain.
- The novel influenza strain and first human cases will be identified outside of Canada.
- Surveillance measures are in place to detect influenza-like illness (ILI) across Canada.
- The pandemic strain may cause more than one wave of illness.[4]
- The public will be interested in all methods of personal protection against infection.
- Public acceptance of restrictive control measures will positively correlate with the proximity of cases.
- It may be possible to delay introduction of pandemic influenza into isolated communities; however, it is not likely that this strategy could be sustained especially if the virus has acquired the ability to spread efficiently from human to human.
- The latest WHO and Canadian pandemic phase terminology will be used in planning and response.

During the Pandemic Alert Period there is an expectation that measures will be taken to contain the novel virus at source. During the Pandemic Period the goal has a mitigation focus, that is, to minimize morbidity, mortality and societal disruption. Therefore the recommended actions in this annex differ for these two distinct periods. An example of this is the recommendations for antiviral use for contacts of cases. The containment strategy requires further discussion at the national level, however in the meantime the recommended measures are expected to be applicable should containment be necessary.

3.0 Public Education

Public education is a key activity for public health authorities during all the pandemic phases. During the Interpandemic Period (Phase 1 and Phase 2), most influenza-related educational initiatives will likely focus on general facts about influenza, the influenza vaccine and trends during the current and recent seasons. However, this period is also the optimal time to prepare educational initiatives and introduce concepts (e.g. need to modify recommendations as the pandemic evolves) that will be necessary during a pandemic.

3.1 Recommendations

- Prepare educational materials for the general public during the Interpandemic Period; these can be used in and/or modified for each phase of the pandemic threat. Focus on risks and risk avoidance, universal hygiene behaviours (including "respiratory hygiene") and information that will be needed to reduce transmission of illness (including how to seek medical attention in a way that minimizes exposure opportunities), and prepare the general public for the next phase.

[4] The WHO has noted that in the past "more severe disease has tended to arrive with the second wave." [(4)] This observation has not affected the recommendations in this document but it is an important consideration for planning purposes.

- Review and update educational materials for health professionals. Reinforce existing recommendations for management of patients that present with febrile respiratory illness including the provision of masks for coughing patients.
- Anticipate special educational and resource needs, for example, translation requirements and targeted packages for more specific groups (e.g. physician offices, school boards, daycare operators, other business owners, travellers, etc.)
  - During the Interpandemic Period, consider speaking to business owners to encourage business continuity planning that is appropriate for the unique challenges that would be presented by an influenza pandemic.
  - Similarly, school boards should be encouraged to strategize with regard to continuation of education (e.g. Internet or other ways for students to receive and submit assignments) in the event that school facilities are closed.
- Ensure appropriate linkages are in place with communications staff within the public health organization and determine roles, responsibilities and information flow in the event of a pandemic. Together with communications staff:
  - Have a toll-free telephone information line established or ready to be rapidly implemented, with prepared transcripts for phone-line staff.
  - Consider components of the information dissemination process, including Web-based postings as well as print materials.
- Develop templates for specific purposes, such as consent for immunization, and public education about indications for the access to antiviral treatment.
- Ensure ongoing training of staff within the public health authority to ensure that expertise is not lost because of staff turnover.

3.2 Goals and Anticipated Outcomes

- Minimize the time needed to disseminate educational materials to the public during an alert and as the pandemic evolves and information needs change.
- Increase baseline public knowledge (i.e. before an alert is issued) by providing information on pandemic influenza during the Interpandemic Period.
- Establish the public health authority as an accurate, reliable and trusted source of information on pandemic influenza through a well-coordinated and prepared education and communication plans.

3.3 Rationale

An influenza pandemic is a global health emergency and therefore public demand for information will be extremely high and sustained as the illness spreads from remote areas and/or countries to Canada and into local communities. Unlike the severe acute respiratory syndrome (SARS) experience where the epidemiology of the disease and the causal organism was initially unknown, a significant amount of information on influenza is available and this can guide the development of generic fact sheets and specific templates for later use.

Before a pandemic vaccine is available, the mitigation of the potential effects of a pandemic will be largely contingent upon the actions of a public that receives, trusts and acts upon timely public education messages. Public health authorities at all levels of government will need to facilitate this process as much as possible.

In March 2004, WHO hosted an international consultation on priority public health interventions before and during an influenza pandemic. The consultation report concluded, "health authorities will need to make a series of emergency decisions in an atmosphere of considerable scientific uncertainty and fragile public confidence. Prior guidance on which interventions are most likely to be effective and feasible at different phases is therefore greatly needed as part of preparedness planning."[1]

3.4 Feasibility and Requirements

Most public health authorities already see public education on these types of health issues as one of their key responsibilities. The contacts established by other public health programs that target schools, large business owners, governments and municipalities could facilitate the implementation of the above recommendations—in particular, presentations on pandemic preparedness that would be specifically aimed toward these groups. Because it is not known when a novel virus will emerge and cause a pandemic, it is important that several trained staff remain familiar with this issue and can be diverted when needed to work on educational materials without notice.

The communications component of the Plan will need to be considered and incorporated into all public education activities in order to present a coordinated response. A pre-established, well-advertised Web site and pre-determined channels for the dissemination of printed materials and e-mail communications are important requirements for effective public education campaigns. An available toll-free telephone line with trained staff will also be an important requirement to maximize the propagation of educational messages.

3.5 Impacts and Stakeholders

Because the demand for information will be enormous and also likely remain high as the pandemic evolves, the impact on staffing within public health authorities will be substantial. Municipal governments and the broader emergency response structure will also be involved in the delivery of public education messages at the local level; public health authorities will be impacted if they are asked to develop and review the content of these messages. The objective is to have a positive impact on the public by anticipating their educational needs and preparing to meet those needs as soon as possible. If this is achieved, public health authorities are more likely to be seen as reliable sources of timely information.

Likely stakeholders will include the entire population who will need general information and specific groups who will need more detailed or specific information, including direction about response activities.

3.6 Anticipated Compliance and Acceptability

Because most public health authorities have the capacity to develop and deliver public education and are established sources of health information in their respective jurisdictions, it is anticipated that their role as educators during an influenza pandemic will be highly acceptable. However, it will be critical to ensure sustained credibility by providing informed, consistent, clear and timely messages.

Compliance with public education will likely be high, especially if the community is already experiencing cases. The perception of personal risk will likely increase as the proximity to cases increases, and it will result in more and more people seeking information on personal protective measures.

4.0 Avian Outbreaks in Canada during the Interpandemic Period

Although it is considered unlikely that a pandemic strain will first emerge in Canada, the public health system needs to be prepared to deal with this possibility. Recent outbreaks of avian influenza both in Asia and in North America have highlighted the need for clear guidelines to manage these outbreaks. Following the outbreak of highly pathogenic avian influenza in British Columbia in the spring of 2004, interim guidelines were developed. Those guidelines have recently been updated and are now found in the document: *Human Health Issues Related to Avian Influenza in Canada*. This document was developed by PHAC with input from all provinces and territories and is available through the Avian influenza link on the PHAC website (available at: http://www.phac-aspc.gc.ca).

The purpose of the interim guidelines is to provide recommendations and tools for public health authorities and other stakeholders involved in the management of human health issues related to domestic avian influenza outbreaks. The recommendations are organized to align with certain components of the Plan, i.e. surveillance, public health measures, infection control, antivirals and vaccine programs. Because the occurrence of a single human case of avian influenza usually denotes the onset of the Pandemic Alert Period in Canada, the interim guidelines are consistent with the recommendations herein for case and contact management during Pandemic Alert Period, Canadian Pandemic Phase 3.1. This annex (i.e.Annex M, Public Health Measures) will become the appropriate reference if human-to-human transmission of the novel virus is observed, at which time aggressive measures will be initiated in an attempt to control or delay the spread of the virus. These measures are presented under the Pandemic Alert Period subheadings under section 5, Public Health Management of Individuals with Influenza-like Illness, and section 6, Management of Contacts of Cases, which follow in this annex.

5.0 Public Health Management of Individuals with Influenza-like Illness

This section includes recommendations for the public health management of people with ILI who have been infected with a novel influenza virus during a pandemic alert and people meeting the national case definition during the pandemic. (The current definition for ILI is available at: www.phac-aspc.gc.ca/fluwatch/index.html). Modified case definitions developed during a pandemic alert or once pandemic activity is occurring will also be posted on the PHAC Web site and distributed to provinces and territories directly by PHAC.

These activities will be initiated when one or more human cases infected with the novel virus are identified in Canada. Until then, case and contact management should follow the guidelines for the Interpandemic Period (or any modified versions of the interpandemic guidelines due to the occurrence of a pandemic alert outside of Canada). However if a medical officer of health has a high level of suspicion that an ill individual might be infected with the novel virus (e.g. an ill traveller with a epi-link to an affected area and for whom laboratory results are pending), the actions described below may be implemented as a precaution until the case can be confirmed.

The recommendations below refer to the management of ill individuals identified in Canada during the specified pandemic periods and Canadian pandemic phases.

5.1 Recommendations

- Encourage all ill individuals (and those providing care to such individuals) to practice good hand and respiratory hygiene (e.g. frequent handwashing, covering the mouth when coughing, etc.) and to frequently clean and disinfect surfaces that could be potentially contaminated with respiratory droplets for the duration of their illness. (See Annex F for additional details and recommendations on infection control.) Also advise them when to seek medical attention and how to do this in a way that minimizes potential exposures (e.g. take a private vehicle instead of public transit if possible).

Recommendations from Management of Individuals with ILI (presumed novel/ pandemic flu):

Pandemic Alert Period: Sporadic activity in Canada – Phase 3.1, Phase 4.1 and Phase 5.1

Indicator: Single human case(s) with a novel virus subtype in Canada with no spread, or at most rare instances of spread to a close contact only. Outside of Canada, clusters resulting from human-to-human transmission may be occurring (e.g. Phase 4.1 and Phase 5.1) but the virus has not demonstrated the efficiency of transmission necessary to cause a pandemic.

- Facilitate appropriate management of ill individual(s) suspected of having the novel virus and who are identified through the surveillance system.
  - Disseminate messages to front-line health care providers in conjunction with enhanced surveillance protocols with regard to the notification and reporting processes for ill individuals of concern (i.e. those with a potential risk factor due to travel or contact with an infected avian or animal source), any updates on infection control precautions, clinical management or laboratory testing recommendations.
- Report ill individuals and facilitate laboratory testing, as agreed upon in the enhanced surveillance process, to the provincial or territorial and federal authorities in the requested format.
- Isolate the ill individual either in hospital (if clinically indicated or recommended, based on available epidemiological data) as per current infection control guidelines or at home.
  - In-home management should include follow-up of the case and their close contacts (see the general recommendations under 6.1 below) through active surveillance, education about infection control precautions in the home setting and instructions about what to do if their illness progresses.
  - Adults recommended for self-isolation at home should stay there for a minimum of 5 days after onset of symptoms (7 days for young children) or until symptoms have resolved, whichever is longer, unless they need to visit a health care provider[5] or unless an alternative diagnosis is made. During this period, they should avoid close contact with unexposed household members.

[5] The case should be given instructions about infection control measures to be implemented if they must leave their home to visit a health care provider (e.g. phone ahead, wear a mask)

- Medical management of these individuals should include treatment with antiviral drugs, depending on the sensitivity profile of the novel virus. This treatment will need to be monitored, with any relevant outcomes (e.g. clinical deterioration despite initiation of antivirals within 48 hour of symptom onset, laboratory evidence of viral resistance, compliance problems, adverse events) to be reported to the appropriate public health authority.

Recommendations for Management of Individuals with ILI (presumed novel/ pandemic flu):

Pandemic Alert Period: Localized or widespread cluster activity in Canada – Phase 4.2 or Phase 5.2

Indicator: Cluster(s) occurring in Canada with "limited" (Phase 4.2) or "substantial" (Phase 5.2) pandemic risk based on various factors, e.g. rate of transmission, geographic localization and spread, severity of illness, impact of control measures, presence of genes from human strains (if derived from an animal strain), other information from the viral genome and/or other scientific information. Outside of Canada, clusters may be occurring (assuming the virus did not originate in Canada) but the virus has not demonstrated the efficiency of transmission necessary to cause a pandemic.

- Aggressively implement protocols for influenza case and outbreak management[6] with consideration of the recommendations on infection control in Annex F.[7] These measures include:
  - isolation of cases,
  - laboratory testing of suspect cases,
  - closing of affected hospital wards or institutions to visitors, etc.,
  - aggressive contact tracing and follow-up (see section 6 below, Management of Contacts of Cases), and
  - reporting individual cases to provincial/territorial and federal public health authorities.
- Medical management of cases presenting within 48 hours of symptom onset should include antiviral treatment. Public health authorities may help coordinate the distribution of antivirals because supplies may be limited and prioritization may be necessary. (See Annex E, Planning Recommendatios for Anti-influenza (Antiviral) Drugs in Canada During a Pandemic, for additional details.)

[6] It is recognized that individual case management by public health authorities will not be sustainable and, depending on the geographical distribution of cases, may need to be discontinued prior to the Pandemic Phase in jurisdictions that are heavily impacted during the Pandemic Alert Period (i.e. Canadian Pandemic Phase 5.2).

[7] For example, this may include triage and provision of surgical masks to patients with respiratory illness presenting for a medical assessment (when cases have already occurred in the specific community).

- As previously noted, antiviral treatment will need to be monitored with outcomes (clinical, laboratory and compliance) reported to the appropriate public health authority.

Note: During the Pandemic Alert Period (i.e. prior to declaration of a pandemic), it is anticipated that antiviral drugs will be used to treat the first cases identified in Canada and attempt to control subsequent spread from these cases. When the pandemic is declared or the supplies dedicated for this early control strategy are exhausted, the antiviral strategy will change to focus on the overall goal of the pandemic response by encouraging dispensing of these medications using the nationally agreed-upon antiviral strategy for the Pandemic Period.

Recommendations for Management of Individuals with ILI (presumed novel/ pandemic flu):

Pandemic Period: Sporadic Cases occurring in Canada – Phase 6.1

Indicator: Single human case(s) with the pandemic virus detected in Canada. No cluster(s) identified in Canada.

Note: If the incubation period, period of communicability and method of transmission for the novel strain are consistent with other known influenza strains, it is likely that this phase will have a very short duration or may even be skipped in Canada (i.e. novel virus activity may not be detected prior to the occurrence of a cluster of cases).

- Facilitate appropriate management of the ill individual(s) suspected of having the novel virus, identified through the surveillance system.
  - Rapidly disseminate messages to front-line health care providers indicating that the novel virus has been detected in the community.
  - If necessary, update and distribute the reporting protocol for suspect cases (i.e. highlighting what may have changed between the Pandemic Alert Period and the Pandemic Period in terms of reporting expectations).
  - Distribute any updates on infection control precautions, clinical management or laboratory testing recommendations.
- Report ill individuals to the P/T and federal authorities in the requested format.
- Facilitate laboratory testing as agreed upon for the Pandemic Period.
- Isolate the ill individual(s), as per current infection control guidelines, in hospital (if clinically indicated or recommended, based on available epidemiological data), at an alternate care facility or at home.
  - In-home management should include follow-up of the case and their close contacts (see recommendations under 6.1 below) through active surveillance, education about infection control precautions in the home setting, and instructions about what to do if their illness progresses.
  - Individuals recommended for self-isolation at home should stay there a minimum of 5 days after onset of symptoms (7 days for young children) or until symptoms have resolved, whichever is longer, or if known, until the end of the period during

which they are expected to be communicable, unless they need to visit a health care provider[8] or unless an alternative diagnosis is made. During this period, they should avoid close contact with unexposed household members.

- It is expected that antiviral drugs from the National Antiviral Stockpile will be used for treatment of all persons with influenza-like illness (presumed pandemic influenza) who are ill enough to need care, and who are assesed within 48 hours of the onset of symptoms. (See Annex E for additional details on antivirals.)
- If cases have occurred in Canada prior to this period, it will be necessary to communicate any changes to the recommendations for case management now that the pandemic virus has arrived in Canada.

Recommendations for Management of Individuals with ILI (presumed novel/ pandemic flu):

Pandemic Period: Localized or widespread activity occurring in Canada – Phase 6.2

Indicator: Sustained transmission of the virus resulting initially in clusters followed by localized and widespread activity in the general Canadian population.

- As case numbers increase, liaise with the group that is in charge of the pandemic response in your jurisdiction to put into effect the sections of the Plan that apply to clinical care (e.g. coordinate patient flow to appropriate sites or settings).
- Switch from reporting individual cases to reporting broad indicators of pandemic impact, (e.g. activity level, hospitalizations) as per surveillance guidelines.
- Provide public messaging[9] on self-care (including isolation), reporting of illness, where, when and how to present for medical assessment, and the availability of limited resources (discontinue individual-focused active surveillance).
- Determine the duration of isolation for ill indivduals cared for outside of a health care facility,[10] based on the epidemiological data available at the time.
  - In the absence of data on period of communicability for the novel virus, isolate patients until 24 hours after their symptoms have resolved.[11]

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[8] The case should be given instructions about infection control measures to be implemented if they must leave their home to visit a health care provider (e.g. phone ahead, wear a mask).

[9] The focus on individual case management will need to change because it will not be sustainable when the number of cases increases in the local community. During the WHO consultation, it was recognized that "as levels of morbidity and mortality mount during a pandemic, measures that made good sense at earlier phases – such as isolation of patients, contact tracing and voluntary quarantine... would cease to be effective or feasible because of the large number of cases."[(1)]

[10] Patients in a health care facility should be managed according to infection control recommendations provided at the time. This recommendation acknowledges that public health may need to recommend a period of isolation for cases remaining in the community (i.e. home setting).

[11] At the time of the pandemic, it may be necessary for essential workers to return to work during their convalescent period while they may still be communicable. In this situation, the appropriate public health authority may make recommendations for these individuals to minimize the possibility of transmission (e.g. wear a mask when in public settings).

- Except when visiting a health care provider, these individuals should stay at home during this time and avoid close contact with unexposed household members (unless an alternative diagnosis is established).
- Consider extending this isolation period for immunocompromised patients or children who are more likely to have prolonged viral shedding.

- It is expected that antiviral drugs from the National Antiviral Stockpile will be used for treatment of all persons with influenza-like illness (presumed pandemic influenza) who are ill enough to need care, and who are assessed within 48 hours of the onset of symptoms. (See Annex E for additional details on antivirals.)
- If cases have occurred in Canada prior to this the period, it will be necessary to communicate any changes to the recommendations for case management now that the pandemic virus has arrived in Canada.
- As case numbers decrease at the end of a pandemic wave:
  - A more individualized focus may be possible including individual case reporting and management (refer to the recommendations for Canadian Phase 6.1 under section 5.1.3 in this annex), and
  - Consideration should be given to evaluating the implemented case management strategies in order to optimally inform the response to any additional waves or pandemics.[12]

5.2 Goals and Anticipated Outcomes

- Cases will have knowledge about how to reduce disease transmission.
- Reduced opportunity for transmission of the novel virus
- Possible containment of an inefficiently spread virus or delayed spread of the pandemic virus
- Documentation and reporting of ill individuals meeting surveillance case definitions
- A well-integrated case-management system that adapts as the situation evolves

5.3 Rationale

Isolation of cases early in the Pandemic Alert Period or early Pandemic Period in Canada may prevent secondary cases or slow the spread of the illness within the population.[13] This may also prevent or reduce disruption of the health care system by "flattening" the epidemic curve, i.e. reduce the demand for health care services from a short intensive outbreak to a more manageable level of demand over a longer period. This could also help reduce societal disruption and potentially buy time for vaccine manufacture and administration, thus mitigating the effects of the pandemic in the community as a whole.

[12] Evaluative studies would not need to be implemented in all jurisdictions. To obtain rapid feedback, consideration should be given to coordinating these efforts. For example, different jurisdictions or sites might be asked to examine different aspects of the response.

[13] 1f cases occur in Canada prior to the virus gaining the ability to be transmitted efficiently from human to human, aggressive measures and treatment may lead to containment.

Scrupulous hand and respiratory hygiene may decrease transmission of the virus, especially if the method of transmission is primarily droplet spread.

Treatment of individuals with presumptive novel or pandemic influenza who present within 48 hours of symptom onset (the period during which neuraminidase inhibitors are known to be most effective in terms of improving clinical outcome) is expected to reduce the duration of symptoms, rate of complications, and potentially decrease the period of communicability.[14] Recognizing that during the Pandemic Alert Period the number of cases will be limited, most cases should be able to be accommodated in hospital settings where infection control procedures are likely more consistent and rigorous compared to the home setting.

Individual case management early in the pandemic will facilitate the collection of epidemiological data that could be used to characterize how the virus presents in Canada. Ongoing evaluation of the epidemiological data from individual cases and comparisons with information from other affected countries may help focus control efforts.

