Annex G

Health Services: Clinical Care Guidelines and Tools

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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- *This annex may be out-of-date with respect to other planning activities and policy decisions.*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.*

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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.

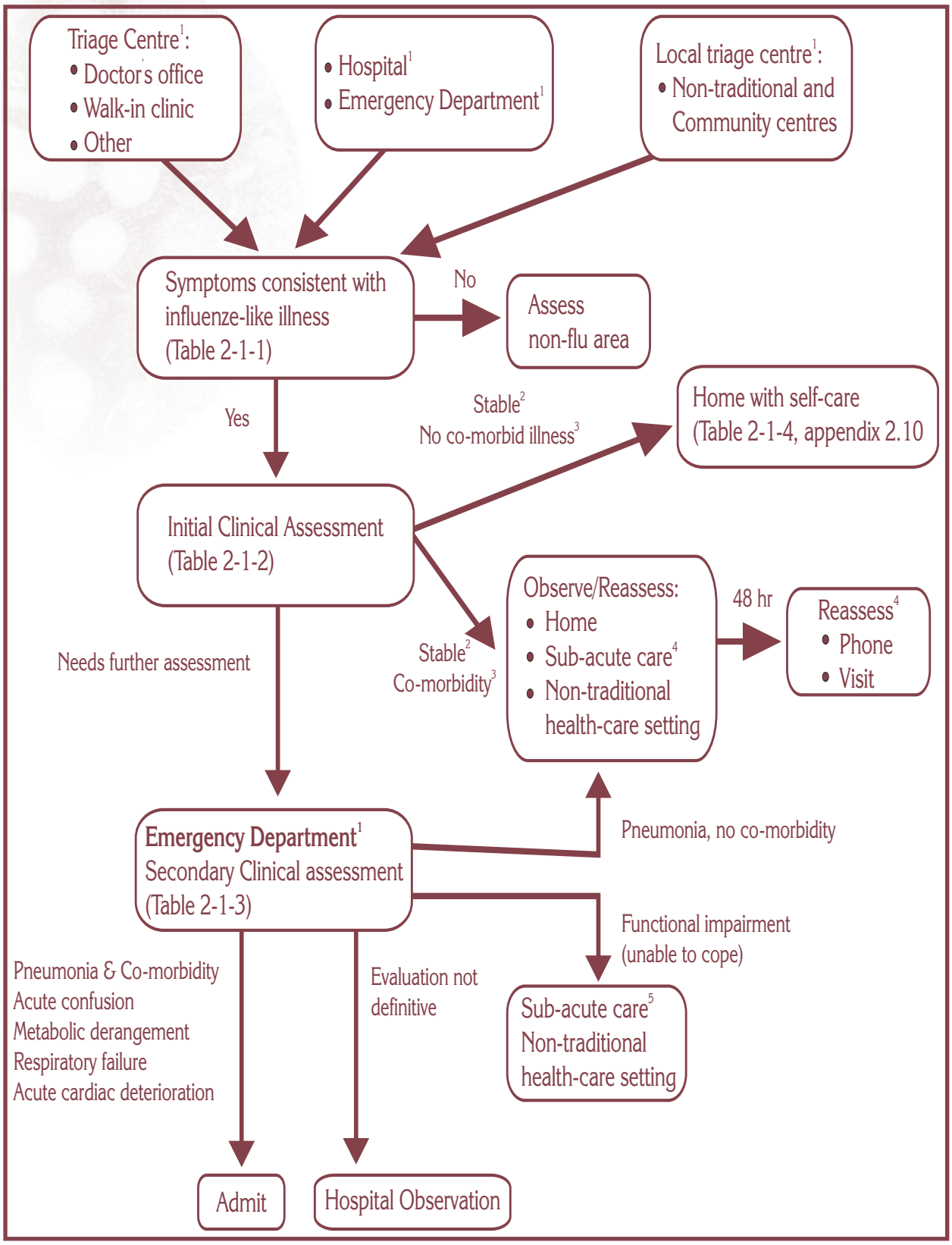
Two algorithms are included in this chapter, one for adults and adolescents (Section 2.1), and a second for children (Section 2.2). There is no clear age limit for the use of these algorithms. Depending on the age of the patient, place of consultation, and on the number of cases of influenza in a given 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