Timely reporting of cases or broad indicators of pandemic impact[15] will enable public health authorities to track the progression of the pandemic throughout Canada. This will inform decision-making about all aspects of the response plan, including the allocation of limited supplies, effectiveness of surveillance and public health control measures, and it will facilitate consistent communication with all stakeholders including the public.

5.4 Feasibility and Requirements

Containment, if possible, will require the timely identification and immediate isolation of cases. Access to sufficient rapid tests for influenza A and subtyping results will help focus the intense efforts that are expected to be implemented should cases be identified in Canada prior to the onset of the global Pandemic Period (Phase 6). A laboratory-testing protocol that is endorsed by all involved parties will increase the feasibility of this intervention.

Basic hand and respiratory hygiene should always be facilitated by ensuring access to adequate supplies and equipment for all cases regardless of where they are cared for during their illness, (e.g. access to soap and running water or alcohol-based hand sanitizers). The availability of isolation rooms in hospitals will quickly become an issue, and it is likely that the establishment of dedicated wards or facilities will be necessary. As the pandemic progresses and hospitals reach capacity, satellite or non-traditional health care sites may need to be established to deal with the increased demand.[16]

Keeping up with reporting requirements will require a dedicated team with pre-established communication protocols. Ideally, electronic databases with Web-based reporting will make this task more efficient. To effectively use broad indicators of pandemic impact,

[14] If during the Pandemic Alert Period a novel virus is causing severe disease, and data suggest that treatment initiation beyond the first 48 hours of symptoms is beneficial, this recommendation will be reviewed and changed as necessary.

[15] It is assumed that the surveillance protocol will be followed as much as possible. It will likely be necessary to switch to "broad indicators," such as hospitalizations, clinic attendance or all-cause mortality, because tracking individual case counts will not be feasible beyond the earliest stages of the pandemic. (See Annex N for details regarding surveillance)

[16] The National Emergency Stockpile System (NESS) has approximately 33,000 beds and cots that are available in the 165 to 200 mobile hospitals and that can be requested through the NESS system.

baseline data on these indicators should be collated at the local or regional level during the Interpandemic Period.

5.5 Impacts and Stakeholders

Prior to pandemic activity in Canada, laboratories will be greatly affected by increased demands for influenza testing. (See Annex C, Laboratory Procedures, for recommendations during the Pandemic Alert Period and the Pandemic Period.)

When the activity level increases, the major impact will be on health care facilities with respect to demands for isolation rooms and wards, isolation supplies and the potential availability of staff to care for patients who may require intensive care. At a minimum, more staff time may be needed because of the requirements for isolation procedures.

Isolation at home will affect not only the patient but also the entire household because special precautions are recommended to minimize transmission in these settings (see section 6 below, Management of Contacts of Cases).

Increased reporting requirements and the need for ongoing updates on patient status (especially at the beginning of the pandemic when it is important to characterize the epidemiology of the pandemic in Canada) will impact both primary health care settings and public health authorities.

5.6 Anticipated Compliance and Acceptability

If cases are detected in Canada prior to evidence of the efficient spread of the virus, compliance with isolation and infection control recommendations may vary and likely will be linked to the observed severity of illness in cases occurring at that time. If cases have already occurred elsewhere in the world, familiarity with the existence and outcomes of those cases may also affect compliance.

As public awareness of pandemic activity outside of Canada increases, there probably will be an increased expectation to protect the health of Canadians. Isolation of ill individuals as a control strategy will likely have high public acceptance, especially if the novel virus is causing severe illness and deaths. The potential effectiveness and role of scrupulous hand and respiratory hygiene in limiting the spread of the novel virus should be emphasized. The general public may perceive these basic "low-tech" measures as insufficient and therefore compliance may be less than optimal. With proper emphasis and consistent messaging by public health authorities, these basic measures, which include covering the mouth when coughing and frequent handwashing, could become so ingrained that it would be "socially unacceptable" to ignore them.

Compliance among isolated individuals will likely vary with severity of the illness and their perception of whether or not they are infected with the pandemic virus. Personal situations (e.g. the tolerance of employers and/or compensation available) may also affect compliance. Orders issued by public health officers or even the courts for isolation may be necessary in some situations; however, this "individual-focused" intervention likely could not be sustained beyond the earliest stages of the pandemic.

If the pandemic spreads to the degree that a community is severely affected and resources are exhausted, it is possible that self-isolation within the home, regardless of severity of illness, will gain acceptance as a control strategy.

6.0 Management of Contacts of Cases

This section includes recommendations for the public health management of contacts of suspected or confirmed cases. For the purposes of this document, a "contact" is someone with face-to-face exposure within 1 metre of a case. The duration of a significant exposure is unknown; therefore, exposures will need to be considered as part of the risk assessment. Follow-up of contacts is expected to be more aggressive during the Pandemic Alert Period and possibly at the earliest stage of the Pandemic Period before public health resources are overwhelmed. This activity is expected to become less focused toward individuals as the pandemic progresses, with messages for contacts being conveyed primarily by public education campaigns as public health resources are re-directed towards other control strategies.

6.1 Recommendations

- Health care workers who are contacts of cases due to occupational exposure should follow the directions provided by the occupational health and/or infection control departments within their facilities.
- Risk assessments should be performed to ensure that the recommendations included in this document are tailored to suit the specific situations, particularly prior to declaration of a pandemic (e.g. if the predominant clinical presentation is conjunctivitis, as opposed to more severe illness, then recommendations for activity restriction of close contacts may not include quarantine).
- All contacts of cases should be provided with information (in a format that takes into consideration literacy levels and language preferences) on:
  - personal protective measures (e.g. handwashing),
  - symptoms of ILI,
  - what to do if they develop symptoms (i.e. who to call and when),
  - how to seek medical attention for any reason, and
  - objectives and expectations with respect to any activity restrictions.
- Encourage contacts **and** members of their households to practice good hand and respiratory hygiene (e.g. frequent handwashing, covering mouth when coughing, etc.) and to frequently clean and then disinfect household surfaces that could be potentially contaminated, particularly during the 3 days following last exposure to a case.
- If a contact of a case develops one or more symptoms compatible with influenza, then they should be managed as per section 5, Public Health Management of Individuals with Influenza-like Illness, in this annex.
- Any use of antivirals for post-exposure prophylaxis during the Pandemic Alert Period should ideally be monitored with outcomes (break-through infection and any adverse events) being reported to the appropriate public health authority.
- As the number of cases and contacts increases, consider setting up telephone "hot-lines" and/or designated assessment clinics.

Recommendations for Management of Contacts of Cases

Pandemic Alert Period: Sporadic activity in Canada – Phase 3.1

Indicator: Single human case(s) with a novel virus subtype in the Canadian population, with no spread, or at most rare instances of spread to a close contact only. Outside of Canada, sporadic cases may be occurring with no spread, or at most rare instances of spread to a close contact only.

Monitoring	➢ Trace contacts of cases and monitor for symptoms of illness for 3 days after last exposure to the case or for the duration of the incubation period associated with the novel virus, whichever is longer. ➢ Monitoring for illness may be passive (i.e. contact is encouraged to self-monitor and report any illness) or active, with or without activity restrictions, depending on the specific situation and the discretion of the local medical officer of health.
Activity Restriction	➢ Consider advising contacts to defer travel to unaffected areas for duration of monitoring period.
Antiviral Use	➢ Do not routinely offer post-exposure prophylaxis with antiviral drugs to household members and other close contacts of human cases in the absence of any suspected human-to-human transmission; however, consider this strategy in severe or unusual cases or when limited human-to-human transmission cannot be ruled out.[17,18]

Recommendations for Management of Contacts of Cases

Pandemic Alert Period: Sporadic activity in Canada – Phase 4.1 and Phase 5.1

Indicator: Single human case(s) with a novel virus subtype in the Canadian population. Outside of Canada clusters resulting from human-to-human transmission are occurring but the virus has not demonstrated the efficiency of transmission necessary to cause a pandemic.

Monitoring	➢ Trace contacts of cases and implement active surveillance for symptoms of illness for 3 days after last exposure to the case or for the duration of the incubation period associated with the novel virus, whichever is longer.

[17] This precautionary measure is intended to reduce the risk that a contact of a case transmits the infection when it is unclear whether human-to-human transmission is occurring.(1)

[18] See reference (3) under References for additional recommendations regarding contacts of non-human cases of novel (avian or animal) influenza.

Activity Restriction	➢ If contacts are promptly identified (i.e. within the incubation period), quarantine them or at a minimum ask them to restrict contact with others for 3 days after last exposure to the case or for the duration of the incubation period, whichever is longer. ➢ Recommend that contacts refrain from travelling for duration of monitoring period.
Antiviral Use	➢ Consider use of antivirals for post-exposure prophylaxis, depending on the resistance status of the novel virus.[19]

Recommendations for Management of Contacts of Cases

Pandemic Alert Period: Localized or widespread cluster activity in Canada – Phase 4.2

Indicator: Small localized cluster(s) occurring in Canada with "limited" (Phase 4) pandemic risk based on various factors, e.g. rate of transmission, geographic localization and spread, severity of illness, impact of control measures, presence of genes from human strains (if derived from an animal strain), other information from the viral genome and/or other scientific information.

Monitoring	➢ Aggressively trace contacts of cases and implement active surveillance for illness in these individuals.
Activity Restriction	➢ If contacts are promptly identified for the cases (i.e. within the known or expected incubation period), quarantine these individuals or at a minimum ask them to restrict their contact with others for a period of 3 days after last exposure to the case or for the duration of the incubation period associated with the novel virus, whichever is longer. ➢ Recommend that contacts refrain from travelling for the duration of monitoring period.
Antiviral Use	➢ Consider the use of antiviral drugs for post-exposure prophylaxis of close contacts, depending on the resistance status of the novel virus. ➢ Public health authorities will likely coordinate the distribution of antivirals for this purpose; this strategy will be used in the Pandemic Alert Period in an attempt to control the spread of the novel virus. ➢ Discontinue this strategy once a pre-determined trigger (e.g. detection of community spread) is met or the supplies dedicated for this early control/containment strategy are exhausted[20].

[19] The decision to quarantine would be based on the risk assessment, which takes into consideration the specifics of the situation(s), including the severity of illness and the pandemic potential of the virus.

[20] At this time a decision regarding any prophylaxis indications for the Pandemic Period, including post-exposure prophylaxis of close contacts, has not been reached and the size of the national stockpile has not been increased to accommodate this or any other prophylaxis indications.

Recommendations for Management of Contacts of Cases

Pandemic Alert Period: Localized or widespread cluster activity in Canada – Phase 5.2

Indicator: Cluster(s) occurring in Canada with "substantial" pandemic risk based on various factors, e.g. rate of transmission, geographic localization and spread, severity of illness, impact of control measures, presence of genes from human strains (if derived from an animal strain), other information from the viral genome, and/or other scientific information).

Monitoring	➢ Aggressively implement protocols for influenza case and outbreak management as long as possible[21] with consideration of the recommendations for infection control in Annex F[22]. ➢ Assessment of exposure may involve identifying possible exposure sites (e.g. schools, workplace) rather than trying to identify individuals that were in close contact with the case. ➢ If feasible consider active surveillance for close contacts of the case(s). ➢ Facilitate and encourage self-monitoring for ILI for individuals linked to possible exposure sites but with unknown exposure to the case(s). ➢ Provide the necessary instructions and resources to permit those who are self-monitoring to report of any early signs of ILI immediately (24 hours/day, 7 days/week) and to receive instructions regarding isolation and medical management.
Activity Restriction	➢ Quarantine close contacts and individuals linked to the exposure sites or at a minimum and ask these individuals to restrict their contact with others for a period of 3 days after last exposure to the case or for the duration of the incubation period associated with the novel virus, whichever is longer. ➢ If not quarantined, recommend that contacts and individuals linked to exposure sites refrain from travelling for the duration of monitoring period.

[21] It is recognized that individual case management by public health authorities will not be sustainable and, depending on the geographical distribution of cases, may need to be discontinued before the Pandemic Period in jurisdictions that are heavily impacted during the Pandemic Alert Period.

[22] For example, this may include triage and provision of surgical masks to patients with respiratory illness presenting for a medical assessment (when pandemic influenza cases have already occurred int he specific community).

Antiviral Use	➢ Consider the use of antiviral drugs for post-exposure prophylaxis of close contacts, depending on the availability of the drugs and resistance status of the novel virus. ➢ Public health authorities will likely coordinate the distribution of antivirals for this purpose; this strategy will only be used in the Pandemic Alert Period in an attempt to control the spread of the novel virus. ➢ Discontinue this strategy once a pre-determined trigger (e.g. detection of community spread) is met or the supplies dedicated for this early control/containment strategy are exhausted.[23]

Recommendations for Management of Contacts of Cases

Pandemic Period: Sporadic activity in Canada – Phase 6.1

Indicator: Single human case(s) with the pandemic virus detected in Canada. No cluster(s) identified in Canada.

Note: If the incubation period, period of communicability and method of transmission for the novel strain is consistent with other known influenza strains, it is likely that this phase will have a very short duration and may not occur at all in Canada (i.e. novel virus activity may not be detected prior to the occurrence of a cluster of cases).

Monitoring	➢ Identify possible exposure settings and instruct all close contacts of the case(s) and individuals linked to the exposure setting (e.g. passengers on same flight) to self-monitor for early signs of ILI for 3 days after last exposure to the case or for the duration of the incubation period associated with the novel virus, whichever is longer. ➢ Provide the necessary instructions and resources to permit those who are self-monitoring to report of any early signs of ILI immediately (24 hours/day, 7 days/week) and to receive instructions regarding isolation and medical management.
Activity Restriction	➢ Educate known and potential contacts of cases about the period of communicability for influenza and the need to isolate themselves immediately should they start to develop signs of ILI. ➢ Discourage travel during the self-monitoring period.
Antiviral Use	➢ At this time a decision regarding any prophylaxis indications for the Pandemic Period, including post-exposure prophylaxis of close contacts, has not been reached and the size of the national stockpile has not been increased to accommodate this or any other prophylaxis indications.

[23] At this time a decision regarding any prophylaxis indications for the Pandemic Period, including post-exposure prophylaxis of close contacts, has not been reached and the size of the national stockpile has not been increased to accommodate this or any other prophylaxis indications.

Pandemic Period: Localized or widespread activity in Canada – Phase 6.2

Indicator: Sustained transmission of the virus resulting initially in clusters followed by localized and widespread activity in the general Canadian population.

Monitoring	➢ As the number of cases and subsequent contacts increases, advice to contacts should be incorporated in messages directed to the affected community as a whole. ➢ Provide guidance on how to monitor for signs of ILI (e.g. recording temperature or identifying respiratory symptoms). ➢ Contact follow-up may intensify in order to identify the end of a pandemic wave when pandemic activity appears to be declining.
Activity Restriction	➢ If quarantining of contacts was previously implemented, consider discontinuing this practice during this phase, i.e. when the virus is known to be efficiently spreading from human to human and resources might be better allocated for other activities.
Antiviral Use	➢ At this time a decision regarding any prophylaxis indications for the Pandemic Period, including post-exposure prophylaxis of close contacts, has not been reached and the size of the national stockpile has not been increased to accommodate this or any other prophylaxis indications.

Post-Pandemic Period

Indicator: Reports of cases counts and other broad indicators of pandemic activity in Canada suggest that the pandemic virus is no longer causing significant illness in the population.

- Consider evaluation activities that examine the effectiveness of the contact management strategies employed during the pandemic wave(s).

6.2 Goals and Anticipated Outcomes

- Identification of infected contacts of cases prior to their becoming communicable
- Early detection of additional cases, decreasing interval between onset of communicability and isolation
- Potential limitation of spread or slowing of the spread
- People in close contact with cases will have the knowledge about how to reduce the possibility of further exposure to the virus.
- Gain knowledge about the impact of implemented strategies

6.3 Rationale

If outbreaks occur in Canada while transmission of the virus is still relatively inefficient (i.e., during the Pandemic Alert Period), containment may be possible if prompt and effective contact management, including activity restriction and quarantine, and potentially the prophylactic use of antiviral drugs can be implemented.

Ensuring that those individuals who are known to have had contact with a case are appropriately monitored and informed about whom to contact should they become symptomatic will facilitate early case detection and early antiviral treatment. At the start of the pandemic, epidemiological data available from these early cases will be helpful in characterizing the pandemic activity and epidemiology in Canada. This information will further inform the response, especially interventions requiring the identification of high-risk groups.

Because supplies of antiviral drugs may be limited for the containment strategy, targeted use is recommended for contacts of the first cases identified in an area during the Pandemic Alert Period when human-to-human transmission is known to be occurring. This attempt to decrease spread of the virus will likey have limited application because it will not be operationally feasible once widespread community transmission occurs.

The public health authority is responsible for providing information on how to manage any potential illness in contacts of cases or members of their households and on how to reduce the chance of viral infection. By doing so, individuals (and the community as a whole) will perceive the public health authority as an engaged partner in this health care crisis and a credible presence in any future public health interventions (especially with regard to potentially less popular strategies that may involve prioritizing limited supplies).

6.4 Feasibility and Requirements

The use of quarantine is not anticipated to be as effective for influenza compared with other diseases with longer incubation periods. But if cases and clusters occur in Canada prior to the onset of the pandemic, it will be essential to implement restrictions on activities in order to try to contain the outbreak(s). This intervention will be most successful if the cases and subsequently their contacts are identified very quickly after onset of illness in the case and if the novel strain is not being efficiently transmitted among humans (as in the Pandemic Alert Period). Given these caveats, the use of individual quarantine measures should be employed at the discretion of the local public health authority and only when appropriate resources can be allocated to this effort.

Quarantining contacts will require extensive public health resources; its success as a containment and control strategy is contingent on thoroughness of contract tracing, rapid implementation and ongoing monitoring. These efforts will not be sustainable beyond the Pandemic Alert Period and, depending on the size of the outbreaks, they may need to be discontinued during the Pandemic Alert Period (i.e., prior to Phases 6.1 and Phase 6.2 in Canada).

Providing information to contacts will be done initially on an individual basis by fact sheets or telephone advice. This will require trained staff who have access to the list of contacts that have been generated by the case investigation process. This approach may be feasible early in the pandemic, but it will quickly need to change to a more efficient population-based strategy (see section 3, Public Education, in this annex).

The availability of antiviral drugs and dedicated human resources will dictate the feasibility of implementing post-exposure prophylaxis for contacts of cases. Public health authorities will likely be involved in overseeing that drugs are dispensed to the targeted individuals.

Due to the epidemiology of influenza (e.g. the possibility of transmission prior to onset of symptoms), it would be extremely difficult to evaluate how the contact management strategies will affect pandemic activity in any one community. However from a resource management perspective, it may be worthwhile to examine how resources are allocated for the purpose of contact management and whether any changes can be made to these strategies to improve the efficiency of the overall pandemic response.

6.5 Impacts and Stakeholders

The occurrence of a case will immediately increase the number of "stakeholders" because contacts of the case will be seeking advice on the mitigation of personal risk. The local public health authority may be overwhelmed with inquiries and the need to collect information on contacts soon may be superseded by other priorities. For educational and communication purposes, the entire population should be considered potential contacts of a case in this situation.

6.6 Anticipated Compliance and Acceptability

If cases are detected in Canada prior to evidence of the efficient spread of the virus, compliance with quarantine and infection control recommendations may vary and likely will be linked to the observed severity of illness in cases occurring during that time.

In light of the SARS experience of 2003 where contacts of cases were notified and monitored by local public health authorities throughout the outbreak(s),[5] the public may not understand why contacts of the novel influenza cases may not be notified and put into quarantine or why this strategy may be employed only at the start of activity in Canada. A proactive education campaign may increase acceptability of the proposed recommendations, which exclude routine quarantine during the Pandemic Period. It is important to recognize and be prepared to deal with individuals who choose to self-quarantine or other institutions (e.g. schools, workplaces) that may implement their own quarantine rules.

If antiviral drugs are initially made available for contacts of the first cases in a particular jurisdiction, it will be difficult to discontinue this intervention when it is no longer feasible or effective from a population perspective or if it is not a recommended use of antivirals from the national stockpile during the Pandemic Period. The public will need to be informed in advance about strategies for the availability of antivirals and reasons for these strategies. This information will facilitate the acceptance of public health decisions that focus on the main objective of reducing the overall number of cases and deaths. Two concepts will need to be addressed by educational and risk-communication messaging to optimize compliance and facilitate acceptance to public health decisions; these are that certain public health measures will need to change as the pandemic evolves and that the use of the drugs in the national stockpile has been based on national-level decisions to facilitate equitable access and optimal usage across Canada.

Evaluation activities may be more successful if they are coordinated to ensure that selected sites examine specific issues, thus potentially reducing duplication of effort and the need for all sites to participate. This approach may improve the acceptability of evaluation activities among health authorities in jurisdictions that are still recovering from the pandemic.

7.0 Community-Based Disease Control Strategies

Controlling the spread of influenza in the community likely will not be possible without an effective vaccine, assuming that the novel virus will cause illness with similar characteristics to other influenza A infections. Specifically, the short incubation period, high infectiousness, ability of the virus to survive for extended periods of time on environmental surfaces, non-specific clinical symptoms, and potential for asymptomatic infection and spread from asymptomatic individuals greatly limits the effectiveness and feasibility of most traditional public health control measures. During the SARS outbreak, no vaccine or virus-specific drugs were available for treatment or prophylaxis; therefore, the need to effectively isolate communicable cases and identify and quarantine their respective contacts became paramount. A recent modeling exercise concluded that influenza would be "difficult to control even with 90% quarantining and contact tracing because of the high level of presymptomatic transmission."[6]

Because the potentially high attack rate of a novel virus in the general population will stretch all existing health care resources, ideally planners should consider dedicating resources only to measures that will effectively mitigate the impact of the pandemic. Unfortunately most community-based measures under consideration, including the widespread use of masks, cancellation of public gatherings and closure of schools and businesses, have been anecdotally reported to be ineffective, or their effectiveness has not been formally evaluated. The use of mathematical modeling to predict the potential effectiveness of these types of interventions may provide estimates of their impacts that will help in the development of future planning documents.

Despite the absence of data on effective measures, it is recommended that the conclusions related to the measures or actions described below should be considered when planning for a pandemic. These recommendations are based mainly on expert opinion and are intended to facilitate a consistent approach. They are not intended to supersede the implementation of any measures that may be directed by P/T authorities.

The triggers for the following measures will depend both on the measure and on the way the pandemic unfolds. In general, decisions about implementing these measures will likely be made by the local public health authority (i.e. Medical Officer of Health). However, it is recognized that directions may also be forthcoming from the P/T or regional levels to ensure the consistency of a broad-based approach.

7.1 Strengthen recommendations to stay home from public events and locations (i.e. self-isolate) if you have fever and new onset of respiratory symptoms[24]

Trigger

Arrival of one or more confirmed cases in the P/T. Local authorities should reinforce this recommendation when cases occur in their jurisdiction.

Advantages

- Potential to decrease the number of people exposed to an ill person and therefore decrease (or delay) the spread of disease
- Easy to implement as a "recommendation for the public"
- Likely to have high public acceptance

Disadvantages

- Compliance will vary and will not be measurable (therefore effectiveness will not be quantifiable)
- May result in unnecessary absenteeism among essential workers because, based on the non-specific symptoms, individuals ill due to other causes will end up staying home
- Potential expectation for public health authorities to provide resources to "enforce" the recommendation

Conclusion

This measure is sensible, feasible and easy to implement from a public health perspective. Despite being potentially disruptive to businesses and society as a whole, it may delay the spread of the disease within the community. This "flattening out" of the epidemic curve is beneficial because it may reduce the demand for health care services on any particular day or week and result in a high but manageable level of demand over several weeks instead.

- **Strongly recommend implementation**

[24] Individuals with chronic respiratory conditions should consider staying home if they have onset of fever and an exacerbation of respiratory symptoms.

7.2 Close Schools and Daycare Centres

Trigger

Declaration of one or more confirmed cases in the local community by the local public health authority (i.e. confirmation of pandemic presence), depending on the epidemiological context (i.e. extent to which these settings are expected to contribute to transmission based on observed age of cases, etc.). It is not necessary or desirable to wait until spread in these settings is demonstrated.

Advantages

- Children are known to be efficient transmitters of influenza; closing schools and large daycare facilities may reduce transmission or delay spread of the disease (in this age group and in younger siblings, parents and close contacts of school and daycare attendees).
- Most public health authorities have the legal authority to implement this measure and have a working relationship with school boards.

Disadvantages

- Alternate arrangements will need to be made for child care which may lead to "gatherings" of children outside of the school setting thus contradicting the intended benefit of the school closure.
- Only applies to school-age children and children attending large daycare facilities
- Essential workers might be diverted to child-care responsibilities.

Conclusion

This measure is feasible and would be most effective if the pandemic was causing high attack rates in pre-school or school-age children. It is recognized that school boards or daycare administrators may choose to independently close their facilities regardless of the epidemiology of the pandemic. The Working Group recommends this measure as a key consideration for decreasing transmission of influenza in a community.

- **Recommend implementation be considered**

7.3 Restrict indoor public gatherings (other than schools)

(e.g. close theatres and other venues where large amounts of people gather indoors in close proximity, halt mass public transportation services)

Trigger

When the local public health authority indicates that transmission is occurring within the community[25]

Advantages

- Decreases the number of venues in which spread to a large number of people is possible

Disadvantages

- May feed public panic and cause societal disruption
- Negative economic impact on business owners (may generate compensation claims)
- Sustainability for the duration of the pandemic wave may be problematic, especially when the pandemic activity is widespread.

Conclusion

This type of measure may be feasible but compliance and sustainability might be difficult, especially because effectiveness is unproven. This is particularly true for gatherings and activities that are considered "essential" (e.g. public transportation) and would cause significant societal disruption should they be discontinued.

If the epidemiology of the pandemic suggests higher morbidity and/or mortality in a specific group of individuals (e.g. adolescents), then canceling events known to attract this specific high-risk group should be considered, especially if the virus is being efficiently transmitted. The objective of these targeted cancellations or restrictions would be to avoid a sudden increase in demand for health care services as a consequence of a "spike" in cases due to efficient transmission at a large gathering.

Once the virus is circulating in a community, indoor gatherings at events or at locations for businesses may be suspended without public health intervention because of public reluctance to participate in large gatherings. Because the effectiveness of this measure is unknown and it may be difficult to sustain, the Working Group does not recommend its broad implementation. However, it is recommended that those who are involved in hosting large gatherings ensure the availability of hand-sanitation supplies in public washrooms.

- **Not recommended for broad implementation**
- **Consider if high-risk gatherings can be identified**

[25] These types of measures would be likely be most effective prior to cases with transmission occurring in the community. However in the absence of disease, it would be difficult to justify this type of drastic measure for which there is no sound data for its effectiveness.

7.4 Use of masks by well individuals

Trigger

Declaration of the arrival of one or more confirmed cases in the local community by the local public health authority

Advantages

- May decrease exposure to large droplets containing virus
- Psychologically reassures people that they are taking measures to prevent infection

Disadvantages

- Hands and other surfaces may be contaminated when mask is removed (requires public education).
- May cause panic if the availability of masks is limited
- Public purchase of masks may limit the availability of masks in health care settings where they are required.
- Not all members of the public can afford to purchase masks. If recommended by public health authorities, there could be an expectation that they will be publicly funded and provided by public health programs.
- It is not feasible to wear masks constantly for the duration of pandemic wave.
- Use of masks, apart from other infection control practices, is of limited effectiveness and may provide a false sense of security.

Conclusion

This measure is not feasible or sustainable on a population basis. It is not likely to be effective in reducing disease spread in the general population and therefore is not recommended as a community-based strategy. It is acknowledged that individual people who are wearing a recommended mask properly at the time of an exposure may benefit from the barrier that a mask provides. The WHO has recommended that mask use by the public should be based on risk, including frequency of exposure and closeness of contact with infectious persons and suggests that based on this risk assessment use of masks in crowded settings such as public transit may be justified.[7] At the time of a pandemic, however, when the virus is circulating in the community it will not be possible for public health authorities to assess and compare risks of exposure in specific public settings (e.g., public transit, restaurants, recreational complexes). Therefore, members of the public may wish to purchase and use masks for individual protection; however, outside of known high-risk settings (e.g. a hospital with cases) this would not be an appropriate use of public resources.

Well individuals caring for cases in a non-traditional site or home setting should follow the recommendations provided by the Infection Control Working Group for individuals functioning in this capacity (see Annex F).

- **Not recommended as a community-based intervention or measure**

7.5 Implement hand-sanitizing stations in public settings
(e.g. public transit settings)

Trigger

When the local public health authority indicates that transmission is occurring within the community

Advantages

- May increase frequency of handwashing and therefore reduce spread of disease
- Reinforces key message about handwashing

Disadvantages

- Effectiveness depends on public compliance
- Will not be effective against droplet spread via coughs and sneezes
- Requires human and financial resources to keep stations adequately supplied
- Potentially expensive to supply and maintain
- May give people a false sense of security

Conclusion

Frequent handwashing is an effective infection control measure when dealing with people known to be infectious. This measure is feasible, but maintaining these hand-sanitizing stations at the time of a pandemic would likely be possible only if the responsibility of supplying them could be assumed by organizations other than public health ones.

The effectiveness of public hand-sanitizing stations as a community-based strategy in a pandemic situation is unknown and would be largely influenced by public compliance, which could be highly variable, and the proportion of infectious individuals in public places at any given point in time. Therefore, this measure (i.e. the establishment of new sanitizing stations) is not considered to be effective for significantly reducing the spread of the disease in the general population. It is not recommended as a community-based strategy because of its anticipated minimal incremental benefit.

Public messaging about handwashing must be encouraged and existing public washrooms should be appropriately stocked with supplies at all times. However for the reasons previously stated and the difficultly in maintaining these stations at the time of a pandemic, the establishment of new hand-sanitizing stations in public settings is not considered to be an appropriate use of public resources.

- **Not recommended as a community-based intervention or measure**

7.6 Increase frequency of cleaning of surfaces in public settings
(e.g. public transit settings, large institutions, businesses)

Trigger

When the local public health authority indicates that transmission is occurring within the community

Advantages

- May remove viable virus from frequently touched surfaces and therefore reduce spread of disease
- Reinforces key message about mode of transmission and personal hygiene

Disadvantages

- Requires resources to maintain cleanliness
- Impossible to "target" cleaning efforts
- Efficacy depends on frequency and quality of cleaning (with appropriate supplies and techniques)
- Optimal frequency of cleaning cannot be determined and could be unsustainable during the peak of the epidemic in the community
- Potentially expensive

Conclusion

Environmental cleaning is most effective when dealing with surfaces associated with people known to be infectious. Increasing the frequency of cleaning is feasible, but identifying infectious individuals in public settings is not. The frequency of hand contact with various "public" surfaces would virtually require constant cleaning to have any effect on reducing the number of microorganisms on these surfaces. Realistically, this measure cannot be implemented; therefore, it is not recommended for broad use as a community disease containment strategy.

Individuals who may want to reduce their risk of exposure to infectious droplets may want to consider more frequent cleaning of their own environments and limiting hand contact with "public surfaces" (e.g. elevator buttons, public telephones).[26] These strategies could be included in public education messages.

- **Not recommended as a community-based intervention/measure.**

[26] During the 1918 and 1919 Spanish Flu pandemic, there are anecdotal reports that greeting by shaking hands was discouraged.

7.7 Other Measures NOT Recommended for Implementation

All of the measures or general principles addressed in this document were also raised during the WHO international consultation process (March 2004), as outlined in the meeting report.[1] The consensus was that the measures that follow were either not necessary or not appropriate. The Public Health Measures Working Group also agrees with these conclusions.

Measure	Comments
Urge entire population in an affected area to check for fever at least once daily	➢ A potential measure to decrease interval between symptom onset and patient isolation; however, this has not been effective in other situations
Introduce thermal scanning into public places	➢ Experience has not shown this measure to be effective
Widespread environmental or air disinfection	➢ Not practical
Disinfect clothing, shoes or other objects of persons exiting affected areas	➢ Not recommended for public health purposes ➢ May be required by veterinary authorities to prevent spread of infection in animals
Restrict travel to and from affected areas	➢ Enforcement considered impractical in most countries ➢ Likely to occur voluntarily when risk is appreciated by the public
Cordon sanitaire	➢ Enforcement considered impractical

8.0 Isolated Communities

Some of the community-based interventions and travel and border-related measures in this document might be more feasible for isolated communities than for heavily populated areas. This is because potential community-exposure sites may be identified more easily in isolated communities, and the movement of individuals can be monitored or possibly restricted. It has been anecdotally reported that during the 1918 and 1919 Spanish flu pandemic, small villages in Alaska that stringently restricted movement in and out of the village remained free of influenza. While this measure may not be possible in this day and age, there may be a greater potential in isolated communities than in more populated regions to delay the introduction of the pandemic strain until vaccines are available. Pandemic planners for these areas should consider engaging the residents in the planning process in order to investigate their potential support for these restrictive but potentially helpful early measures.

9.0 Travel and Border-Related Measures

An extensive list of public health measures that could be considered at the international level is addressed in the report from the WHO international consultation on this subject.[1] In general, entry screening for travellers from affected areas is not encouraged, with the exception of geographically isolated infection-free areas (e.g. islands) where it is considered to be potentially more feasible. There was consensus however on potential value of exit screening for all travellers from areas with human infection when human-to-human transmission was known to be occurring (i.e. starting in the Pandemic Alert Period, Phase 4 and Phase 5). This could be achieved by using health declarations and questionnaires, and possibly temperature screening, in combination with widespread messaging that recommends ill persons to postpone travel. Implementing "stop lists" (i.e. of isolated or quarantined persons) was considered feasible for certain countries, but generally it was not encouraged nor was medical examination for travellers at risk or with fever.

The following text is organized by pandemic period and phase. It is intended to document travel and border-related measures that may be implemented in Canada in response to the evolving pandemic whether it originates outside of Canada (i.e. International Origin) or inside of Canada (i.e. Domestic Origin). It is intended to provide guidance on potential P/T and local public health roles in travel and border-related measures.

International Origin: Canadian Pandemic Phase 3.0

Indicator: Human infection(s) with a novel virus subtype occurring in one or more locations outside of Canada, but little immediate pandemic risk (no spread, or at most rare instances of spread to a close contact only).

Advisories

A Travel Health Advisory will be posted on the PHAC Web site to inform travellers about the occurrence of human infections in specific international geographic regions and recommend personal health measures to reduce health risks. Advisories will recommend pre-travel medical consultation for individual risk assessment and post-travel medical assessment for illness that occurs during travel or develops on return.

Public health measures

- Be prepared to respond to news releases and travel health advisories posted on international and domestic public health Web sites (e.g. PHAC, WHO) informing travellers of the occurrence of human infection with a novel influenza virus[27] in a specific international geographic region.
- Provide updates to health care professionals to:
  - Raise awareness among health care professionals providing pre-travel consultations,

[27] This may have been preceded by media attention and alerts about outbreaks in avian or animal populations in which the public would be advised to avoid contact with possible sources of the virus (e.g. poultry farms, live animal markets).

- Increase awareness of the "travel" risk factors for infection with the novel virus among health care professionals assessing ILI in returning travellers, and
- Ensure that the recommended surveillance measures, infrastructure and links are in place. (The Surveillance Section of the Plan, which is currently being developed for the next edition of the Plan, will contain specific recommendations.)

- Manage any cases from a public health perspective (see section 5, Public Health Management of Individuals with Influenza-like Illness, in this annex).

Domestic Origin: Canadian Pandemic Phase 3.1

Indicator: Human infection(s) with a novel virus subtype in the Canadian population, but little immediate pandemic risk (no spread, or at most rare instances of spread to a close contact only).

Advisories

In collaboration, the Council of Chief Medical Officers of Health (CCMOH) and PHAC could post (on the PHAC Web site) a Travel Health Advisory informing Canadians about the occurrence of human infections in a specific domestic geographic area. This advisory would provide up-to-date and comprehensive information about any health risks and indicate whether or not there are recommendations not to travel to the affected geographic area, i.e. the area defined by the local or P/T public health authority where the case(s) occurred. Dissemination of the Travel Health Advisory beyond posting on the PHAC Web site would be dictated by both the CCMOH and PHAC. This could involve direct messaging to specific audiences (e.g. Canadian Medical Association) or to the media.

Public health measures

- Be prepared to respond to news releases and public health Web site postings (PHAC and WHO) that inform international travellers to Canada and the general Canadian public of the occurrence of human infection with a novel influenza virus[28] in a specific geographic region of Canada.
- Provide updates to health care professionals to:
  - Raise awareness among Canadian health care professionals who may be required to respond to their clients requests for information regarding their risks, should they be travelling to the affected geographic area in Canada;
  - Increase awareness of the travel-risk factors for infection with the novel virus among health care professionals who may assess persons with ILI who have visited or recently left the affected geographic area; and
  - Ensure that the recommended surveillance measures, infrastructure and links are in place. (The Surveillance Section of the Plan, which is currently being developed for the next edition of the Plan, will contain specific recommendations.)
  - Manage any cases from a public health perspective (see section 5, Public Health Management of Individuals with Influenza-like Illness, in this annex).

[28] Ibid.

International Origin: Canadian Pandemic Phase 4.0, Phase 4.1, Phase 5.0 and Phase 5.1

Indicator: Cluster(s) occurring outside of Canada with "limited" (Phase 4.0) or "substantial" (Phase 5.0) pandemic risk based on various factors, e.g. rate of transmission, geographic localization and spread, severity of illness, impact of control measures, presence of genes from human strains (if derived from an animal strain), other information from the viral genome and/or other scientific information. Sporadic imported cases may or may not be occurring in Canada (denoted by Phase 4.1 and Phase 5.1).

Advisories

Based on available information, either a Travel Health Advisory or a Travel Warning will be posted on the PHAC Web site to inform travellers about the occurrence of human-to-human transmission in a specific international geographic region(s) and to recommend deferral or delay of all non-essential travel to a specific destination. This may be targeted to readily identified groups who are potentially at very high risk or to all travellers, depending on the situation.

PHAC may consider disseminating public health messages by other means (e.g. posters, TV monitors, large video screens) at ports of entry. Provinces and territories will be notified about these decisions, and they will be consulted with regard to the content of messages that have implications about the provision of public and clinical health services in their jurisdictions.

Public health measures

- Manage any cases arriving or identified in Canada as specified under section 5, Public Health Management of Individuals with Influenza-like Illness, in this annex (also see "Screening logistics" below).
- Manage any contacts of cases as specified under section 6, Management of Contacts of Cases, in this annex (also see "Contact management logistics" below).
- P/T and local public health authorities need to consider how to manage travellers from affected areas who are advised to self-monitor for fever:
  - may initially involve direct public health follow-up and monitoring of contacts,
  - may involve designated phone lines for self-reporting by symptomatic travellers, and
  - may involve establishing local public health designated assessment sites that would be linked to public health surveillance activities.
- Ensure appropriate and timely dissemination of Travel Health Advisory and Travel Warning updates (may include further publicizing of the Web site).
- Provide latest outbreak information, guidance and support to government and non-government officials and the institutions they represent (for PHAC this would likely include port authorities, Canada Border Services Agency, the Royal Canadian Mounted Police and international air carriers)
- F/P/T and local public health authorities will need to collaborate on advance notification of the arrival of ill travellers, and assessing, releasing or detaining and transferring ill travellers for medical examination.
- PHAC will implement Traveller Contact Information Forms (TCIFs) if deemed necessary on appropriate air carriers:

- initially at Customs, and
- within 48 hours on selected air carriers.

- PHAC will distribute Health Alert Notices at points of entry to international returning travellers:
  - initially on debarkment, and
  - within 48 hours on selected air carriers.
- PHAC and P/Ts will consider implementing additional public educational materials (e.g. posters, TV monitors, video screens) at all arrival sites in ports of entry to reinforce the messages in Health Alert Notices

Screening logistics

Health assessments for arriving ill travellers will continue to be conducted as usual, under the authority of the *Quarantine Act*. Screening by thermal scanning, visual inspection or other means of all arriving international travellers or those arriving from specific geographical regions will not likely be considered. Participants at the WHO international consultation meeting did not consider such screening to be effective but rather to be "one example of a resource-intensive intervention that might nonetheless be introduced in response to public and political pressure."[1]

Contact management logistics

Contact tracing will be initiated for those arriving on international conveyances (i.e. airplanes, ships) with a confirmed case (or suspect case, as deemed necessary). The operational framework to access contact information of airline passengers will be left to the discretion of P/Ts.

Passengers could be directly contacted using the contact information collected from the flight manifest or from TCIFs if they have been filled out on air carriers. Alternatively, passengers could be contacted through public messaging by media sources.

If P/Ts chose to contact passengers directly, they will need to make a formal request that PHAC obtain the flight manifest or forward on the appropriate TCIFs for the flights of concern. To access the flight manifest, the PHAC will formally request passenger contact information from airline carriers and forward this information to the appropriate domestic and international public health officials so that they can contact individual travellers directly. To facilitate contact tracing of travellers, the TCIF system can be implemented on selected air carriers.

As the occurrence of clusters of cases continues or increases, contact tracing and notification will likely be conducted indirectly (passively) by public messaging rather than by actively attempting to directly contact each individual traveller. This transition to indirect tracing may occur in specific areas of Canada before the declaration of a pandemic, if these areas experience such a high level of activity during this alert period that the sustainability of available resources for this initiative becomes an issue.