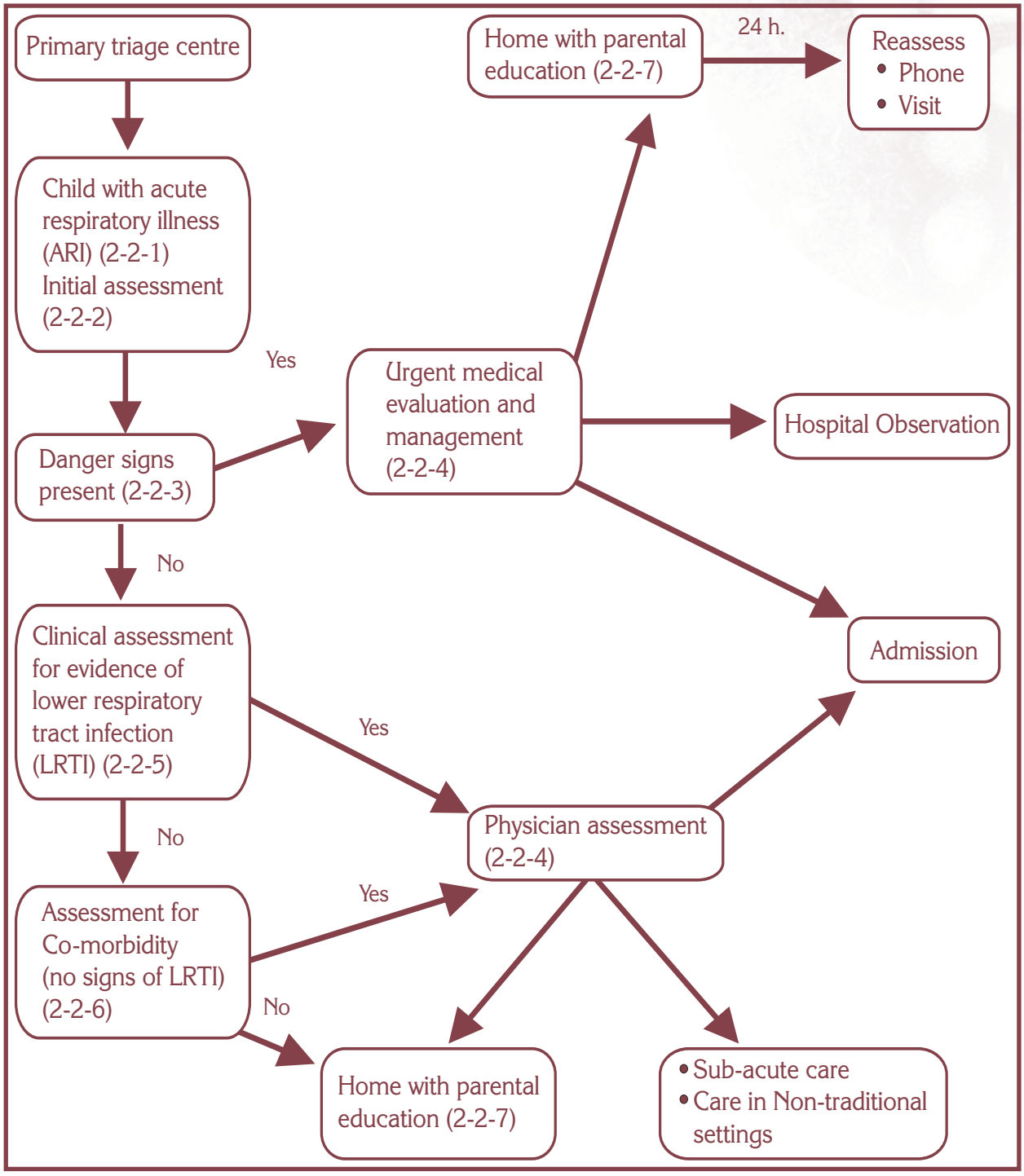
- Supervision (family, friends, allied health, nurse)
- Antiviral therapy (if seen before 48 hours of onset, contingent on pandemic priorities)
- Follow-up after 48 hours by phone call/ health care worker visit.

* 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

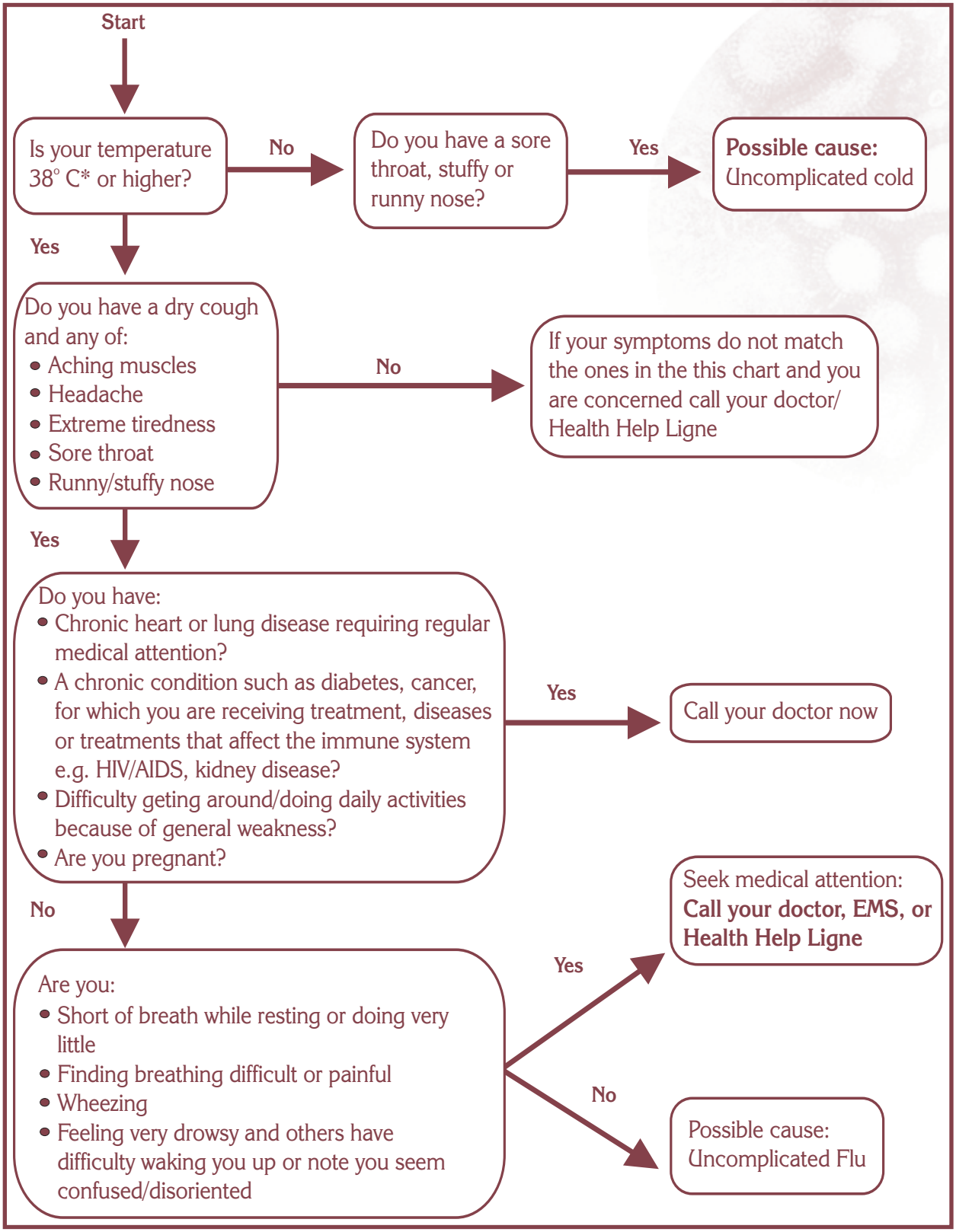
- Use a clean probe tip each time, and follow the manufacturer's instructions carefully.
- Gently tug on the ear, pulling it up and back. This will help straighten the ear canal, and make a clear path inside the ear to the eardrum.
- Gently insert the thermometer until the ear canal is fully sealed off.
- 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.