Domestic Origin: Canadian Pandemic Phase 4.2 and Phase 5.2

Indicator: Cluster(s) occurring in Canada with "limited" (Phase 4.2) or "substantial" (Phase 5.2) pandemic risk based on various factors, e.g. rate of transmission, geographic localization and spread, severity of illness, impact of control measures, presence of genes from human strains {if derived from an animal strain}, other information from the viral genome and/or other scientific information).

Advisories

In collaboration, CCMOH and PHAC may recommend postponement of all non-essential travel to an affected geographic area within Canada. This recommendation can be targeted to readily identified groups of travellers who are potentially at very high risk or to all travellers, depending on the epidemiological data available from the affected area.

Health Alert Notices can be distributed at points of entry to the affected area(s) by P/Ts. These notices will contain (i) outbreak information consistent with information provided in travel advisories and other formal communications, (ii) guidelines or a questionnaire for self-screening, and (iii) guidelines for reporting to health care professionals or other officials specified symptoms (e.g. fever) that start during the interval that is consistent with the observed or known incubation period. Provinces and territories might consider disseminating similar public health messages at mass transit facilities that serve domestic travellers.

Public health measures

- Affected area: manage cases as specified under section 5, Public Health Management of Individuals with Influenza-like Illness, in this annex (also see "Screening logistics" below).
- Affected area: manage any contacts of cases as specified under section 6, Management of Contacts of Cases, in this annex (also see "Contact management logistics" below).
- P/Ts in collaboration with local public health authorities can implement exit screening at domestic airports serving affected areas within Canada. This may occur in collaboration with PHAC under delegated provincial authority or the *Emergency Act*
  - Increase public messaging regarding staying home, specifically not to travel when ill, and
  - Ensure directions for symptomatic individuals identified by the health declaration process at airports are clear and consistent with the local response to the pandemic activity.
- Unaffected areas: see "Contact management logistics" and "Screening logistics" below.
- P/T and local public health authorities not in an area experiencing a cluster(s) need to consider how to manage travellers from the affected area(s) who have not been specifically identified as contacts of a case:
  - may involve active or passive surveillance or designated phone lines for self-reporting by symptomatic travellers,
  - may involve designating assessment sites which would be linked to public health surveillance activities, and
  - ongoing appropriate and timely dissemination of Travel Health Advisory and Travel Warning updates and latest outbreak information in all areas.

Contact management logistics

Although identified cases are not expected to be circulating in public, contact tracing for any individuals arriving in an unaffected area on domestic conveyances (e.g. plane, bus, train) with a confirmed case (or suspect case, as deemed necessary) can be initiated. If initiated, P/Ts will formally request traveller contact information from domestic air carrier flights and forward all contact information on Canadian travellers to the appropriate domestic public health authorities for follow-up contact tracing activities. At the discretion of the provincial authority, PHAC may be asked to contact the air carrier and forward the appropriate information to all involved Canadian jurisdictions. Provinces and territories will need to forward all contact information on international travellers to PHAC who will forward it to appropriate international public health authorities.

In the unlikely event that short-term detention (1 to 3 days) of arriving travellers from a Canadian geographic area of risk proves necessary, P/Ts in collaboration with local public health authorities will take the lead in managing the event. At the discretion of the provincial authority, they may ask PHAC to provide this service.

As the occurrence of clusters of cases continues or increases, contact tracing and notification will likely be conducted passively by public messaging rather than by actively attempting to contact individual travellers. This transition may occur before the declaration of a pandemic if increasing notifications make it non-sustainable.

Screening logistics

Provinces and territories could implement health assessments of ill travellers arriving on domestic flights that originate from affected area within Canada. Alternatively, P/Ts could request assistance from PHAC to implement these health assessments under delegated provincial authority.

Exit screening for all travellers from the affected areas within Canada (i.e. those experiencing clusters of human infection) would likely be implemented during this phase in the form of health declaration questionnaires.[29] This would likely be limited to those exiting the area by air travel.

At exit points (i.e. airports, sea ports, land border crossings) from the affected area(s) within Canada, modified versions of Health Alert Notices (or "health declarations") containing (i) information about the outbreak consistent with information provided in Travel Health Advisories and other formal communications, (ii) a questionnaire for self-screening, and (iii) guidance for reporting specified signs of illness would likely be distributed. Additional screening methods aimed at detecting potentially infected individuals might also be considered at the directive of the CMOH and PHAC.

[29] Public or political pressure may result in the implementation of more visible interventions, such as thermal scanning or ear-temperature measurement. Note: Airlines also have a responsibility for disallowing obviously ill persons from boarding.

Pandemic Period: Canadian Pandemic Phase 6.0, Phase 6.1 and Phase 6.2

Indicator: Amplification and sustained transmission in the population

Advisories

During these phases, the wording of travel advisories may be strengthened to specifically recommend not traveling under any circumstances to affected areas. This may not be necessary if public demand for travel decreases and airline companies cancel service to certain areas.

While pandemic activity is increasing in Canada, actions implemented during the Pandemic Alert Period (Phase 4 and Phase 5) will quickly become unsustainable. Once widespread community transmission occurs in Canada, the allocation of resources targeted to keeping the virus out of the country will become unnecessary and resources should be re-allocated.

Public health measures

- Similar to the Pandemic Alert Period (Phase 4 and Phase 5) until no longer feasible or deemed to be ineffective due to widespread activity
- Public health measures directed toward travellers will likely be discontinued or scaled back at different times in different jurisdictions as the local epidemiology dictates.
- In subsequent waves of the pandemic, messaging and wording on health declarations and screening activities may need to be revised to take into consideration persons who were ill during the first wave and are now probably immune.

Post-Pandemic Period

Indicator: Reports of cases counts and other broad indicators of pandemic activity in Canada suggest that the pandemic virus is no longer causing significant illness in the population.

Advisories

Travel advisories would be revised as pandemic activity declines in various geographical areas. Public messaging may focus again on travellers as sources of infection if the wave has already moved through specific jurisdictions and community transmission is no longer being observed.

Public health measures

- May be similar to Pandemic Alert Period (Phase 3.1), i.e. focus on public and health care provider education as opposed to high levels of activity at airports
- Support recommended surveillance activities as per surveillance component of the Plan

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Appendix A: Summary of Recommendations

A.1 Case and Contact Management Summary

Canadian Pandemic Phase	Case Management	Contact Management
3.1	➢ Isolate adults for 5 days (young children for 7 days) or until symptoms have resolved, whichever is longer (or period of communicability if known). ➢ Active surveillance for those isolated at home. ➢ Report individual cases. ➢ Facilitate laboratory testing. ➢ Early treatment with antivirals.	➢ Active or passive surveillance for symptoms for 3 days or duration of incubation period if known. ➢ Consider asking to defer travel for duration of surveillance period. ➢ Consider post-exposure antiviral prophylaxis for severe or unusual cases or when human-to-human transmission cannot be ruled out. ➢ Recommend annual flu vaccine.
4.1 or 5.1	➢ As per 3.1 above	➢ Active surveillance for symptoms for 3 days or duration of incubation period if known. ➢ Quarantine or activity restriction to limit contact with others. ➢ Consider post-exposure prophylaxis with antiviral drugs.
4.2 or 5.2	➢ As per 3.1 above ➢ Close off wards and restrict visitors if applicable. ➢ Report cases and clusters.	➢ As per 4.1 or 5.1 above. ➢ For 5.2, recommend self-monitoring for those linked to a possible exposure site (instead of individual-focused active surveillance).
6.1	➢ As per 3.1 above	➢ Self-monitoring for symptoms. ➢ No quarantine. ➢ Consider deferring travel during self-monitoring period. ➢ Antiviral use as per national antiviral strategy for the Pandemic Period.
6.2	➢ Isolate for 24 hours after symptom resolution or duration of period of communicability if known. ➢ Public messaging on self-care (including isolation), reporting of illness, where, when and how to present for medical assessment, and availability of limited resources (discontinue individual-focused active surveillance). ➢ Antiviral treatment for those presenting within 48 hours and for whom it is deemed medically necessary.	➢ As per 6.1 above. ➢ More public messaging. ➢ No quarantine.

A.2 Community-Based Disease Control Strategies

Recommended as a community-based intervention	**Not Recommended** as community-based intervention
➢ Stay home from public events and locations (i.e. self-isolate) if you have fever and new onset of respiratory symptoms. ➢ Consider school and daycare closure. ➢ Restrict indoor public gatherings (other than schools) if "high-risk" settings can be identified.	➢ Broad restrictions on indoor public gatherings other than schools. ➢ Use of masks by well individuals (not including care-providers). ➢ Implement hand-sanitizing stations in public settings. ➢ Increase frequency of cleaning of surfaces in public settings. ➢ Urge entire population in an affected area to check for fever at least once daily. ➢ Thermal scanning in public places. ➢ Air disinfection. ➢ Disinfection of clothing, shoes or other objects of persons exiting affected areas. ➢ Actively restrict travel to and from affected areas. ➢ Cordon sanitaire.

Annex N

Pandemic Influenza Surveillance Guidelines

Date of Latest Version: **October 2006**

Note:

- This is a new annex being released with the 2006 version of the Canadian Pandemic Influenza Plan.

Table of Contents

Preamble

Since 2004, Canadian public health surveillance stakeholders, through national working groups, have been defining the roles, responsibilities as well as the minimum standards for national surveillance data to be collected during interpandemic and pandemic periods.

The ability to adapt to rapidly evolving situations must be included in all surveillance guidelines. As such, the following annex is part of an ongoing and evolving preparedness plan. It is recognised that while the current published version outlines high level surveillance guidelines, further detail is required in order to provide comprehensive national guidelines, in particular, a more detailed description of streamlined surveillance activities for phase 6.

Therefore, the annex should be considered with the following list of next steps:

- Review of the sustainability of routine surveillance activites and consideration of options for streamlined surveillance which may include either greater focus on more reliable indicators or modification/simplification of routine activities during a pandemic
- Prioritize surveillance activites by phase
- Explore options and feasibility for development of new surveillance activities as part of preparedness, e.g. real-time mortality surveillance.

Introduction

The overall goals of influenza 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.***

The strategies used to achieve these goals will depend on a number of factors including the epidemiology of the pandemic. Determination of epidemiological parameters and indicators are critical for informing the public health response. As the pandemic progresses through each phase, the surveillance activities needed to guide public health actions will change from enhanced activities in the pandemic alert phases to streamlined activities at the height of the pandemic.

In this document, influenza surveillance guidelines, including data collection, collation, analysis and dissemination/communication issues for both disease and virologic surveillance are outlined for each phase of the pandemic. In addition, detailed protocols for virologic surveillance and other laboratory procedures can be found in the laboratory annex of the Canadian Pandemic Influenza Plan (Annex C).

This document has been prepared for pandemic planning purposes as well as to facilitate a standardised approach to national influenza surveillance during the interpandemic period. While the characteristics of a novel influenza virus are not known, the experiences learned from both SARS and outbreaks of human infection with influenza A (H5N1), have underscored the importance of preparatory planning and establishing a surveillance infrastructure capacity for the detection and monitoring of emerging respiratory infections. The following framework addresses planning for surveillance in general terms; however, it should be understood that while some of the recommended actions can be prepared for in advance, other situation-specific recommendations and alerts will need to be developed based on information that will only be available as the situation evolves.

Guidelines are necessary to ensure data are collected in a standardized manner across jurisdictions to enable national level analysis and cross-jurisdictional comparison. The guidelines represent the minimum recommended activities required for national monitoring of the evolving pandemic. Provincial and territorial jurisdictions may choose, based on their on own risk assessment and experience, to increase the sensitivity of surveillance activities (e.g. increased timeliness of data collection and reporting or use of more sensitive case definitions for monitoring) while respecting national health reporting standards. Further, as additional information becomes available during the course of the pandemic, monitoring and reporting activities may be refined as necessary.

The objectives of these guidelines are to assist federal, provincial and territorial (FPT) partners in the development or enhancement of surveillance activities that will facilitate:

- ongoing risk assessment for pandemic influenza based on national and international sources
- rapid detection and monitoring of the arrival of a novel/pandemic influenza virus anywhere in Canada,
- timely description of the epidemiologic and virologic characteristics of the pandemic

- detection and characterization of unusual/unexpected disease patterns or manifestations
- real-time monitoring of disease severity indicators i.e. through real-time surveillance of hospitalizations or deaths
- implementation and discontinuation of public health measures[1]
- ongoing evaluation of disease and virologic surveillance activities for each pandemic phase (e.g. timeliness, appropriate sensitivity and specificity, effectiveness in guiding public health measures)
- comparing novel influenza strains to match pandemic vaccine composition
- identification of areas of need for special studies and further research

Assumptions

- The Respiratory Illness Outbreak Response Protocol (RIORP)[2] will be approved and implemented in order to facilitate data sharing and communication within Canada during the pandemic. This document outlines local, PT and federal reporting processes.
- Information on the current risk assessment, epidemiologic, virologic, and clinical descriptions (based on the global situation) will be available and shared in a timely manner via our international partners (e.g., WHO).
- The majority of, if not the entire population, will be susceptible to the pandemic strain.
- During the pandemic alert period (the early phases of the arrival of a novel virus with pandemic potential in Canada) detailed reporting of epidemiological data and contact tracing for initial cases by public health will be possible.
- As the efficiency of human-to-human transmission increases, resulting in widespread activity of the novel virus in Canada, surveillance resources are expected to be strained. This may impact participation and reporting rates for routine surveillance activities such as sentinel influenza-like illness (ILI) reporting. While in some areas participation may be maintained at sufficient levels for accurate monitoring population-based trends on a local or even provincial/territorial level, participation rates may fall off elsewhere thus limiting the representativeness of the data in certain areas or nationally. At the height of the pandemic, if population-based ILI rates become unreliable for monitoring disease spread/ population impact, particularly at the regional or national level, surveillance may be limited to tallying outbreaks in residential institutions and/or assessment of regional influenza activity levels (i.e. streamlined surveillance).
- The novel virus strain (pandemic strain) will supplant other circulating influenza strains.
- The pandemic will last 12 to 18 months and more than one wave may occur within a 12 month period and could have a similar or more severe impact than the initial wave.
- PHAC will follow guidelines as per the International Health Regulations.

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1 Refer to the Public Health Measures, Annex M of the Canadian Pandemic Influenza Plan.

2 RIORP is an agreement between Federal/Provincial/Territorial governments to guide the operating procedures to assist in coordinating the investigation and control of severe respiratory outbreaks in Canada.

Special Studies

Protocols for special studies which may be conducted during the pandemic should be developed and pre-tested in the interpandemic/pandemic alert periods, recognizing that refinements may be necessary at the time of a pandemic. It is recognised that these studies will most likely be conducted in parallel to other surveillance activities.

Special studies may include, but are not limited to, serological surveys[3] of early cases/clusters of human infection with a novel influenza virus, vaccine effectiveness studies, role of bacterial pathogens in the development of secondary complications and serious outcomes, investigation of reported adverse events following immunization (AEFI), antiviral resistance monitoring, and modes of transmission studies (e.g. in community or hospital-based settings).

In addition, targeted studies may be useful in supplementing routine surveillance data to assess the impact of the pandemic on the health care system as well as in terms of social and economic impact. Even if conducted at the end of the pandemic wave, special studies may serve as a means of evaluating and refining various attempted interventions to lessen the impact of successive waves of the pandemic.

Surveillance Activities by Canadian Pandemic Phases

Surveillance for pandemic influenza is expected to be founded on timely, representative and comprehensive surveillance activities that are the cornerstones of ongoing routine annual influenza surveillance, including:

- Disease/epidemiologic surveillance
- Laboratory/virologic surveillance, including antiviral resistance monitoring
- Ongoing information sharing through established communication networks (e.g. CIOSC, *FluWatch*, provincial and territorial networks)

Several additional activities are recommended for pandemic influenza surveillance both for enhanced detection of early warning signals and for monitoring during a pandemic, including:

- Animal health surveillance (early detection of animal outbreaks and/or animal-to-human transmission in interpandemic and pandemic alert periods)
- Monitoring vaccine and antiviral uptake
- Monitoring of adverse events following immunization

The following tables describe the surveillance objectives, roles and responsibilities for public health stakeholders at each level of government (federal, provincial/territorial and local). The tables are organized by successive phases of a pandemic based on the Canadian Pandemic Phases which reflects both the global situation (phases 1.0, 2.0, 3.0, etc.) as well as the highest level of novel virus activity in Canada (sub-phases 3.1, 4.1, 5.1, etc.). See the Background Section of the Canadian Pandemic Influenza Plan for more details.

Note: In the description of the phases the term "animal" is used to cover both avian and mammalian species.

[3] For a generic serosurvey protocol, refer to the following document: "Generic Serosurvey Protocol of People Exposed to Influenza", Appendix 1.

Interpandemic Period

Table 1: Interpandemic Period

Canadian Pandemic Phase	
1.0	No new virus subtypes have been detected in humans. An influenza virus subtype that has caused human infection may be present in animals located outside of Canada. If present in animals, the risk of human infection/disease is considered to be low.
1.1	No new virus subtypes have been detected in humans. An influenza virus subtype that has caused human infection is present in animals in Canada but the risk of human infection/disease is considered to be low.
2.0	No new virus subtypes have been detected in humans. However, an animal influenza virus subtype that poses substantial risk to humans is circulating in animals located outside of Canada.
2.1	No new virus subtypes have been detected in humans. However, an animal influenza virus subtype that poses substantial risk to humans is circulating in animals in Canada.

Surveillance Objectives/Roles and Responsibilities

Objectives:

- to assess the seasonal burden of influenza and to detect and describe unusual events including emergence of new strains and unexpected outcomes such as changes in distribution or increases in severity
- to establish baseline influenza activity levels

Federal:

- Provide ongoing leadership through organisation of teleconferences/meetings, providing guidance and surveillance recommendations as needed
- Align national pandemic surveillance plans with WHO global pandemic influenza surveillance plans
- Participate in the WHO Global Influenza Surveillance Network
- Conduct regular information scanning and seek verification of international disease activity of potential public health significance i.e. International Ministries of Health and/or other international surveillance networks
- Coordinate national level routine annual influenza surveillance activities via *FluWatch,* including hosting national influenza surveillance meetings and leading the development of recommendations for ongoing improvements of the *FluWatch* system
- Develop national recommendations/surveillance protocols for enhanced surveillance of severe emerging respiratory infections (SRI) for early detection and response to emerging respiratory infections
- Provide regular dissemination of surveillance information and analysis (weekly *Fluwatch*, annual influenza reports)
- Provide information, risk assessment and surveillance recommendations on an as needed basis in relation to identified events with pandemic potential (e.g. avian influenza) specific alerts/signals to F/P/T public health surveillance stakeholders[4]
- Lead the development of national standards for case definitions, minimum datasets and mechanisms for data collection and reporting during the pandemic phases

[4] At the federal level, regular environmental scanning for the detectionof potentially significant influenza-like illness is conducted using official information sources for influenza surveilance (e.g. WHO and international government influenza surveillance programs) as well as unconfirmed reports from early warning systems (e.g. ProMed and other media scanning software such as the Global Public Health Intelligence Network (GPHIN)). Provinces and territories receive regular summaries of the internatinal situation through the Canadina Integrated Outbreak Surveillance Centre (CIOSC).