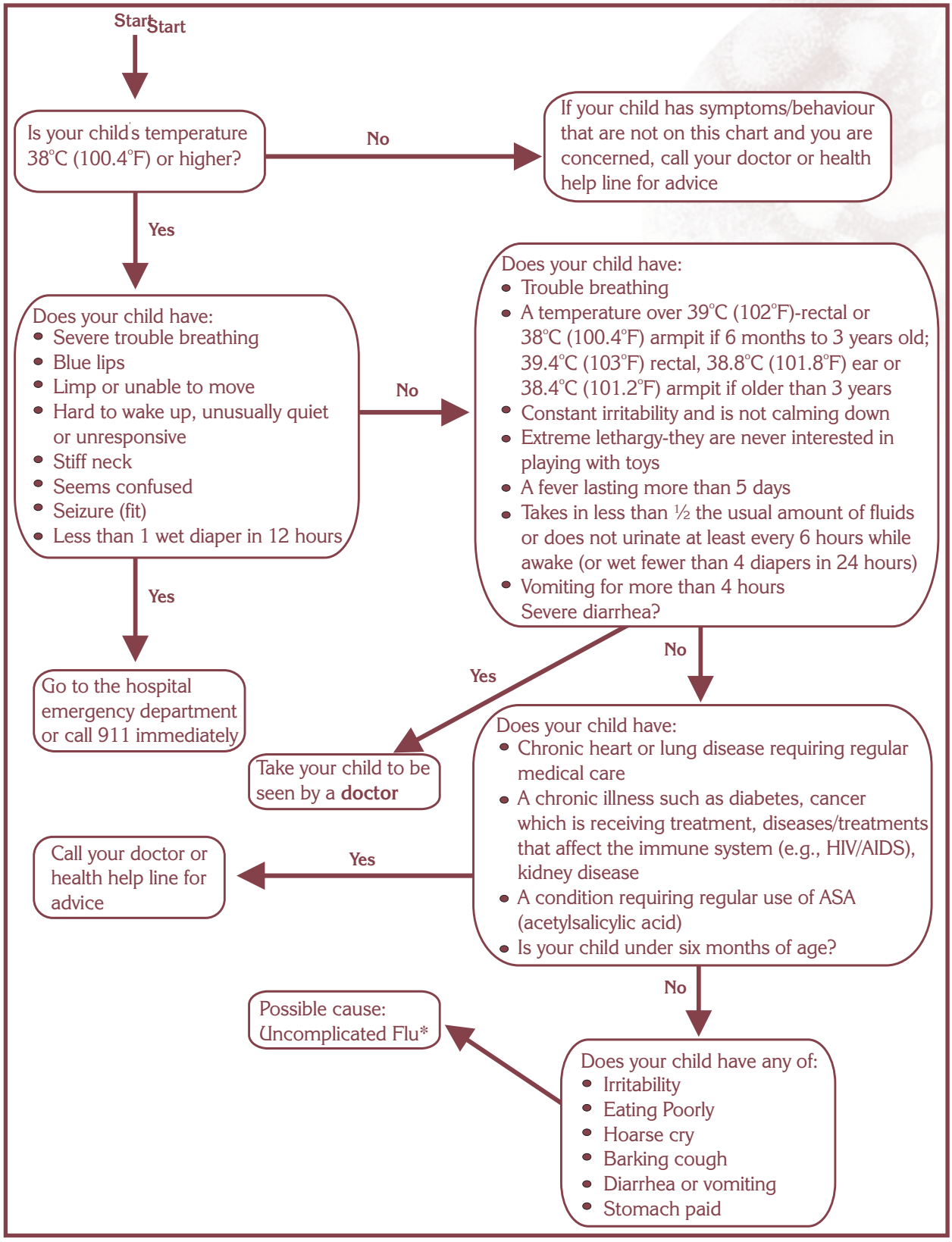
What to expect

- **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?