Surveillance Objectives/Roles and Responsibilities *(continued)*

Federal:

- Enhance linkages between federal departments including linkages between human and animal health surveillance partners (e.g., Canadian Food Inspection Agency, National Centre for Foreign Animal Diseases, Canadian Cooperative Wildlife Health Centre, etc.)
- Develop business continuity plans and increase capacity and training and/or set priorities to meet surveillance requirements during each phase of a pandemic. This includes identifying which routine activities can be suspended or reduced during a pandemic
- Develop a human resources plan to ensure sustainability of surveillance activities during a pandemic
- Work with F/P/T and Local partners to agree on phase-specific minimum surveillance activities for monitoring at each phase of the pandemic. In particular, work to establish priorities for critical common surveillance activities that can be maintained as streamlined surveillance during the height of a pandemic when resources are strained
- Coordinate the establishment of surveillance systems to estimate severity

P/T/local:

- Determine key surveillance stakeholders within P/T jurisdiction
- Ensure P/T pandemic plan is in place and align P/T/Local surveillance plans with national surveillance plans
- Participate in routine annual influenza surveillance activities (e.g. *FluWatch)*
- Participate in national influenza surveillance meetings
- Maintain intra-P/T surveillance networks to enable early detection of influenza activity
- Ensure capacity (surveillance infrastructure, technical/human resources) to meet national minimum standards for case detection, minimum datasets and mechanisms for data collection and reporting during the pandemic period
- Establish and maintain mechanisms for the timely sharing of surveillance data from the local to the P/T and on to the federal jurisdictions
- Provide regular dissemination of surveillance information and specific alerts/recommendations to national and jurisdictional stakeholders
- Develop business continuity plans and increase capacity and training and/or set priorities to meet surveillance requirements during each phase of a pandemic. This includes identifying which routine activities can be suspended or reduced during a pandemic
- Develop a human resources plan to ensure sustainability of surveillance activities during a pandemic
- Identify potential sentinel surveillance sites (regions, settings) that may be used to assist in focusing limited resources or answer specific questions (i.e. special studies) during a pandemic
- Work with F/P/T and Local partners to agree on phase-specific minimum surveillance activities for monitoring at each phase of the pandemic. In particular, work to establish priorities for critical common surveillance activities that can be maintained as streamlined surveillance during the height of a pandemic when resources are stretched
- Confirm that public health laboratories within the province/territory have the capacity and materials needed to isolate and subtype influenza viruses. If they do not, linkages to those laboratories having this capacity should be established and coordination agreements put in place

Table 1.1: National Surveillance Data during the Interpandemic Period[5]

Canadian Pandemic Phase	
1.0	No new virus subtypes have been detected in humans. An influenza virus subtype that has caused human infection may be present in animals located outside of Canada. If present in animals, the risk of human infection/disease is considered to be low.
1.1	No new virus subtypes have been detected in humans. An influenza virus subtype that has caused human infection is present in animals in Canada but the risk of human infection/disease is considered to be low.
2.0	No new virus subtypes have been detected in humans. However, an animal influenza virus subtype that poses substantial risk to humans is circulating in animals located outside of Canada.
2.1	No new virus subtypes have been detected in humans. However, an animal influenza virus subtype that poses substantial risk to humans is circulating in animals in Canada.

National Surveillance Data	
Disease surveillance	
(a)	influenza activity level by P/T region (based on *FluWatch* definitions)
(b)	influenza-like illness (ILI) consultation rate (number of ILI sentinel physician visits/ 1000 consults)
(c)	number of laboratory-confirmed outbreaks in long-term care facilities
(d)	number of influenza-associated hospitalizations and influenza-associated deaths in children 0-18 years through sentinel paediatric hospitals (IMPACT[6])
Laboratory surveillance	
(e)	percent positive influenza tests (total number of laboratory tests for influenza and number of positive results, by virus type (A or B))
(f)	strain characterisation, number identified for each strain and subtype, and percentage of total for approximately 10% of isolates from the sentinel laboratory respiratory virus detection system
(g)	increased targeted strain characterisation based on risk assessment in areas where animal strains are circulating
(h)	antiviral resistance testing for influenza isolates
Risk assessment	
(i)	summary of national/international areas where animal virus activity has been confirmed

*Appendix 2 provides a pictorial representation of the national FluWatch influenza surveillance system.

[5] During the interpandemic phases, these data (*FluWatch*) will be reported on a weekly (during the influenza season) and bi-weekly (during the summer months) basis

[6] The Immunization Monitoring Program ACTive (IMPACT) is a paediatric hospital-based national active surveillance network for adverse events following immunization, vaccine failures and selected infectious diseases in children that are, or are soon to be, vaccine preventable.

Pandemic Alert Period

Table 2, below, describes the surveillance objectives for the pandemic alert period. The objectives are general, given the unknown epidemiology of a novel influenza virus infection and uncertainties as to how it might behave in terms of efficiency of human-to-human transmission, impact on the population/population sub-groups and capacity to spread rapidly. Recommended surveillance tools and protocols, including surveillance case definitions, will need to be developed and revised based on information received as the situation evolves. The triggers that will signal the move to a new phase are generally based on relative ability to infect humans and spread efficiently among humans, as determined by observed activity and a comprehensive risk assessment. This risk assessment will include analyzing the interplay of these and other factors (e.g. infectiousness, rate of transmission, incubation period and period of communicability, severity of illness, impact of initial control measures, etc.). These factors should be viewed as general parameters which are useful for describing the critical points in the evolution and escalation of a pandemic and can only be assumed prior to strain identification and circulation of the novel virus. Furthermore, initial predictions are subject to change as the novel virus becomes adapted to human populations and flexibility will be important to respond to rapid adjustment of surveillance and related activities. As such, the following tables provide a basic framework for establishing and maintaining the recommended surveillance infrastructure and for clarifying basic roles and responsibilities to managing these activities at the various levels of government.

Supplementary Surveillance Recommendations – Ongoing Risk Assessment and Emerging Respiratory Illness Updates (Alerts/FYIs):

The ongoing maintenance and adjustment of routine surveillance activities and the timely sharing of surveillance and risk assessment information is an important supplement to the basic surveillance framework laid out in this annex. Based on ongoing risk assessment derived from the interpretation of local, regional, national and international influenza/emerging respiratory illness activity, recommendations may be made on an as-needed basis. These will guide increased vigilance and direct surveillance and investigation of severe and/or unexpected respiratory illnesses in relation to exposures of concern (high risk travel locations, exposure settings or types of contact). Furthermore, monitoring and investigation activities may be adjusted in terms of sensitivity and specificity as dictated by the evolving situation. Factors that may influence the opportunity for initial containment of cases/isolated clusters, such as the length of the incubation period and efficiency of transmission, will contribute to the decision of whether or not to continue case and cluster investigation with a view to controlling spread, if only temporarily, to buy additional time at the outset of a pandemic.[7] The following framework should be considered with these factors in mind, underscoring the need for flexible, simple and proven activities/systems founded on good routine surveillance practices, clarified roles and responsibilities and efficient use of resources.

[7] Refer to the Public Health Measures, Annex M, of the Canadian Pandemic Influenza Plan.

Table 2: Pandemic Alert Period

Canadian Pandemic Phase
3.0 Outside Canada human infection(s) with a new subtype are occurring, but no human-to-human spread, or at most rare instances of spread to a close contact has been observed. No cases identified in Canada.

Surveillance Objectives/Roles and Responsibilities

Objective:

- to detect and describe the first introduction of the novel virus in Canada
- to create awareness and ensure surveillance systems meet standards and pandemic plans are updated, tested and ready for possible implementation

Federal:

- Provide ongoing leadership through organisation of teleconferences/meetings, providing guidance and surveillance recommendations as needed
- Conduct regular information scanning and seek verification of international disease activity of potential public health significance i.e. International Ministries of Health and/or other international surveillance networks

Additional roles/responsibilites for phase 3:

- Confirm with WHO any reports of novel virus detection
- Establish current risk assessment with international surveillance partners
- Assess and convey current risk assessment to national surveillance partners
- Inform PIC/CCMOH/CPHLN/FluWatch reps of situation and advise all to remain on alert for further updates (e.g. for updates of current avian influenza H5N1 affected areas refer to http://www.phac-aspc.gc.ca/h5n1/index.html)
- Review surveillance annex of pandemic plans and ensure systems and resources are ready/tested/available for rapid ramp up
- Review and confirm that all pandemic alert period surveillance activities via FluWatch and SRI surveillance are operating optimally
- Coordinate with P/T partners the review and modification of national case definitions. Ensure process is in place to document changes in the case definition and the definitions for reporting purposes are consistent with the international definitions
- Review/revise standard reports and pandemic reporting tools for dissemination of epidemiological and virologic information within Canada (*FluWatch* weekly reports for the public and CIOSC weekly situation updates for public health professionals)
- Define reporting parameters (process, frequency)
- Coordinate the implementation of surveillance systems to estimate severity of a novel virus outbreak (e.g. hospitalisations, mortality surveillance)

P/T/local:

Additional roles/responsibilites for phase 3:

- Ensure awareness and appropriate actions are carried out by key stakeholders and confirm that enhanced surveillance is implemented
- Review and confirm all normal interpandemic influenza surveillance activities via FluWatch and SRI surveillance are operating optimally
- Review the surveillance annex of pandemic plans and ensure systems and resources are ready/available for rapid ramp up if this becomes necessary
- Participate in regular information sharing with F/P/T/local stakeholders partners through teleconferences and electronic reporting
- Define reporting parameters (process, frequency, content)

Surveillance Objectives/Roles and Responsibilities *(contineud)*

P/T/local:

Additional roles/responsibilites for phase 3:

- Review/revise standard reporting forms, data collection tools and surveillance reports
- Regular information sharing nationally as well as from local to provincial jurisdictions
- Implement surveillance systems to estimate severity of the pandemic (e.g. mortality surveillance) if not already established during gthe interpandemic period

Canadian Pandemic Phase

3.1 Single human case(s) with a new subtype detected in Canada. Virus is not known to be spreading from human-to-human, or at most rare instances of spread to a close contact have been observed.

Surveillance Objectives/Roles and Responsibilities

Objective:

- to capture epidemiological data on the first case(s) of the novel virus infection in Canada
- to further heighten awareness and ensure surveillance systems meet standards and pandemic plans are updated, tested and ready for implementation

In addition to phase 3.0 roles and responsibilities:

Federal:

- Convene a meeting of PIC and the national surveillance working group to develop recommendations to review risk and implement enhanced surveillance e.g. awareness/heightened vigilance, surveillance/advisory at points of entry, increasing proportion of isolates subtypes and isolate referral
- Send Public Health Alert using CIOSC which includes an analysis of the epidemiologic information on the first case(s) detected in Canada (Alert to be approved by PIC)
- Follow up of potential imported/exported cases (e.g. linking with relevant international counterparts to share/obtain exposure/contact history)
- Report non-nominal case information to the WHO (for list of data elements refer to appendix 2) *to be added once report form is revised*
- Coordinating the enhancement of antiviral resistance monitoring

P/T/local:

- The PHLs and other viral diagnostic laboratories will be on high alert and will focus on: enhanced laboratory-based surveillance for the emerging new subtype; viral isolation by culture if appropriately equipped; implementation or augmentation of Real Time-PCR assays or other Nucleic Acid Tests (NATs) for identification and subtyping of influenza viruses. Case by case risk assessments will be used at this phase to determine the extent of enhanced surveillance[8]
- Immediately report and refer to the NML any positive influenza laboratory findings or situations in which the strain type cannot be identified at the PT laboratory level from a case with ILI symptoms and epidemiological links with the novel influenza strain need to be reported and shipped to the NML immediately to ensure rapid confirmation characterization. Refer to the laboratory annex of the CPIP for details
- Convene a meeting of P/T surveillance groups to review national recommendations, review P/T/Local recommendations and implement enhanced surveillance
- Investigation of sporadic cases, including contact tracing, public health monitoring, and collection of detailed epidemiologic data using the SRI or other available report form (http://www.phac-aspc.gc.ca)

[8] The level of enhanced surveillance will depend on the location of the first case(s) in Canada as well as the risk assessment and whether the cases arise in Canada or are imported cases and novel viruses arising in Canada.

Canadian Pandemic Phase

4.0 Outside Canada small cluster(s) with limited human-to-human transmission are occurring but spread is highly localized, suggesting that the virus is not well adapted to humans. No cases identified with these cluster(s) have been detected in Canada.

Surveillance Objectives/Roles and Responsibilities

Objective:

- to detect and describe the first introduction of the novel virus in Canada
- to provide the information to heighten awareness and increase vigilance while ensuring system capacity and resource availability

Federal:

- Provide ongoing leadership through organisation of teleconferences/meetings, providing guidance and advice as needed
- Conduct regular scanning and verification of national and international surveillance information e.g. Ministries of Health and other international surveillance networks
- Assess and convey current risk assessment to national surveillance partners
- Convene a meeting of PIC and the national surveillance working group to develop recommendations to review risk and implement enhanced surveillance e.g. awareness/heightened vigilance, surveillance/advisory at points of entry, increasing proportion of isolates subtypes and isolate referral
- Review surveillance annex of pandemic plans and ensure systems and resources are ready/available for rapid ramp up if this becomes necessary
- Review and confirm that all normal inter-pandemic surveillance activities via FluWatch and SRI surveillance are operating optimally
- Coordinate with P/T partners the review and modification of national case definitions. Ensure process is in place to document changes in the case definition and the definitions are consistent with the international definitions
- Review/revise standard reports for dissemination of epidemiological information within Canada
- Review/revise reporting parameters (process, frequency)

Additional roles/responsibilities for phase 4:

- Confirm with the WHO report of clusters of 2 or more cases
- Confirm case definitions with the WHO
- Review/revise Public Health Alert to increase awareness for informed public health and clinical decision making as necessary[9] (revisions to Alert to be approved by PIC)

P/T/local:

- Ensure regular contact with key pandemic decision makers and stakeholders within P/T jurisdiction
- Ensure awareness and appropriate action is carried out by key stakeholders and confirm that enhanced surveillance is implemented
- Review surveillance annex of pandemic plans and ensure systems and resources are ready/available for rapid ramp up if this becomes necessary

Additional roles/responsibilities for phase 4:

- Review and confirm all normal inter-pandemic influenza surveillance activities via FluWatch and SRI surveillance are operating optimally
- Disseminate change in pandemic phase to health care providers

[9] Although it is considered unlikely that a pandemic strain will first emerge in Canada, the public health system needs to be prepared to deal with this possibility. Public Health Alerts need to address the situation for both impor

Canadian Pandemic Phase

4.1 Single human case (s) with virus that has demonstrated limited human-to-human transmission detected in Canada. No cluster(s) identified in Canada.

4.2 Small localized clusters with limited human-to-human transmission are occurring in Canada but spread is highly localized, suggesting that the virus is not well adapted to humans.

Surveillance Objectives/Roles and Responsibilities

Objective:

- to identify, capture epidemiological data and describe the epidemiological characteristics on the first cases and clusters of the novel virus infection in Canada
- to provide data to monitor the containment of the outbreak
- to provide the information to heighten awareness and increase vigilance while ensuring system capacity and resource availability

Federal:

- Provide ongoing leadership through organisation of teleconferences/meetings, providing guidance and advice as needed
- Conduct regular scanning and verification of national and international surveillance information e.g. Ministries of Health and other international surveillance networks
- Assess and convey current risk assessment to national surveillance partners
- Convene a meeting of PIC and the national surveillance working group to develop recommendations to review risk and implement enhanced surveillance e.g. awareness/heightened vigilance, surveillance/advisory at points of entry, increasing proportion of isolates subtyped and isolate referral
- Review surveillance annex of pandemic plans and ensure systems and resources are ready/available for rapid ramp up if this becomes necessary
- Review and confirm that all routine inter-pandemic surveillance activities via FluWatch and SRI surveillance are operating optimally
- Coordinate with P/T partners the review and modification of national case definitions. Ensure process is in place to document changes in the case definition and the definitions are consistent with the international definitions
- Review/revise standard reports for dissemination of epidemiological information within Canada
- Provide alert to increase awareness for informed public health and clinical decision making as necessary

Additional roles/responsibilities for phase 4.1, 4.2:

- Implement international border-based surveillance (depending on origin of cases) coordinated by the Centre for Emergency Preparedness and Response (PHAC)[10]
- Collect/compile/distribute epidemiological data for cases reported in Canada
- Establish current level of risk to guide public health actions (e.g. transmission characteristics associated with secondary cases)
- Review protocols for special studies[11] and prepare dedicated teams as necessary to ensure prompt activation of the studies when appropriate
- Revise case definitions based on observed clinical presentation of cases
- Report non-nominal case/cluster information to the WHO (for list of data elements refer to appendix 3)

[10] Refer to the Public Health Measures, Annex M, of the Canadian Pandemic Influenza Plan.

[11] Implementation of serologic surveys can be considered at this time. Guidelines developed as a framework to be revised as needed at the time of implementation are found in appendix I. Plans for vaccine effectiveness studies should be reviewed and prepared for implementation.

Surveillance Objectives/Roles and Responsibilities *(continued)*

P/T/local:

- Ensure awareness and appropriate action is carried out by key stakeholders and confirm that enhanced surveillance is implemented immediately in affected area in order to identify any human to human transmission in Canada
- Review surveillance annex of pandemic plans and ensure systems and resources are ready/available for rapid ramp up if this becomes necessary

Additional roles/responsibilities for phase 4.1, 4.2:

- Review and confirm all normal inter-pandemic influenza surveillance activities via FluWatch and SRI surveillance are operating optimally
- Conduct case/cluster investigation and report to PHAC (for list of data elements refer to appendix 3)

Canadian Pandemic Phase

5.0 Outside Canada larger cluster(s) are occurring but human-to-human spread still localized, suggesting that virus is becoming increasingly better adapted to humans but may not yet be fully transmissible (substantial pandemic risk). No cases identified with these clusters have been detected in Canada.

Surveillance Objectives/Roles and Responsibilities

Objective:

- to detect and describe the first introduction of the novel virus in Canada
- to heighten awareness and increase vigilance while ensuring system capacity and resource availability

Federal:

- Provide ongoing leadership
- Confirm with the WHO sustained person-to-person transmission and determine if there are outbreaks in one or more countries
- Conduct regular scanning and verification of national and international surveillance information e.g. Ministries of Health and other international surveillance networks
- Assess and convey current risk assessment to national surveillance partners
- Convene PIC and the national surveillance working group to determine situation-specific information needs and appropriate enhanced surveillance activities (increased lab testing and referral, collection of epidemiologically relevant information, e.g. travel history, immunization status, other information needed to guide the control measures based on global experience)
- Notify PIC/CCMOH/CPHLN/FluWatch reps of situation and recommended action, including situation-specific enhanced surveillance activities
- Initiate ramp up of enhanced surveillance if determined necessary (based on efficiency of human-to-human spread and assessment of pandemic potential)
- Ensure any additional systems and resources are ready/available for rapid ramp up if this becomes necessary

P/T/local:

- Ensure heightened awareness and appropriate action is carried out by key pandemic stakeholders including enhanced surveillance activities
- Ramp up to enhanced surveillance as required
- Ensure additional systems and resources are ready/available for rapid ramp up if this becomes necessary
- Information sharing with F/P/T/local partners

Canadian Pandemic Phase

5.1 Single human case(s) with virus that is better adapted to humans detected in Canada. No cluster(s) identified in Canada.

Surveillance Objectives/Roles and Responsibilities

Objective:

- to identify, capture epidemiological data and describe the epidemiological characteristics on the first cases and clusters of the novel virus infection in Canada
- to provide data to monitor the containment of the outbreak
- to provide the information to heighten awareness and increase vigilance while ensuring system capacity and resource availability

In addition to phase 5.0 roles and responsibilities:

Federal:

- Report non-nominal case/cluster information to the WHO (for list of data elements refer to appendix 3)

P/T/local:

- Conduct case investigation and report to the PHAC (for list of data elements refer to appendix 3)

Canadian Pandemic Phase

5.2 Larger localized cluster(s) with limited human-to-human transmission are occurring in Canada but human-to-human spread still localized, suggesting that virus is becoming increasingly better adapted to humans but may not yet be fully transmissible (substantial pandemic risk).

Surveillance Objectives/Roles and Responsibilities

Objective:

- to identify, capture epidemiological data and describe the epidemiological characteristics on the first cases and clusters of the novel virus infection in Canada
- to provide data to monitor the containment of the outbreak
- to provide the information to heighten awareness and increase vigilance while ensuring system capacity and resource availability

In addition to phase 5.1 roles and responsibilities:

Federal:

- *Cluster within one P/T*: assist with the coordination and implementation of the outbreak investigation as led by the P/T, act as the liaison with international organisations
- *Clusters in more than one P/T*: coordinate outbreak investigation and act as the liaison between provinces/territories as well as international organisations
- Revise case definitions based on observed clinical presentation of cases

P/T/local:

- *Cluster within one P/T*: lead the outbreak investigation and report to the PHAC (for list of data elements refer to appendix 3)

Table 2.1: National Surveillance Data for the Pandemic Alert Period

Canadian Pandemic Phase
3.0 Outside Canada human infection(s) with a new subtype are occurring, but no human-to-human spread, or at most rare instances of spread to a close contact has been observed. No cases identified in Canada.
National Surveillance Data
Disease surveillance (a) influenza activity level by P/T region (based on *FluWatch* definitions) (b) influenza-like illness (ILI) consultation rate (number of ILI sentinel physician visits/ 1000 consults) (c) number of laboratory-confirmed outbreaks in long-term care facilities (d) number of influenza-associated hospitalizations and influenza-associated deaths in children 0-18 years through sentinel paediatric hospitals (IMPACT[12]) **Laboratory surveillance** (e) percent positive influenza tests (total number of laboratory tests for influenza and number of positive results, by virus type (A or B)) (f) strain characterisation, number identified for each strain and subtype, and percentage of total for approximately 10% of isolates from the sentinel laboratory respiratory virus detection system (g) increased targeted strain characterisation based on risk assessment in areas where animal strains are circulating (h) antiviral resistance testing for influenza isolates **Risk assessment** (i) summary of national/international areas where animal virus activity has been confirmed (j) summary of international activity in humans

[12] The Immunization Monitoring Program ACTive (IMPACT) is a paediatric hospital-based national active surveillance network for adverse events following immunization, vaccine failures and selected infectious diseases in children that are, or are soon to be, vaccine preventable.