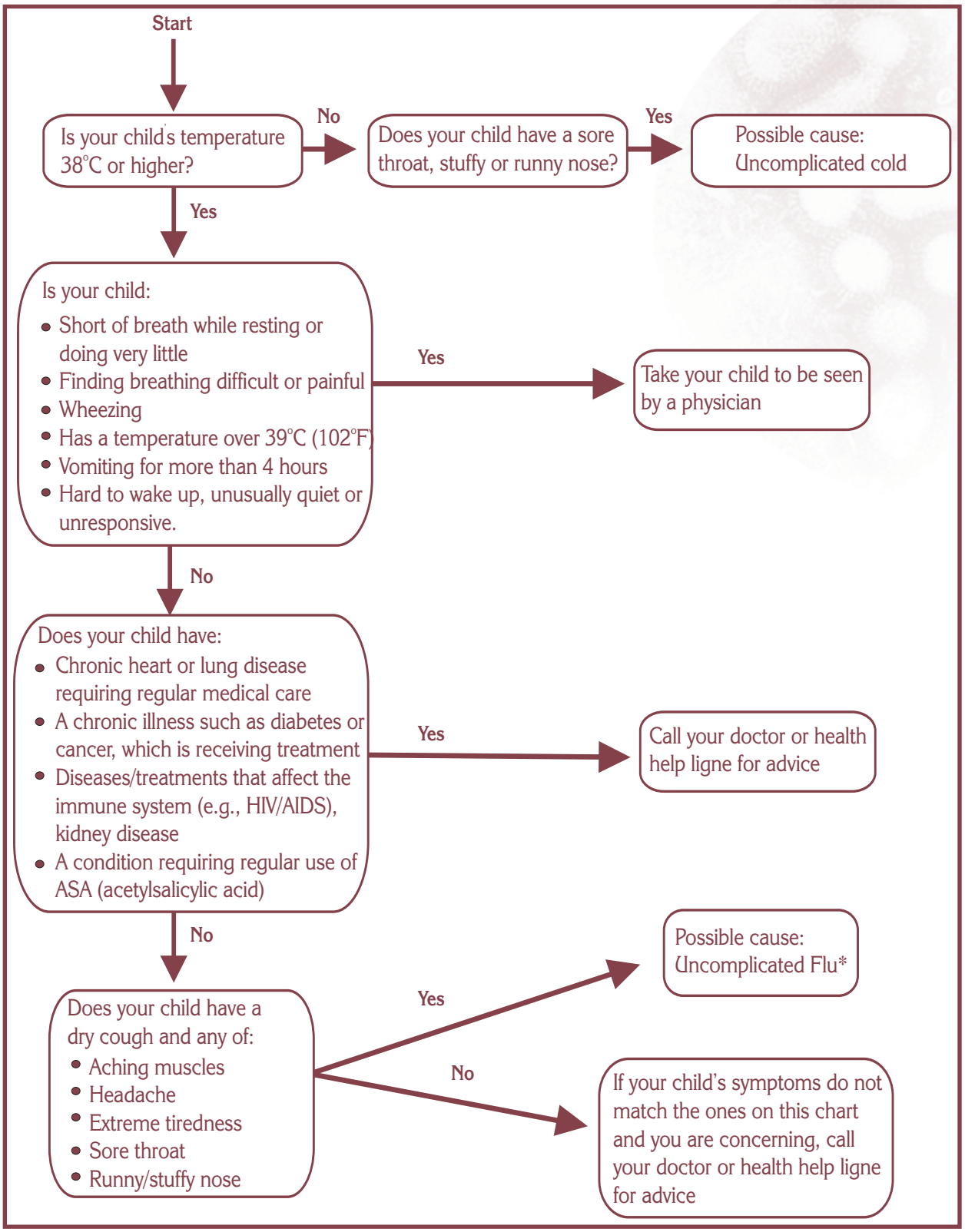


If your child has symptoms/behavior that are not on this chart and you are concerned, call your doctor or health help line for advice.

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].

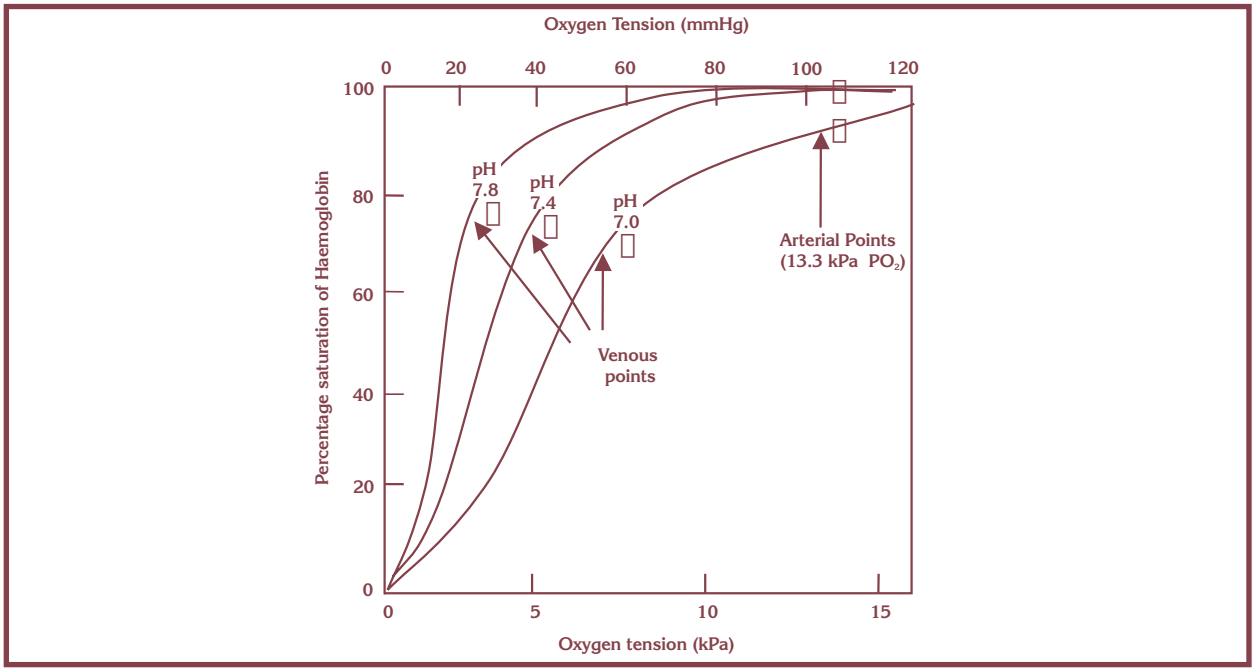
2. **Trans cutaneous PO2 monitoring**

- 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).

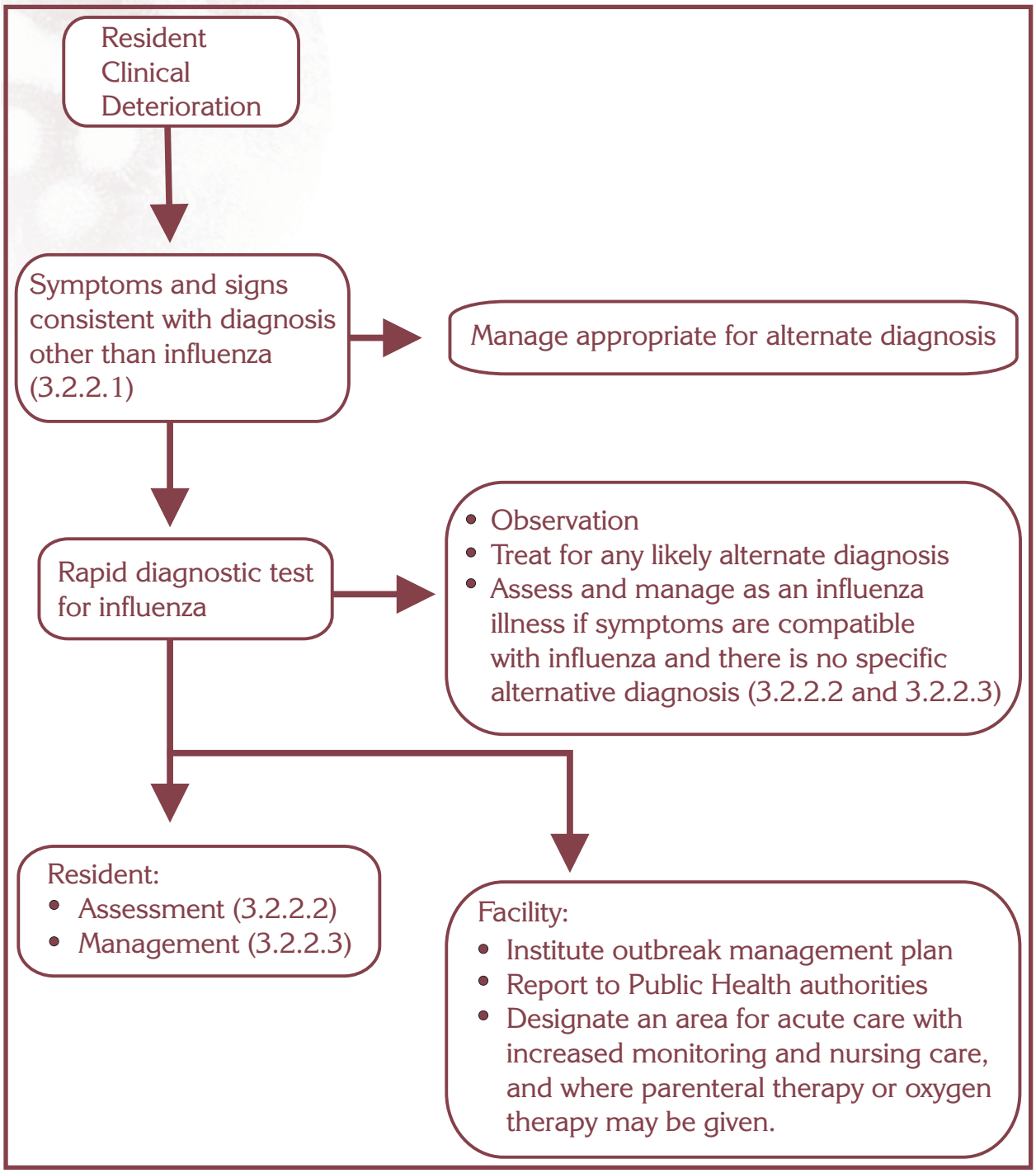
d) Facility guidelines for use of prophylactic antivirals, within the framework of antiviral prioritization for pandemic influenza, should be in place in all LTCF.