Canadian Pandemic Phase

3.1 Single human case(s) with a new subtype detected in Canada. Virus is not known to be spreading from human-to-human, or at most rare instances of spread to a close contact have been observed.

National Surveillance Data

Disease surveillance

(a) influenza activity level by P/T region (based on *FluWatch* definitions)

(b) influenza-like illness (ILI) consultation rate (number ILI sentinel physician visits/ 1000 consults)

(c) number of laboratory-confirmed outbreaks in long-term care facilities

(d) number of influenza-associated hospitalizations and influenza-associated deaths in children 0-18 years through sentinel paediatric hospitals (IMPACT[13])

Laboratory surveillance

(e) percent positive influenza tests (total number of laboratory tests for influenza and number of positive results, by virus type (A or B))

(f) Strain characterisation, number identified for each strain and subtype, and percentage of total for approximately 10% of isolates from the sentinel laboratory respiratory virus detection system

(g) increased targeted strain characterisation based on risk assessment in areas where animal strains are circulating

(h) antiviral resistance testing for influenza isolates

Risk assessment

(i) summary of national/international areas where animal virus activity has been confirmed

(j) summary of international activity in humans

In addition to indicators for 3.0:

(k) detailed epidemiological description and estimation of incubation and communicability periods (e.g. number of secondary cases)

(l) *if antivirals are used for prophylaxis* - antivirals: # patients with ILI after prophylaxis, length of time given prophylaxis, severe adverse events

(m) enhanced laboratory surveillance (increased strain characterisations) targeted to areas where the first case(s) are identified. Includes subtyping samples from contacts with known exposure who report ILI symptoms (based on case by case risk assessment)

(n) monitoring for unusual outbreaks and cluster activity

[13] The Immunization Monitoring Program ACTive (IMPACT) is a paediatric hospital-based national active surveillance network for adverse events following immunization, vaccine failures and selected infectious diseases in children that are, or are soon to be, baccine preventable.

Canadian Pandemic Phase	
4.0	Outside Canada small cluster(s) with limited human-to-human transmission are occurring but spread is highly localized, suggesting that the virus is not well adapted to humans. No cases identified with these cluster(s) have been detected in Canada.
5.0	Outside Canada larger cluster(s) are occurring but human-to-human spread still localized, suggesting that virus is becoming increasingly better adapted to humans but may not yet be fully transmissible (substantial pandemic risk). No cases identified with these clusters have been detected in Canada.

National Surveillance Data

Same data as 3.0:

Disease surveillance

(a) influenza activity level by P/T region (based on *FluWatch* definitions)

(b) influenza-like illness (ILI) consultation rate (number ILI sentinel physician visits/ 1000 consults)

(c) number of laboratory-confirmed outbreaks in long-term care facilities

(d) number of influenza-associated hospitalizations and influenza-associated deaths in children 0-18 years through sentinel paediatric hospitals (IMPACT)

Laboratory surveillance

(e) percent positive influenza tests (total number of laboratory tests for influenza and number of positive results, by virus type (A or B))

(f) strain characterisation, number identified for each strain and subtype, and percentage of total for approximately 10% of isolates from the sentinel laboratory respiratory virus detection system

(g) Increased targeted strain characterisation based on risk assessment in areas where animal strains are circulating

(h) antiviral resistance testing for influenza isolates

Risk assessment

(i) summary of national/international areas where animal virus activity has been confirmed

(j) summary of international activity in humans

Canadian Pandemic Phase

4.1 Single human case(s) with virus that has demonstrated limited human-to-human transmission detected in Canada. No cluster(s) identified in Canada.

4.2 Small localized clusters with limited human-to-human transmission are occurring in Canada but spread is highly localized, suggesting that the virus is not well adapted to humans.

5.1 Single human case(s) with virus that is better adapted to humans detected in Canada. No cluster(s) identified in Canada.

5.2 Larger localized cluster(s) with limited human-to-human transmission are occurring in Canada but human-to-human spread still localized, suggesting that virus is becoming increasingly better adapted to humans but may not yet be fully transmissible (substantial pandemic risk).

National Surveillance Data

Same data as 3.1:

Disease surveillance

(a) influenza activity level by P/T region (based on *FluWatch* definitions)

(b) influenza-like illness (ILI) consultation rate (number ILI sentinel physician visits/ 1000 consults)

(c) number of laboratory-confirmed outbreaks in long-term care facilities

(d) number of influenza-associated hospitalizations and influenza-associated deaths in children 0-18 years through sentinel paediatric hospitals (IMPACT)

Laboratory surveillance

(e) percent positive influenza tests (total number of laboratory tests for influenza and number of positive results, by virus type (A or B))

(f) strain characterisation, number identified for each strain and subtype, and percentage of total for approximately 10% of isolates from the sentinel laboratory respiratory virus detection system

(g) increased targeted strain characterisation based on risk assessment in areas where animal strains are circulating

(h) antiviral resistance testing for influenza isolates

Risk assessment

(i) summary of national/international areas where animal virus activity has been confirmed

(j) summary of international activity in humans

(k) detailed epidemiological description and estimation of incubation and communicability periods (e.g. number of secondary cases)

(l) *if antivirals are used for prophylaxis* - antivirals: # patients with ILI after prophylaxis, length of time given prophylaxis, severe adverse events

(m) enhanced laboratory surveillance (increased strain characterisations) targeted to areas where the first case(s) are identified. Includes subtyping samples from contacts with known exposure who report ILI symptoms (based on case by case risk assessment)

(n) monitoring for unusual outbreaks and cluster activity

In addition to data for 3.1:

(o) # and epidemiological description of settings involved

Pandemic Period

Table 3: Pandemic Period

Canadian Pandemic Phase
6.0 Outside Canada increased and sustained transmission in general population has been observed. No cases have been detected in Canada.
Surveillance Objectives/Roles and Responsibilities
Objective: - to describe the first cases in Canada - to inform the response by tracking occurrence and progression of the pandemic through the population **Federal:** - Provide ongoing leadership - Confirm with the WHO reports of multiple widespread outbreaks with high rates of morbidity/mortality in multiples countries - Conduct regular scanning and verification of national and international surveillance information e.g. Ministries of Health and other international surveillance networks - Evaluate current epidemiology to facilitate prioritisation (if necessary) of scarce resources to high risk groups - Convene meeting with PIC and the national surveillance working group to evaluate situation and determine information needs and frequency of reporting, e.g. geographic regions/specific urban centres or selected population groups/health case settings for ramping up of surveillance activities (e.g. sentinel/non-sentinel surveillance ramp up to increase coverage, specimen collection, collection of mortality data) - Scale up surveillance activities as required (frequency of data collection, additional information needs, dissemination to partners) - Coordinate with P/T's the review and revision of case definition based on current evidence of the clinical spectrum of the disease - Distribute revised data collection forms and database transmission instructions/protocols if not done previously - Prepare to implement the human resources plan developed during phase 1 **P/T/local:** - Have regular contact with key stakeholders within jurisdictions - Ensure surveillance activities are scaled up, resources are in place as necessary, and appropriate action is carried out - Prepare to implement the human resources plan developed during phase 1

Canadian Pandemic Phase

6.1 Single human case(s) with the pandemic virus detected in Canada. No cluster(s) identified in Canada.

Note: It is likely that this phase will have a very short duration and may not occur at all in Canada (i.e., novel virus activity may not be detected prior to the occurrence of a cluster of cases).

Surveillance Objectives/Roles and Responsibilities

Objective:

- to describe the first cases in Canada
- to inform the response by tracking occurrence and progression of the pandemic through the population

In addition to phase 6.0 roles and responsibilities:

Federal:

- Collect, collate and analyse national impact and trends and provide epidemiological summaries to characterize outbreaks and impact using mortality and enhanced surveillance data (age-specific mortality rates, high risk groups)
- Provide epidemiological summaries to characterise outbreaks and impact (mortality, high risk groups, clinical presentation)
- Implement the human resources plan developed during phase 1

P/T/local:

- Collect, collate and analyse P/T impact and trends and provide epidemiological summaries to PHAC to characterize outbreaks and impact using mortality and enhanced surveillance data (age-specific mortality rates, high risk groups, clinical spectrum of the disease)
- Report antiviral use, antiviral-related adverse events to Health Canada, and adverse events following immunization (AEFI) data to PHAC
- Implement the human resources plan developed during phase 1

Canadian Pandemic Phase

6.2 Localized or widespread pandemic activity observed in Canadian population.

Surveillance Objectives/Roles and Responsibilities

Objective:

- to identify and describe the affected population thereby facilitating identification of high risk groups and comparisons between other populations or other influenza season in order to guide public health actions
- to inform the response by tracking occurrence and progression of the pandemic through the population
- to determine triggers bases on decreasing activity levels for implementation of post-pandemic activities in preparations for second and later waves

In addition to phase 6.0 roles and responsibilities:

Federal:

- Scale back to streamlined surveillance (to be further defined)
- Coordinate activities for evaluation and resource planning for subsequent waves

P/T/local:

- Scale back to streamlined surveillance (to be further defined)
- Evaluate performance and plan resources for subsequent waves

Table 3.1: National Surveillance Data for the Pandemic Period

Canadian Pandemic Phase
6.0 Outside Canada increased and sustained transmission in general population has been observed. No cases have been detected in Canada.
National Surveillance Data
Disease surveillance (a) influenza activity level by P/T region (based on *FluWatch* definitions) (b) influenza-like illness (ILI) consultation rate (number of ILI sentinel physician visits/ 1000 consults) (c) number of laboratory-confirmed outbreaks in long-term care facilities (d) number of influenza-associated hospitalizations and influenza-associated deaths in children 0-18 years through sentinel paediatric hospitals (IMPACT[14]) **Laboratory surveillance** (e) percent positive influenza tests (total number of laboratory tests for influenza and number of positive results, by virus type (A or B)) (f) strain characterisation, number identified for each strain and subtype, and percentage of total for approximately 10% of isolates from the sentinel laboratory respiratory virus detection system (g) increased targeted strain characterisation based on risk assessment (h) antiviral resistance testing for influenza isolates **Risk assessment** (i) summary of international activity in humans

[14] The Immunization Monitoring Program ACTive (IMPACT) is a paediatric hospital-based national active surveillance network for adverse events following immunization, vaccine failures and selected infectious diseases in children that are, or are soon to be, baccine preventable.

Canadian Pandemic Phase

6.1 Single human case(s) with the pandemic virus detected in Canada. No cluster(s) identified in Canada.

Note: It is likely that this phase will have a very short duration and may not occur at all in Canada (i.e., novel virus activity may not be detected prior to the occurrence of a cluster of cases).

National Surveillance Data

Same data as 5.1, 5.2:

Disease surveillance

(a) influenza activity level by P/T region (based on *FluWatch* definitions)

(b) influenza-like illness (ILI) consultation rate (number of ILI sentinel physician visits/ 1000 consults)

(c) number of laboratory-confirmed outbreaks in long-term care facilities

(d) number of influenza-associated hospitalizations and influenza-associated deaths in children 0-18 years through sentinel paediatric hospitals (IMPACT)

Laboratory surveillance

(e) percent positive influenza tests (total number of laboratory tests for influenza and number of positive results, by virus type (A or B))

(f) strain characterisation, number identified for each strain and subtype, and percentage of total for approximately 10% of isolates from the sentinel laboratory respiratory virus detection system

(g) increased targeted strain characterisation based on risk assessment

(h) antiviral resistance testing for influenza isolates

Risk assessment

(i) summary of international activity in humans

(j) detailed epidemiological description and estimation of incubation and communicability periods (e.g. number of secondary cases)

(k) *if antivirals are used for prophylaxis* - antivirals: # patients with ILI after prophylaxis, length of time given prophylaxis

(l) enhanced laboratory surveillance (increased strain characterisations) targeted to areas where the first case(s) are identified. Includes subtyping samples from contacts with known exposure who report ILI symptoms (based on case by case risk assessment)

(m) monitoring for unusual outbreaks and cluster activity

(n) # and epidemiological description of settings involved

In addition to data for 5.1, 5.2:

(o) # surveillance regions with widespread activity, based on FluWatch definitions

NOTE: Presently, there is no mechanism for collecting mortality data on a real-time basis. This is a recognized gap in information for monitoring of severity of the pandemic. While required during inter-pandemic phases to monitor severity of annual influenza epidemics, establish baseline expected seasonal mortality trends and detect potential signals, real-time mortality surveillance is recommended at the height of a pandemic to describe the severity of the pandemic, identify high risk age groups and provide crude indications of intervention effectiveness. As well, during this heightened phase of the pandemic, resources are expected to be scarce and due to low participation/reporting rates, existing surveillance activities may no longer provide accurate or complete data. While routine surveillance activities are not expected to stop entirely, participation rates may be very low and therefore data quality and representativeness may be poor. As such, simple and flexible systems for surveillance are key. In addition to routine activities that are established and maintained, new and recommended activities, such as real-time mortality surveillance, should be simple and flexible.

Canadian Pandemic Phase
6.2 Localized or widespread pandemic activity observed in Canadian population.
National Surveillance Data
Streamlined surveillance for activity and severity: influenza activity levels (using modified indicators for assessment). Other severity indicators under consideration, as above.

Post-Pandemic Period

While the post-pandemic period suggests that the pandemic waves have ended and that the virus is no longer causing significant outbreaks in the population, it is acknowledged that the virus will continue to circulate. The following outlines activities to evaluate the surveillance activities during the pandemic, however, surveillance and laboratory activities during this time should continue to monitor changes in the pandemic virus.

Table 4: Post-Pandemic Period

Canadian Pandemic Phase
Post-Pandemic Reports of case counts and other broad indicators of pandemic activity in Canada suggest that the pandemic virus is no longer causing significant illness in the population.
Surveillance Objectives/Roles and Responsibilities
Objective: - to assess the seasonal burden of influenza and to detect unusual events including unusual or new strains, unusual outcomes/syndromes, or unusual distribution or severity of influenza within the population - to evaluate and assess system's ability to provide information useful for reducing morbidity and mortality during a pandemic - to summarise the epidemiological characteristics of the pandemic waves in Canada - to continue to monitor changes in the pandemic virus **Federal:** - Provide ongoing leadership - Confirm with WHO end of global widespread novel virus activity - Resume regular scanning and verification of national and international surveillance information e.g. Ministries of Health and other international surveillance networks - Evaluate current epidemiology and end of pandemic activity - Convene meeting with PIC and the national surveillance working group to determine any special information needs for the evaluation of surveillance system performance during the pandemic waves - Provide epidemiological summaries to characterise the impact of the pandemic waves in Canada (spread, age-specific morbidity and mortality rates, high risk groups) - Coordinate activities for evaluation and resource planning, including special studies for surveillance of delayed effects of the pandemic virus (e.g. neurological) - Resume interpandemic influenza surveillance via FluWatch (except in case of additional information needs for evaluation) - Scale back frequency and change focus of regular updates via e-mail, fax, teleconferencing and web postings to meet the needs of evaluation and planning activities - Evaluate surveillance system performance and plan improvements as required **P/T/local:** - Resume interpandemic FluWatch and jurisdiction-specific activities - Evaluate surveillance system performance and plan improvements as required and share the information with F/P/T/local stakeholders

Appendix 1: Generic Serosurvey Protocol of People Exposed to Influenza

Drafted by: The Vaccine Preventable and Respiratory Infections Surveillance (VPRIS) working group, April 2006.

Background

To understand the risk of new influenza strains to humans, it is important to know their capability to infect people and cause disease. During the recent years, several avian influenza strains caused outbreaks in animals with limited secondary transmission to humans. These human cases may potentially transmit their influenza to their various types of contacts: household, healthcare workers or social contacts. In the multiple possible scenarios regarding pandemic influenza, one expects strains that will become pandemic to initially be acquired from animals, cause limited transmission and progressively hone their capacity to infect humans through adaptative mutations or reassortment.

To identify potential pandemic strains, it is important to be able to define the transmissibility of these strains to humans as well as their virulence which is their capacity to cause serious disease. When an influenza strain infects a person, it will trigger an antibody immune response specific to this strain. The presence of these antibodies is an accurate marker of infection even in absence of symptoms. Serosurveys of persons who have been in contact with infected animals or humans are therefore helpful to estimate the transmissibility of new strains and their virulence when coupled with clinical symptoms.

This generic protocol describes a methodology to conduct serosurveys in people who have been in contact with infected animals or humans. This methodology has to be adapted to the specific context of the outbreak. While the influenza strains to investigate may be of swine origin or from another type of animal, the most likely hosts of strains that will raise concerns are birds. For simplicity, the protocol will refer to avian strain when speaking of the implicated animal strain.

This protocol is a synthesis of several serosurvey protocols used elsewhere in the world after or during outbreaks of avian influenza. It describes a method that can be used with the three most frequent types of contacts investigated: workers and people in contact with infected animals, household contacts of human cases and healthcare workers in contact with patients. The study design and variables to collect will vary for each situation but laboratory assessment is common to all studies. The proposed questionnaire presents a series of questions and variables that may or may not apply to a specific situation. It is not meant to be exhaustive but can serve as a basis to construct the questionnaire adapted to the specific outbreak. Investigators should choose the items most relevant to their situation and should consider adding other questions that have not been presented but may be important in their context.

Objective

To estimate the prevalence of avian influenza-specific antibodies in persons exposed to avian influenza infected animals or patients, to describe the spectrum of illness, and assess epidemiologically associated risk factors for having antibodies to avian influenza.

Study design

Two types of surveys can be conducted. Prospective studies estimate the incidence of infections whereas retrospective studies estimate prevalence of past exposures to avian influenza without confirming the time when the infection occurred.

Description and source of study population and catchment areas

The target populations for the study should be defined with inclusion criteria describing the demographic characteristics of participants (age, gender, occupation, residence, etc…) and the type and timing of exposure to infected animals or patients.

Exposed and non exposed participants

Seroprevalence studies that include only a group of exposed persons are useful but may not be adequate to identify risk factors outside the direct exposure to an infected animal or patient that contributed to infection. The inclusion of a group of participants who have not been exposed to infected animals or patients will generally provide a different perspective on other factors or behaviours that contributed to infection. Therefore the enrolment of a group of non-exposed participants is generally recommendable.

Enrolment and data collection

The site of enrolment, the method to contact participants, to obtain their informed consent, to collect information and blood specimen should be described. It may be useful to plan to ask participants who have positive test results for antibody to avian influenza if they would agree to participate in follow-up studies. The follow-up could include 1) clinical information on an influenza-like illness if not yet available; 2) testing of banked sera if available for comparison of antibody titers to assist with the interpretation of test results; and/or 3) testing of an additional blood sample to assist with the interpretation of test results. The participant may choose to participate in any of the three components of the study that are applicable and may refuse to participate in any of them.

Variables

Variables to collect will vary according to the specific event. However the set of common characteristics that are interesting include: Age, sex, area of residence, primary occupation, medical history and underlying conditions, smoking habits, prior influenza vaccination, number of persons in the household, contacts with pet animals, travel, activities where contacts with animal may have occurred, household and non household contacts with a sick person, types of contacts, presence of symptoms of respiratory infection, duration of disease, medical consultation, hospitalization, outcome.

For occupational exposure, specific questions related to each activity and the protective measures used should be collected.

The sample questionnaire includes several variables collected during previous serosurveys and can serve as a starting point to develop the final questionnaire to use during a specific event. The questions have been grouped into sections that address specific issues. Some or all of these sections may be relevant during an outbreak and selection should be made accordingly. This questionnaire is not meant to be exhaustive and should be adapted to individual situation.

Laboratory methods

As the antibody response requires time to become detectable, specimens collected early after a contact may still be negative despite the presence of an ongoing infection whereas negative specimens collected ≥ 21 days after the last possible time of exposure rule out an infection. This concept is important for prospective studies because they will require the collection of two blood specimens: one at time of enrolment and a second one collected ≥ 21 days after the last possible time of exposure. Retrospective studies will collect only one specimen taken ≥ 21 days after the last possible time of exposure. As antibodies persist for months, a retrospective study has little risks of false negative results if conducted within six months of exposure.

The blood should be centrifuged, and serum separated, aliquoted into multiple cryovials and, labelled. If tested within a week, the serum can be kept in the refrigerator. If not tested immediately sera should be frozen at minus 20 °C. For long term conservation, sera should be frozen at minus 70 °C. Determination of antibodies to avian influenza can be done through a variety of assays including haemagglutination inhibition, neutralization assays including micro-neutralization and western blot (Ref: Rowe T, Abernathy RA, Hu-Primmer J, Thompson WW, Lu X, Lim W, Fukuda K, Cox NJ, Katz JM. Detection of antibody to avian influenza A (H5N1) virus in human serum by using a combination of serologic assays. Journal of Clinical Microbiology 1999;37:937-43) .