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.

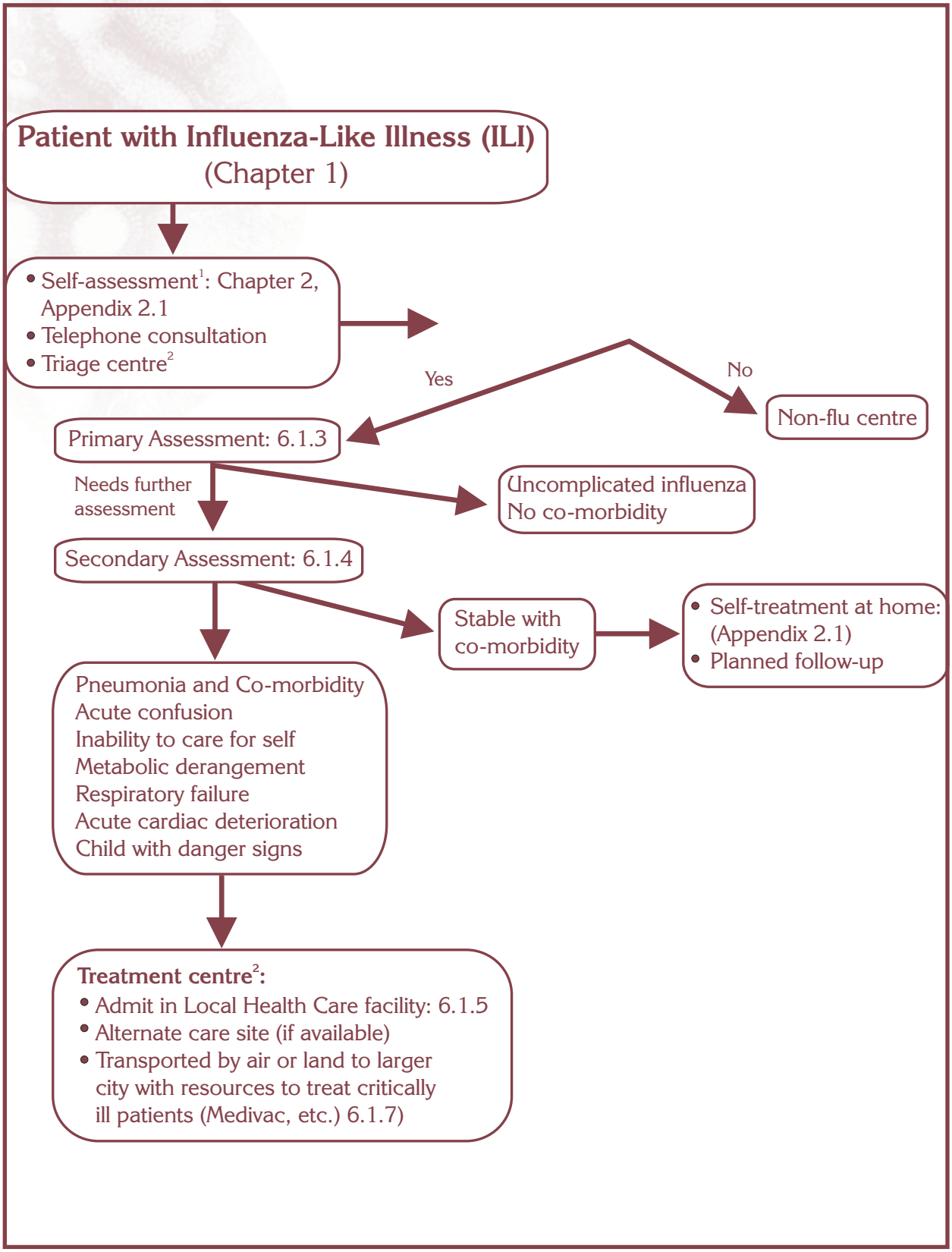
3. Education of all medical and non-medical volunteers of the importance of early identification and notification if a case is suspected.
4. A response capacity maintained 7 days per week.
5. Specific reporting mechanisms and standardized data collection (see appendices in Chapters 2 and 4).