Sample size and statistical power

The precision of the estimate will vary with the expected prevalence of infection. The precision of prevalence in studies with only one group of exposed people is presented Table 1. Table 2 presents the number of participants per group required for different expected prevalence to obtain an 80% power.

Table 1 Sample size required when testing only one group of exposed persons by expected prevalence and desired precision

Prevalence	Precision			
	±1%	±2%	±5%	±10%
1%	380	95	15	4
5%	1,825	456	73	18
10%	3,457	864	138	35
15%	4,898	1,225	196	49

Table 2 Sample size of each group (exposed and non-exposed) by expected level of prevalence in the exposed and non exposed group assuming an alpha threshold of 5% and a power of 80%

Prevalence in the exposed group	Prevalence in the control group			
	1%	2%	3%	5%
5%	332	653	1604	Infinite
10%	121	161	221	474
15%	71	86	104	159
20%	50	57	65	88
25%	37	42	46	58

While in many circumstances the number of people exposed will not be sufficient to obtain precise estimates, studies will still be valuable to demonstrate if transmission appears to be efficient or small.

Statistical Analysis

The primary outcome is the seroprevalence of antibody in the exposed and non exposed groups. Risk factors should be sought comparing the characteristics of positive and negative exposed patients and comparing the exposed and unexposed participants.

Ethics

Seroprevalence studies must respect the highest ethical standards for protection of the research subject and be approved by a recognized Research Ethics Board. Signed informed consent should be obtained from each subject. In respect of the individual's privacy, a study code number must be assigned to all research participants. This will allow for confidentiality of information to be maintained to the extent legally possible. A record linking the participant's name and study code number should be kept secure and confidential by the investigator. Personal information should never be divulged to a third party and only aggregate results presented at conferences and in publications. Patients should be informed that testing will only be done for the presence of antibody to influenza and other respiratory viruses, but that under no circumstance will their sample be screened for unrelated viruses such as HIV.

The benefit of these studies is to increase knowledge concerning the risk for infection from avian influenza viruses. There may be no direct benefit to the research subject who is donating blood for these studies. If antibody is detected among participants, the study may also help determine which types of exposures are associated with an increased risk of infection. The potential discomforts and hazards of seroprevalence studies are minimal. These include risks associated with venipuncture, which may cause temporary discomfort at the procedure site. Participants should have access to contact phone numbers in the consent form in the event of adverse reactions to blood draws or general concerns during the course of the study. The participant should be free to withdraw his/her sample from the serum bank and/or participation in the study at any time after the blood is drawn.

Annex 1
Sample Questionnaire for Avian influenza serosurvey

Study ID #_____

Interview Date (dd/mm/yyyy):	**Interviewer:**

Nominal data : *(Can be put on a separate form)*

Family Name (Last Name):	**Given Name (First Name):**
Date of Birth (dd/ mm/yyyy):	**Home Telephone Number:**
Address:	**Work Telephone Number:**
City:	**Postal code:**

Non nominal data

First three digit of the postal code:	**Sex :** **Male** ◯ **Female** ◯
Age (years):	**What is your primary occupation?**

Medical History

Have you ever been diagnosed by a doctor with any of the following chronic medical conditions?

Asthma	No ◯	Yes ◯	Unknown ◯
Emphysema or chronic bronchitis	No ◯	Yes ◯	Unknown ◯
Other chronic lung disease	No ◯	Yes ◯	Unknown ◯
Chronic heart disease	No ◯	Yes ◯	Unknown ◯
Diabetes mellitus	No ◯	Yes ◯	Unknown ◯
Kidney failure	No ◯	Yes ◯	Unknown ◯
Immunodeficiency	No ◯	Yes ◯	Unknown ◯
Cancer	No ◯	Yes ◯	Unknown ◯
Other _____	No ◯	Yes ◯	Unknown ◯
Are you taking oral steroids daily?	No ◯	Yes ◯	Unknown ◯
In the past year, have you smoked a total of 5 or more packs of cigarettes or other tobacco products?		No ◯	Yes ◯
If yes: On average, how many packs of cigarettes or other tobacco products do you smoke per day?			_____ (packs per day)
How many years have you smoked?			_____ (years)
Did you receive a flu shot during the past fall or winter?		No ◯	Yes ◯

Household data

How many total individuals (including you) live in your household? _____

How many individuals are there in each of the following age categories

Age Categories: 0 - 5 years _____ 6 - 17 year _____ 18 - 64 years _____ 65 + years _____

In your residence, is there a pet animal?	No ◯	Yes ◯	Unknown ◯
If yes, is it a: Bird	No ◯	Yes ◯	
Cat	No ◯	Yes ◯	
Dog	No ◯	Yes ◯	
Another animal (specify): _____	No ◯	Yes ◯	
Ecluding you, do any of your household members currently work at:			
Any activities related to raising or processing poultry?	No ◯	Yes ◯	Unknown ◯
Any activities related to raising or processing pigs?	No ◯	Yes ◯	Unknown ◯
Any activities related to raising or processing other animals?	No ◯	Yes ◯	Unknown ◯
Is a health care worker?	No ◯	Yes ◯	Unknown ◯
Does anyone **excluding you** smoke cigarettes inside your household?	No ◯	Yes ◯	Unknown ◯

Travel outside region of residence

Did you travel outside your area of residence in the month before (put the exposure period)	No ◯	Yes ◯	Unknown ◯

If yes, Where did you go? _____

What date did you leave? _____/_____/_____

At what date did you come back? _____/_____/_____

Symptoms of respiratory infection DURING (period of interest to define), did you newly develop any of the following symptoms?

Have you ever been diagnosed by a doctor with any of the following chronic medical conditions?

			Date of onset
Feverishness	No ◯	Yes ◯	_____
Measured temperature ≥ 38°C	No ◯	Yes ◯	_____
Cough	No ◯	Yes ◯	_____
Sore throat	No ◯	Yes ◯	_____
Runny nose	No ◯	Yes ◯	_____
Body aches	No ◯	Yes ◯	_____
Headache	No ◯	Yes ◯	_____
Red or watery eyes	No ◯	Yes ◯	_____

If you were sick:

How many days did your illness last? _____(days)

Were you so ill that you could not come to work?	No ◯	Yes ◯
Did you seek medical attention?	No ◯	No ◯
Were you hospitalized?	No ◯	No ◯

During the exposure period (to define), did you do the following activities?

Play outdoors?	No ◯	Yes ◯	Unknown ◯
Visit bird parks or aviaries?	No ◯	Yes ◯	Unknown ◯
Visit any place where there were wild birds (sparrows, robins, etc.)?	No ◯	Yes ◯	Unknown ◯
Visit any place where there were pet birds (song birds, parrots, etc.)?	No ◯	Yes ◯	Unknown ◯
Visit any place where there were wild pigeons (i.e. in a park)?	No ◯	Yes ◯	Unknown ◯
Visit a poultry farm?	No ◯	Yes ◯	Unknown ◯
Visit another type of farm?	No ◯	Yes ◯	Unknown ◯
Clean up an area where wild bird feces were visible?	No ◯	Yes ◯	Unknown ◯
Clean up pet bird feces?	No ◯	Yes ◯	Unknown ◯
Clean up an area where poultry feces were visible?	No ◯	Yes ◯	Unknown ◯
Visit any place where there were other types of animals than birds?	No ◯	Yes ◯	Unknown ◯

Household contacts with a sick person

How many days did you spend with the patient between:

Period 1: (7 days before onset of disease in the index case): _____days

Period 2: (7 days from onset of disease in the index case): _____days

Did you talk with ill person?	No ◯	Yes ◯	Unknown ◯
Did you eat meal with ill person?	No ◯	Yes ◯	Unknown ◯
Did you share utensils or cups with ill person?	No ◯	Yes ◯	Unknown ◯
Did you hug ill person?	No ◯	Yes ◯	Unknown ◯
Did you kiss ill person?	No ◯	Yes ◯	Unknown ◯
Did you take care of this ill person?	No ◯	Yes ◯	Unknown ◯
Did you share the same sleeping room as ill person(s)?	No ◯	Yes ◯	Unknown ◯
Did you share bed with ill person(s)?	No ◯	Yes ◯	Unknown ◯

Non household contacts with a sick person

During the time from_____ to _____ (Period to define)

Have you been in contact with anyone ill with fever, cough, or sore throat?	No ◯	Yes ◯	Unknown ◯
If yes,			
Were you ever in an enclosed area (e.g. room or vehicle/bus/car) with this ill person?	No ◯	Yes ◯	Unknown ◯
Were you ever within 3 meters of this ill person?	No ◯	Yes ◯	Unknown ◯
Did you talk with ill person?	No ◯	Yes ◯	Unknown ◯
Did you eat meal with ill person?	No ◯	Yes ◯	Unknown ◯
Did you share utensils or cups with ill person?	No ◯	Yes ◯	Unknown ◯
Did you hug ill person?	No ◯	Yes ◯	Unknown ◯
Did you kiss ill person?	No ◯	Yes ◯	Unknown ◯
Did you take care of this ill person?	No ◯	Yes ◯	Unknown ◯
Did you share the same sleeping room as ill person(s)	No ◯	Yes ◯	Unknown ◯
Did you share bed with ill person(s)	No ◯	Yes ◯	Unknown ◯

Poultry and Other Animal Exposures

Did you **ever**:

Live or work on a poultry farm?	No ◯	Yes ◯	Unknown ◯
Live or work on a pig farm?	No ◯	Yes ◯	Unknown ◯
Work as a butcher?	No ◯	Yes ◯	Unknown ◯
Work in a restaurant preparing poultry or pork?	No ◯	Yes ◯	Unknown ◯
Work in any other aspect of poultry or pig industry?	No ◯	Yes ◯	Unknown ◯

If yes Specify:_____

If yes to any of the above, during what time period?_____/_____ (mo/ yr) through_____/_____(mo / yr)

Have you ever hunted birds or waterfowl? No ◯ Yes ◯

If yes, what types: _____

Occupational exposure to poultry

During the period (period of interest to define), have you worked in any of the following settings?

Poultry hatchery	No ◯	Yes ◯
Poultry farm	No ◯	Yes ◯
Poultry slaughter	No ◯	Yes ◯
Poultry depopulation operations	No ◯	Yes ◯
Poultry necropsy	No ◯	Yes ◯
Laboratory processing of poultry pathogens (e.g. avian viruses)	No ◯	Yes ◯
Other, please specify _____	No ◯	Yes ◯

If yes to any of the above

how many years have you worked with poultry? _____ (years)

how often did you work with poultry on average?_____(day/week)_____(weeks/year)

During the period (period of interest to define), have you worked with any of the following types of live poultry or waterfowl?

Chicken	No ◯	Yes ◯
Turkey	No ◯	Yes ◯
Duck	No ◯	Yes ◯
Quail	No ◯	Yes ◯
Goose	No ◯	Yes ◯

Other type of poultry, please specify _____

During the period (period of interest to define), in which of the following activities did you engage?

Come within 1 meter of live poultry	No ◯	Yes ◯
Touch live poultry	No ◯	Yes ◯
Touch ill or diseased poultry	No ◯	Yes ◯
Slaughter poultry	No ◯	Yes ◯
Clean poultry stalls, cages or trucks	No ◯	Yes ◯
Process poultry specimens in a lab	No ◯	Yes ◯

Other types of work with poultry _____

If exposed to infected poultry

Please indicate if you engaged in any of the following tasks and, if so, how many days per week on average did you engage in the specified activity for at least part of the day. For each activity, please specify if you wore protective gear while engaging in the specific task.

Came within 1 meter of healthy birds? No ◯ Yes ◯ *If yes*:_____(days/wk)

- Wore gloves? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore mask? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore eye protection? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯

Came within 1 meter of ill birds? No ◯ Yes ◯ *If yes*:_____(days/wk)

- Wore gloves? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore mask? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore eye protection? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯

Came within 1 meter of birds that tested positive for avian influenza? No ◯ Yes ◯ *If yes*:_____(days/wk)

- Wore gloves? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore mask? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore eye protection? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯

Touched healthy birds? No ◯ Yes ◯ *If yes*:_____(days/wk)

- Wore gloves? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore mask? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore eye protection? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯

Touched live birds that were ill? No ◯ Yes ◯ *If yes*:_____(days/wk)

- Wore gloves? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore mask? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore eye protection? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯

Touched dead birds? No ◯ Yes ◯ *If yes*:_____(days/wk)

- Wore gloves? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore mask? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore eye protection? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯

Touched live or dead birds that tested positive for avian influenza? No ◯ Yes ◯ *If yes*:_____(days/wk)

- Wore gloves? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore mask? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore eye protection? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯

Collected cloacal or endotracheal swabs? No ◯ Yes ◯ *If yes*:_____(days/wk)

- Wore gloves? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore mask? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
- Wore eye protection? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯

Collected environmental swabs from chicken or turkey houses? No ◯ Yes ◯ *If yes*:_____(days/wk)

Wore gloves? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
Wore mask? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
Wore eye protection? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯

Have you been present for onloading or offloading of dead birds? No ◯ Yes ◯ *If yes*:_____(days/wk)

Wore gloves? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
Wore mask? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
Wore eye protection? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯

Have you been present for incineration of birds? No ◯ Yes ◯ *If yes*:_____(days/wk)

Wore gloves? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
Wore mask? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯
Wore eye protection? Never ◯ Sometimes ◯ Most of the time ◯ Always ◯

If you wore a mask for any of the activities described above, what type of mask did you wear?

_____

Please describe any other activities that brought you near to or in contact with poultry during (period of exposure)_____

Hospital Work and exposure to patients

What is your occupation in the hospital?

Nurse ◯ Nurses aid ◯ Doctor ◯ Laboratory worker ◯ Cleaner ◯
Other _____

What department(s) do you work at? _____
What floor(s) do you work on? _____ (list all floors)
How many hours per week do you work in the hospital? _____(hours per week)

Do you work at any other hospital? No ◯ Yes ◯

If "yes", what other hospitals do you work at? _____

Have you been in the same room as one of the avian flu patients? No ◯ Yes ◯ Unknown ◯

If yes,
How many hours in total have you been in the same room with all the avian flu patients?_____(hours)
What was the last date that you have been in the same room with a patient? _____/_____/_____ (dd-mm-yyyy)

Were the avian flu patients wearing masks? No ◯ Yes ◯ Unknown ◯
Did you touch any of the avian flu patients? No ◯ Yes ◯ Unknown ◯
When you were in the same room as an avian flu patient, did you wear a mask? No ◯ Yes ◯ Unknown ◯

If "yes", indicate what type of mask: N95 ◯ Surgical mask ◯ Other mask: _____

Did you always wear a mask when you provided care? No ◯ Yes ◯ Unknown ◯
When you were in the same room as an avian flu patient, did you wear any eye protection? No ◯ Yes ◯ Unknown ◯

If "yes" indicate what type of eye protection: Goggles ◯ Glasses ◯ Face shield ◯ Other: _____

Did you always wear eye protection when you provided care?	No ◯	Yes ◯	Unknown ◯
When you were in the same room as an avian flu patient, did you wear gloves?	No ◯	Yes ◯	Unknown ◯

If "yes"

Did you always wear gloves when you provided care?	No ◯	Yes ◯	Unknown ◯

Have you been involved in performing or assisting to any of the following high risk procedures with avian flu patients :

Nebulized therapies	No ◯	Yes ◯
Aerosol humidification	No ◯	Yes ◯
Non-invasive ventilation (CPAP, BiPAP)	No ◯	Yes ◯
Use of bag-valve mask to ventilate a patient	No ◯	Yes ◯
Endotracheal intubation	No ◯	Yes ◯
Airway suctioning	No ◯	Yes ◯
Sputum induction	No ◯	Yes ◯
Tube or needle thoracotomy	No ◯	Yes ◯
Bronchoscopy or other upper airway endoscopy	No ◯	Yes ◯
Tracheostomy	No ◯	Yes ◯
Open Thoracotomy	No ◯	Yes ◯
When you did these procedures, did you wear a mask?	No ◯	Yes ◯

If "yes", indicate what type of mask: N95 ◯ Surgical mask ◯ Other mask: _____

When you did these procedures, did you wear eye protection?	No ◯	Yes ◯

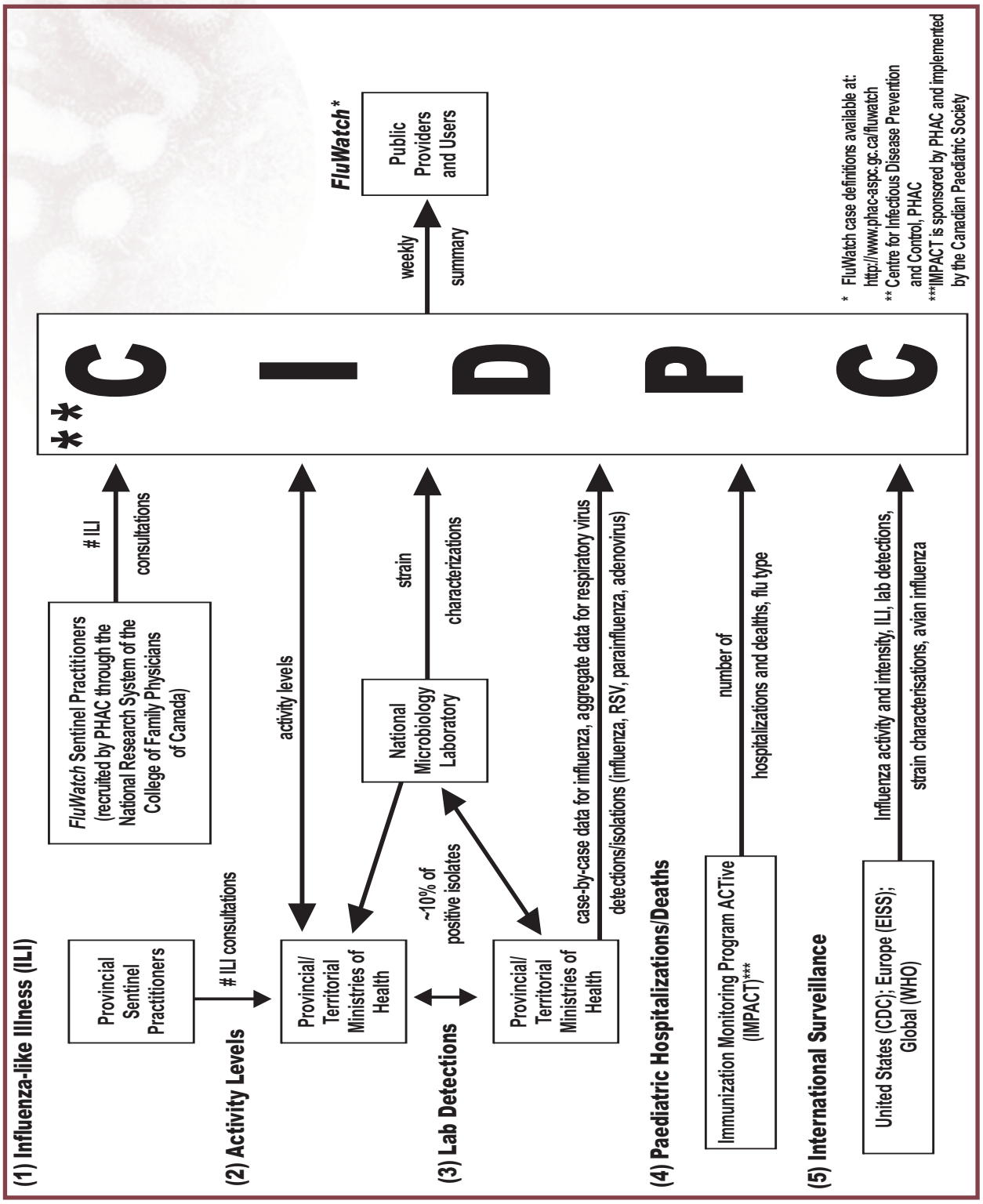
If "yes" indicate what type of eye protection: Goggles ◯ Glasses ◯ Face shield ◯ Other: _____

Did you take the antiviral drug "Tamiflu" (oseltamivir) since (period of interest)?	No ◯	Yes ◯	Unknown ◯

If "yes", why did you take it because

- You had flu symptoms ◯
- You had direct contact with an avian flu patient ◯
- No direct contact with an avian flu patient but there were cases in the hospital ◯

Appendix 2: National FluWatch Influenza Surveillance System



Appendix 3: National SRI Investigation Report Form Data Elements

(please refer to form for definitions: www.phac-aspc.gc.ca)

Reporting Information

- ✓ Name/affiliation of person making report
- ✓ Reporting contact phone number
- ✓ Date of Report