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

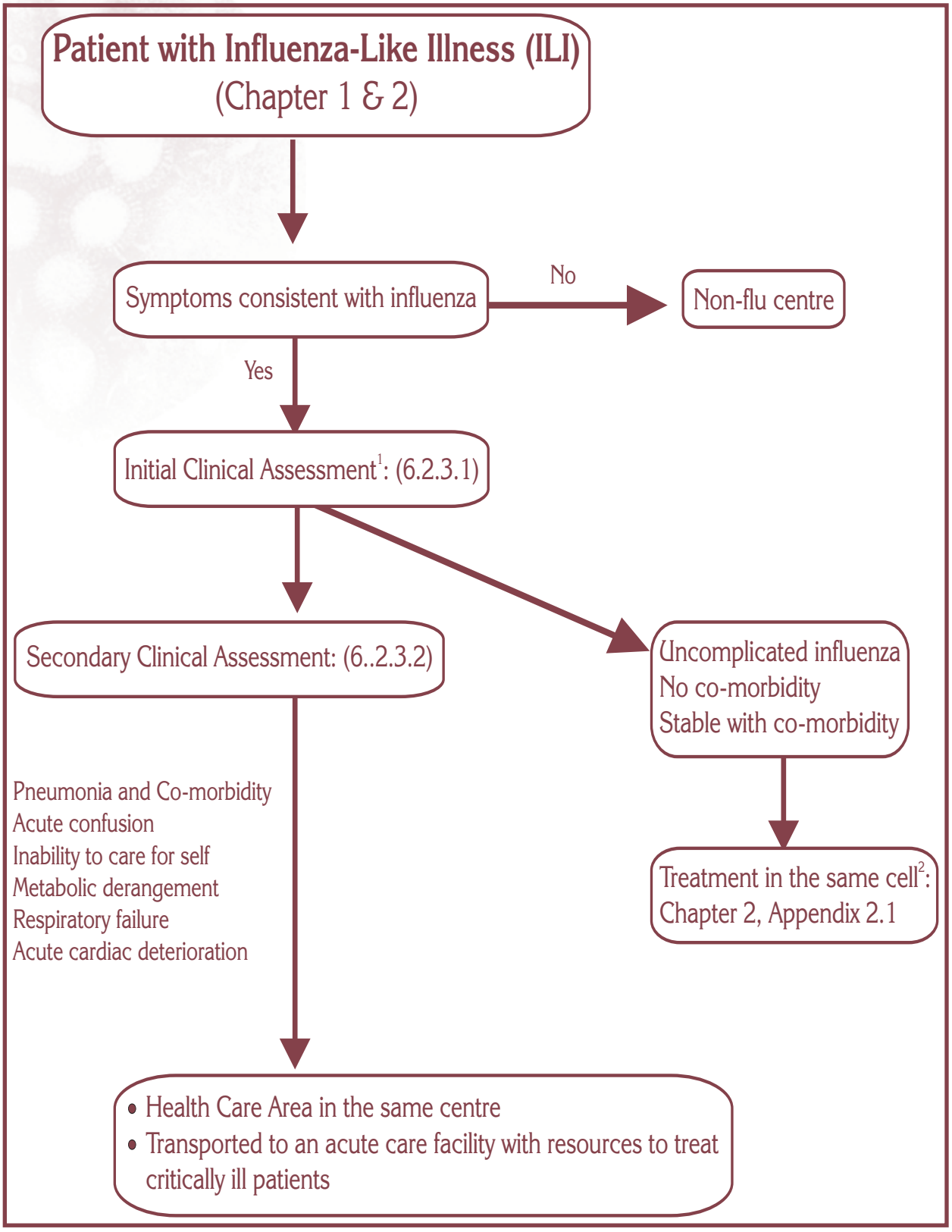
Provincial institutions can also be classified as maximum, medium, or minimum-security institutions; they provide lodging to individuals sentenced 2 years minus one day or less (about 87,000 per year, roughly 8.000 in a given day).

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.

References

1. ACIP April 20, 2001, posting date. Prevention and control of influenza. Recommendations of the Advisory Committee on Immunization Practices. MMWR 50 (RR04); 1-46. http://www.cdc.gov/mmwr/preview/mmhtml/rr5004a1.htm [8019]. [Online.]
2. Aiba H, Mochizuki M, Kimura M, and Hojo H. 2001. Predictive value of serum interleukin-6 level in influenza virus-associated encephalopathy. Neurology 57:295-299.
3. Aoki FY. 2001. The use of antiviral agents for the treatment and control of influenza. A background document for the Canadian Pandemic Contingency Planning. University of Manitoba. [8196].
4. Ballester OF, Abdallah JM, and Prasad AS. 1985. Impaired IgM antibody responses to an influenza virus vaccine in adults with sickle cell anemia. Am J Hematol 20:409-412. [8309].
5. Ballistreri WF. 1996. Reye Syndrome and Reye-like Diseases, p. 1144-1145. In W. Nelson (ed.), Nelson Textbook of Pediatrics, 15th ed. WB Saunders company, Philadelphia, London, Toronto, Montreal, Sydney, Tokyo.
6. Banerji A, Bell A, Mills E, McDonald J, Subbarao K, Stark G, Eynon N, and Loo V. 2001. Lower respiratory tract infections in Inuit infants on Baffin Island. Can Med Assoc J 164:1847-1850.
7. Baraff LJ, Bass JW, Fleisher GR, Klein J, Mc Cracken GH, Powell KR, and Schriger DL. 1993. Practice guideline for the management of infants and children 0 to 36 month of age with fever without source. Pediatrics 92:1-12. [6929].
8. Barker WH. 1986. Excess pneumonia and influenza associated hospitalizations during influenza epidemics in the United States, 1970-1978. Am J Public Health 76:761-765. [8041].
9. Barker WH. 1986. Influenza and Nursing Homes. Am J Public Health 76:491-492. [8044].
10. Barker WH, Borisute H, and Cox C. 1998. A study of the impact of influenza on the functional status of frail older people. Arch Intern Med 158:645-650. [8039].
11. Barker WH, Menegus MA, Hall CB, Betts RE, Freundlich CB, Long CE, O'Brien DH, Weiner LB, Cunningham C, Bonville CA, Alger KP, and Waltz EC. 1995. Community wide laboratory-based influenza surveillance focused on older persons. 1989-1992. Am J Prev Med 11:149-155. [8034].
12. Barker WH, and Mullooly JP. 1980. Impact of epidemic type A influenza in a defined adult population. Am J Epidemiol 112:798-811.
13. Barker WH, and Mullooly JP. 1982. Pneumonia and influenza deaths during epidemics: Implications for prevention. Arch Intern Med 142:85-89. [8043].
14. Barker WH, and Mullooly JP. 1981. Underestimations of the role of pneumonia and influenza in causing excess mortality. Am J Publ Health 71:643-645.