Patient Information

- ✓ Gender
- ✓ Date of Birth
- ✓ Age at outset
- ✓ Forward Sorting Locator
- ✓ City of residence
- ✓ Health unit of residence
- ✓ Occupation

Surveillance definition algorithm

- ✓ Hospitalized patients: symptoms
- ✓ Epi-link/Risk factors
- ✓ Post-mortem
- ✓ Case classification
- ✓ Isolation date

Clinical Information

- ✓ Clinical presentation
- ✓ Symptoms onset date
- ✓ Was patient hospitalized (date of admission/date of discharge)
- ✓ Course of illness
- ✓ Disposition at time of report

Underling Illness

- ✓ Chronic heart disease
- ✓ Lung disease
- ✓ Diabetes
- ✓ Immune suppressed
- ✓ Kidney disease
- ✓ Other

Travel Related

- ✓ Travel to Zone of Re-emergency/ Emergency (ZRE) or H5N1 affected area
- ✓ Country/Hotel (residence)
- ✓ Date of arrival/date of departure
- ✓ Part of a tour
- ✓ Ill during flight
- ✓ Flight number
- ✓ Carrier
- ✓ Seat
- ✓ City of origin
- ✓ Date of flight

Exposure history

- ✓ Contact of previously identified SRI case
- ✓ Contact case status
- ✓ Type of contact
- ✓ Date of first contact
- ✓ Date of last contact
- ✓ Contact with HCW
- ✓ Contact with traveller to ZRE of H5N1 affected area
- ✓ Contact with laboratory worker who works directly with emerging or re-emerging pathogens

Laboratory Testing

- ✓ SRI Lab tracking code
- ✓ Date specimen collected
- ✓ Specimen source
- ✓ Test method
- ✓ Test result
- ✓ Date test performed
- ✓ Comments

Glossary of Terms and List of Acronyms

Glossary of Terms and List of Acronyms

A	
ACD	Acute and communicable disease prevention
Acute	Short term, intense symptomatology or pathology, as distinct from chronic. Many diseases have an acute phase and a chronic phase. This distinction is sometimes used in treatments.
Acute care	Services provided by physicians and other health professionals and staff in the community and in hospitals. These include emergency, general medical and surgical, psychiatric, obstetric and diagnostic services.
AEFI	Adverse Event Following Immunization*
Alternate level of care *See also Acute care, InterQual criteria*	Alternative care that, had it been available, would have been more appropriate for a person in an acute care hospital who does not meet the criteria for acute care.
Amantadine	An antiviral agent indicated in adults and children >1 year for the treatment of illness due to influenza and for prophylaxis following exposure to influenza type A viruses. It has no effect against the influenza type B virus.
Antigen	Any molecule that is recognized by the immune system and that triggers an immune response, such as release of antibodies.
Antigenic drift	A gradual change of the hemagglutinin or neuraminidase proteins on the surface of a particular strain of influenza virus occurring in response to host antibodies in humans who have been exposed to it. It occurs on an ongoing basis in both type A and type B influenza strains and necessitates ongoing changes in influenza vaccines.
Antigenic shift	The movement of a type A influenza virus strain from other species into humans. The novel strain emerges by reassortment with circulating human influenza strains or by infecting humans directly. Because they flourish in the face of global susceptibility, viruses that have undergone antigenic shift usually create pandemics.
Antibody	Protein molecules that are produced and secreted by certain types of white cells in response to stimulation by an antigen.

B	
Bed *(Institutional Bed)*	In any institution a "bed" includes infrastructure support, including staffing, that is required to care for the patient in that bed. Therefore the requirements for a bed in an intensive care unit, for example, include all the support required for a patient to be cared for at that level.

C	
Case weight	A measure representing the relative resources consumed by different types of hospital cases, distinguishing simple from complex cases.
CCMOH	Council of Chief Medical Officers of Health*
Cross-resistance	The development of strains of a pathogen that not only withstands the effects of a given antimicrobial agent, but other chemically related agents as well.
CDC	United States Centers for Disease Control and Prevention, a federal agency of the United States Department of Health and Human Services
CDPE	Center for Disease Prevention and Epidemiology
CEPR	Centre for Emergency Preparedness and Response (Public Health Agency of Canada)*
CIDPC	Centre for Infectious Disease Prevention and Control (Public Health Agency of Canada)*
CLSN	Canadian Laboratory Surveillance Network
CPHLN	Canadian Public Health Laboratory Network

D	
DFA	Direct fluorescent antibody

E	
EHS	Emergency Health Services*
EIA	Enzyme immunoassay
ESS	Emergency Social Services*
Epidemic	An outbreak of infection that spreads rapidly and affects many individuals in a given area or population at the same time.

Epidemiology	The study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to control of health problems.[1]

F	
Flu	Another name for influenza infection, although it is often mistakenly used in reference to gastrointestinal and other types of clinical illness.
F/P/T	Federal, Provincial and Territorial governments (noun)* or Federal, Provincial and Territorial (adjective)

G	
Goblet cell	A mucous gland in the epithelial lining of specific mucus-secreting passages of the respiratory tract. Mucigen droplets swell the upper portion of the cell, giving it a goblet-like shape.

H	
H1N1	A strain of influenza type A virus that caused the pandemic infection of 1918-1919 and that continues to circulate in humans.
H3N2	A strain of influenza type A virus that caused the pandemic infection of 1968-1969. Of the three influenza viruses that currently circulate in humans, this type causes the greatest morbidity and mortality.
H5N1	A strain of influenza type A virus that moved in 1997 from poultry to humans. While the outbreak of this virus was rapidly contained, it produced significant morbidity and mortality in persons who became infected, probably from direct contact with infected poultry. In 2003 a slightly different strain of H5N1 started circulating in avian species in Asia. As of 2005 this strain has become virtually endemic in the avian population, has infected other species such as swine and felines and has resulted in several fatal human cases.
Hemagglutinin (H)	An agglutinating protein antigen spiking from the surface of the influenza virus. Differences in the amino acid sequencing of the HA antibody give rise to the different subtypes of type A virus (e.g. H1, H2, H3).
Health Care Worker (HCW) *with close patient contact*	Persons who work in settings where essential health care is provided and who during the pandemic would be working within 1 meter of any patients/residents with or without personal protective equipment. *Note: This definition was developed to facilitate pandemic planning regarding the identification of specific groups that may be targeted as part of the antiviral and vaccine strategies. It has been endorsed by the Pandemic Influenza Committee for this purpose but may not be well recognized outside of this group.*

Health Care Worker (HCW) *without close patient contact*	Persons who work in settings where essential health care is provided and who during the pandemic would not be expected to work within 1 meter of any patients/residents. *Note: This definition was developed to facilitate pandemic planning regarding the identification of specific groups that may be targeted as part of the antiviral and vaccine strategies. It has been endorsed by the Pandemic Influenza Committee for this purpose but may not be well recognized outside of this group.*
Health status	The state of health of an individual or a population, as in community health status.
HECN	Health Emergency Communications Network
High-risk groups	Those groups in which epidemiological evidence indicates there is an increased risk of contracting a disease.

I	
IFA	Immunofluorescence assay
IHR	International Health Regulations
IMPACT	Immunization Monitoring Program, ACTive: a paediatric surveillance network
ILI	Influenza-like illness
Inactivated vaccine	A vaccine prepared from killed viruses that no longer retain their infective properties.
Influenza	A highly contagious, febrile, acute respiratory infection of the nose, throat, bronchial tubes, and lungs caused by the influenza virus. It is responsible for severe and potentially fatal clinical illness of epidemic and pandemic proportions.
Influenza type A	A category of influenza virus characterized by specific internal proteins and further subgrouped according to variations in their two surface proteins (hemagglutinin and neuraminidase). It infects animals as well as humans and has caused the pandemic influenza infections occurring in this century.
Influenza type B	A category of influenza virus characterized by specific internal proteins. It infects only humans, causes less severe clinical illness than type A, and spreads in regional rather than pandemic outbreaks.
Influenza type C	A category of influenza virus characterized by specific internal proteins. It does not cause significant clinical illness.

Interpandemic Period	The interval between the last pandemic and the onset of the Pandemic Alert Period. During this period no new virus subtypes have been detected in humans although an influenza virus subtype that has caused human infection may be present in animals.
Isolate	A pure specimen obtained by culture.
Isolation *(as used in epidemiology)*	Separation, for the period of communicability, of infected persons or animals from others in such places and under such conditions as to prevent or limit the direct or indirect transmission or the infectious agent from those infected to those who are susceptible or who may spread the agent to others.[1]
Infection	Condition in which virulent organisms are able to multiply within the body and cause a response from the host's immune defences. Infection may or may not lead to clinical disease.
Infectious	Capable of being transmitted by infection, with or without actual contact.
Inpatient	An individual who receives health care services while admitted in a health care facility overnight or longer.
InterQual criteria. *See also* **Alternate level of care**	A set of measurable clinical indicators, as well as diagnostic and therapeutic services, reflecting the need for hospitalization. Rather than being based on diagnosis, they consider the level of illness of the patient and the services required; thus they serve as the criteria for all acute hospital care, regardless of location or size of the hospital. The criteria are grouped into 14 body systems, and there are three sets of criteria for each body system: Severity of Illness, Intensity of Service, and Discharge Screens.

K

Key health sector decision makers	Persons whose decision-making authority is necessary for implementing and maintaining the health sector response to pandemic influenza. *Note: This definition was developed to facilitate pandemic planning regarding the identification of specific groups that may be targeted as part of specific public health interventions. It has been endorsed by the Pandemic Influenza Committee for this purpose but may not be well recognized outside of this group.*
Key social sector decision makers	Persons whose decision making authority will be necessary at the time of the pandemic to minimize societal disruption. *Note: This definition was developed to facilitate pandemic planning regarding the identification of specific groups that may be targeted as part of specific public health interventions. It has been endorsed by the Pandemic Influenza Committee for this purpose but may not be well recognized outside of this group.*

L	
LICO ***(Low income cutoff point)***	The proportion of people in low-income households to the total population in private households. LICOs are set where families spend 20 percent more of their pre-tax income than the Canadian average on food, shelter and clothing. The LICO takes into account changes in the Consumer Price Index of the area and gives various LICOs according to different family sizes.
LPN ***(Licensed practical nurse)***	A nursing school graduate who has been licensed by a provincial or territorial body; occasional synonym, licensed vocational nurse.

M	
MD *(Doctor of Medicine)*	An individual holding a doctoral degree in medicine.
MEDLARS	Medical Literature Analysis Retrieval System. The computer on which "Medline" and "AIDSLINE®" reside at the National Library of Medicine.
Medline	Medical Literature Analysis Retrieval System on Line. A computer searchable database of published medical literature.
Mean *(statistical)*	Commonly referred to as the "average," the mean of a set of quantities is the sum of the quantities, divided by the number of quantities summed.
Median *(statistical)*	The value such that for a series of ranked quantities, half are above the median, and half are below.
Morbidity	Departure from a state of well-being, either physiological or psychological; illness.
Morbidity rate	The number of cases of an illness (morbidity) in a population divided by the total population considered at risk for that illness.
Mortality	Death, as in expected mortality (the predicted occurrence of death in a defined population during a specific time interval).
Mortality rate	The number of people who die during a specific time period divided by the total population.
Mutation	A permanent, transmissible change in the genetic material of a cell.

N	
NPS	Nasopharyngeal swab
Neuraminidase (N)	A hydrolytic protein antigen spiking from the surface of the influenza virus. It dissolves the protective viscosity of cellular mucous lining, allowing release of new viruses into the respiratory tract. The different proteins are identified using a numerical system (e.g., N1, N2, N3) and when combined with the haemagglutinin type are used to identify various influenza virus subtypes (e.g. H1N1, H3N2)
Neuraminidase inhibitors	A new class of antiviral agents that selectively inhibit neuraminidase activity in both influenza type A and type B viruses, while having no effect on human neuraminidase.
Non-traditional site	The following is a definition of a Non-Traditional Site for the purposes of Pandemic Influenza planning: A Non-Traditional Site is a site offering care for influenza patients. These sites are currently not an established health care site, or are established sites which usually offer a different type or level of care. The functions of an non-traditional site will vary depending on the needs of the community but will focus on monitoring, care and support of influenza patients.

O	
Opportunistic infections	An infection in an immune compromised person caused by an organism that does not usually cause disease in healthy people. Many of these organisms are carried in a latent state by virtually everyone, and only cause disease when given the opportunity of a damaged immune system.
Outpatient	An individual who receives health care services without being admitted to a health care facility.

P	
PAHO	Pan American Health Organization.
Palliative	A treatment that provides symptomatic relief, but not a cure.
***p* value**	The probability of obtaining a given outcome due to chance alone. For example, a study result with a significance level of $p < 0.05$ implies that five times out of 100 the result could have occurred by chance.
PCR *(Polymerase chain reaction)*	A highly sensitive test that can detect and/or DNA fragments of viruses or other organisms in blood or tissue. PCR works by repeatedly copying genetic material using heat cycling, and enzymes similar to those used by cells.

Pandemic	Referring to an epidemic disease of widespread prevalence around the globe.
Pandemic Alert Period	The interval following the Interpandemic Period. Characterized by the occurrence of human infection(s) with a new subtype of influenza virus in the absence of efficient human to human transmission of this new virus.
Pandemic Period	The interval characterized by increased and sustained transmission in the general population of a new influenza virus subtype which is spreading efficiently between humans.
Pandemic societal responders	Persons who are trained or primarily involved in the provision of an essential service that if not sustained at a minimal level would threaten public health, safety or security. *Note: This definition was developed to facilitate pandemic planning regarding the identification of specific groups that may be targeted as part of specific public health interventions. It has been endorsed by the Pandemic Influenza Committee for this purpose but may not be well recognized outside of this group.*
Parenteral	Not through the mouth. Intravenous, intramuscular, and intradermal administration are all parenteral.
Pathogen	Any disease-producing microorganism or material.
Pathogenesis	The natural evolution of a disease process in the body without intervention (i.e., without treatment). Description of the development of a particular disease, especially the events, reactions and mechanisms involved at the cellular level.
Pediatric	Relating to the medical specialty concerned with the development, care and treatment of children from birth through adolescence.
PHAC	Public Health Agency of Canada
PHEIC	Public health emergency of international concern
PHL	Provincial health laboratory
PIC	Pandemic Influenza Committee
the Plan	Canadian Pandemic Influenza Plan for the Health Sector
Pneumocyte	An alveolar epithelial cell in the lungs.
PYLL *(Potential years of life lost)*	The PYLL rate per 1000 population is the ratio of the total years of life lost between ages 0 and 75 due to a specific cause to the total population. The cause of death selected is the underlying cause of death, which is the cause that initiated the sequence of events leading to death.

Preventive care	A comprehensive type of care emphasizing priorities for prevention, early detection and early treatment of conditions, generally including routine physical examinations, immunization, and well-person care.
Preventive medicine	Taking measures for anticipation, prevention, detection, and early treatment of disease.
Primary care	Primary care is the first level of care, and usually the first point of contact, that people have with the health care system. Primary care involves the provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing in the context of family and community. It includes advice on health promotion and disease prevention, assessments of one's health, diagnosis and treatment of episodic and chronic conditions, and supportive and rehabilitative care.
PSEPC	Public Safety and Emergency Preparedness Canada
P/T	Provincial and Territorial governments (noun) and Provincial and Territorial (adjective).
Public health	The art and science of protecting and improving community health by means of preventive medicine, health education, communicable disease control, and the application of social and sanitary sciences.
Public Health Responders	Persons who are essential to the implementation and maintenance of the public health response to pandemic influenza and who would not be expected to come within 1 meter of a known influenza case in their work setting. *Note: This definition was developed to facilitate pandemic planning regarding the identification of specific groups that may be targeted as part of specific public health interventions. It has been endorsed by the Pandemic Influenza Committee for this purpose but may not be well recognized outside of this group.*

Q	
Qualitative	Of, relating to, or expressed in relative or subjective terms. Impossible to quantify precisely.
Quantitative	Of, relating to, or expressed in terms of quantity.

R	
Raw data	Measurements and observations recorded on study data forms. 2. Unedited computer-generated listings of data from study data forms, prior to use of reduction and summary procedures needed for data analysis.
Record	A paper or electronic document that contains or is designed to contain a set of facts related to some occurrence, transaction, or the like.
Resistance	The development of strains of a pathogen that are able to withstand the effects of an antimicrobial agent.
Respiratory epithelium	The pseudostratified coverup of internal body surfaces, which lines all but the finer divisions of the respiratory tract.
Respiratory tract	Structures contained in the respiratory system, including the nasopharynx, oropharynx, laryngopharynx, larynx, trachea, bronchi, bronchioles, and lungs.
RN *(Registered Nurse)*	One who has graduated from a college or university program of nursing education and has been licensed by the state.
Rimantadine	An antiviral agent indicated in adults for the treatment of illness due to influenza and for prophylaxis following exposure to influenza type A viruses. It has no effect against the influenza type B virus.

S	
SARS	Severe acute respiratory syndrome
Secondary care	Services given by a specialist, normally after a referral from a primary care physician, and often in an acute care hospital. It does not include the services of specialists whose services are only available in major urban centres; this level of service would normally be considered tertiary care.
STD	Sexually transmitted disease
Strain	A group of organisms within a species or type that share a common quality. For example, currently circulating strains of influenza include type A (H1N1), type A (H3N2), and type B (H3N2).
Subtype	A classification of the influenza type A viruses based on the surface antigens hemagglutinin (H) and neuraminidase (N).
Significance *(statistical)*	Infers that an observation was unlikely to have occurred by chance alone. Statistical significance is often based on a p value < 0.05. Below this level, the smaller the p value, the greater the statistical significance.

Standard deviation *(statistical)*	A statistic that shows the spread or dispersion of scores in a distribution of scores (i.e. a measure of dispersion). The more widely the scores are spread out, the greater the standard deviation. Standard deviation = the square root of the variance.
Statistics, descriptive	The intent of descriptive statistics is to summarize and present data, e.g. measures of central tendency (mean, mode, median) and measures of variability (standard deviation, variance, standard error of the mean).
Subacute care	Comprehensive, cost-effective inpatient level of care for patients who: (a) have had an acute event resulting from injury, illness or exacerbation of a disease process, (b) have a determined course of treatment, and (c) although stable, require diagnostics or invasive procedures but not intensive procedures requiring an acute level of care. Typically short-term, subacute care is designed to return patients to the community or transition them to a lower level of care. Subacute care is offered in a variety of physical settings. The philosophy of subacute care is to ensure that patients are receiving the most appropriate services at the most appropriate phase of their illness while ensuring quality, cost-effective outcomes.
Symptoms	Any perceptible, subjective change in the body or its functions that indicates disease or phases of disease, as reported by the patient.

T

TAG	Technical Advisory Group
Type	A classification of influenza viruses based on characteristic internal proteins.
Toxicity	The extent, quality, or degree of being poisonous or harmful to the body.
Toxin	A harmful or poisonous agent.
TCIF	Traveller contact information form
Triage	A system whereby a group of casualties or patients is sorted according to the seriousness of their illness or injuries, so that treatment priorities can be allocated between them. It is designed to maximize the number of survivors in emergency situations.

V	
Vaccination	The act of administering a vaccine.
Vaccine	A substance that contains antigenic components from an infectious organism. By stimulating an immune response (but not disease), it protects against subsequent infection by that organism.
Virology	The study of viruses and viral disease.
Virus	A group of infectious agents characterized by their inability to reproduce outside of a living host cell. Viruses may subvert the host cells' normal functions causing the cells to behave in a manner determined by the virus.
Volunteers *(Pandemic)*	A volunteer is a person registered with a government agency or government designated agency, who carries out unpaid activities, occasionally or regularly, to help support Canada prepare for and respond to a pandemic influenza outbreak. A volunteer is one who offers their service of their own free will, without promise of financial gain, and without economic or political pressure or coercion.

W	
WHIMIS	The **Workplace Hazardous Materials Information System (WHMIS)** is Canadian legislation covering the use of hazardous materials in the workplace. This includes assessment, signage, labelling, material safety data sheets and worker training. WHMIS closely parallels the U.S. OSHA Hazcom Standard. Most of the content of WHMIS is incorporated into Canada's *Hazardous Products Act* and the *Hazardous Materials Information Review Act,* which are administered by Health Canada. Certain provincial laws may also apply. WHMIS is enforced by the Labour Branch of Human Resources Development Canada or the provincial and territorial agencies and offices of occupational health and safety.
Wild type	A naturally occurring strain of virus that exists in the population.
WHO	World Health Organization, a special agency of the United Nations generally concerned with health and health care.

References

1. Last, John, M. (Editor) A Dictionary of Epidemiology (2nd edition), 1988. Oxford University Press Inc., New York, New York.