15. Barrett MJ, Hurwitz ES, Schonberger LB, and Rogers MF. 1986. Changing epidemiology of Reye's syndrome in the United States. Pediatrics 77:598-602.

16. Bartlett JG, Dowell SF, Mandell LA, File TM, Musher DM, and Fine MJ. 2000. Guidelines from the Infectious Diseases Society of America. Practice guidelines for the management of CAP in adults. Clin Inf Dis. 31:347-382. [6927].

17. Boivin G, Hardy I, Tellier G, and Maziade J. 2000. Predicting influenza infections during epidemics with use of a clinical case definition. Clin Inf Dis 31:1166-1169. [8028].

18. Bonadio WA. 1987. Incidence of serious infections in afebrile neonates with a history of fever. Pediatr Infect Dis J 6:911-914.

19. Bonser RS, Knight BH, and West RR. 1978. Sudden infant death syndrome in Cardiff, association with epidemic influenza and with temperature. Int J Epidemiol 7:335-340. [8228].

20. Boone M, Minore B, Katt M, and Kinch P. 1997. Strength through sharing: interdisciplinary teamwork in providing health and social services to northern native communities. Can J of Commun Ment Health 16:15-28. [8232].

21. Brocklebank JT, Court SDM, McQuillin J, and Gardner PS. 1972. Influenza A infection in children. Lancet:497-500. [7226].

22. Brydak LB, and Calbecka M. 1999. Immunogenicity of influenza vaccine in patients with hemato-oncological disorders. Leuk Lymphoma 32:369-374. [8313].

23. Brydak LB, and Machala M. 2000. Humoral immune response to influenza vaccination in patients from high risk groups. Drugs 60:35-53. [8220].

24. Brydak LB, Roszkowska-Blaim M, Machala M, Leszczynska B, and Sieniawska M. 2000. Antibody response to influenza immunization in two consecutive epidemic seasons in patients with renal diseases. Vaccine 18:3280-3286. [8239].

25. Canadian Institute for Health Information 2002, posting date. Registered Nurses in Rural and Small town Canada. CIHI. http://www.cihi.ca. [Online.]

26. Carrat F, Flahault A, Boussard E, Farran N, Dangoumau L, and Valleron A. 1998. Surveillance of influenza like illness in France. The example of the 1995/1996 epidemic. J Epidemiol Community Health 52:(suppl 1):32S-38S. [7637].

27. Carrat F, Tachet A, Housset B, Valleron A, and Rouzioux C. 1997. Influenza and influenza-like illness in general practice. Drawing lessons for surveillance from a pilot study in Paris, France. Br J Gen Pract 47:217-220. [7644].

28. Carrat F, Tachet A, Rouzioux C, Housset B, and Valleron A. 1999. Evaluation of Clinical Case definitions of Influenza: Detailed investigation of patients during the 1995-1996 epidemic in France. Clin Inf Dis 28:283-290. [7175].

29. CDC September 2001, posting date. Detection and Control of Influenza Outbreaks in Acute Care Facilities. Department of Health and Human Services, http://www.cdc.gov/ncidod/hip/INFECT/flu_acute.htm [8185]. [Online.]

30. CDC. 2001. ILI this season, as of November 29, 2001. MMWR 50:1084-1086, http://www.cdc.gov/mmwr/PDF/wk/mm5048.pdf [Online].

31. CDC 2002, posting date. Laboratory Diagnostic Procedures for Influenza. CDC: http:/www.cdc.gov/ncidod/diseases/flu/flu_dx_table.htm. [Online.]

32. CDC. 2002. Update: Influenza activity—United States and Worldwide, 2001-02 season, and composition of the 2002-03 influenza vaccine. MMWR 51:503-506, http://www.cdc.gov/mmwr/PDF/wk/mm5123.pdf [Online].

33. Chen W, Calvo PA, Malide D, Gibbs J, Schubert U, Bacik I, Basta S, O'Neill R, Schickli J, Palese P, Henklein P, Bennink J, and Yewdell J. 2001. A novel influenza A virus mitochondrial protein that induces cell death. Nat Med 7:1306-1312. [8237].

34. Cifu A, and Levinson W. 2000. Influenza. JAMA 284:2847-2849. [8198].

35. Claas EC, Osterhaus AD, van Beek R, De Jong J, Rimmelzwaan G, Senne D, Krauss S, Shortridge K, and Webster RG. 1998. Human influenza A H5N1 virus related to a highly pathogenic avian influenza virus. Lancet 351:472-477. [8031].

36. Clements DA, Langdon L, Bland C, and Walter E. 1995. Influenza A vaccine decreases the incidence of otitis media in 6- to 30-month-old children in day care. Arch Pediatr Adolesc Med 149:1113-1117. [8038].

37. Conway EE, Haber RS, Gumprecht J, and Singer LP. 1991. Toxic shock syndrome following influenza A in a child. Crit Care Med 19:123-125.

38. Correctional Service Canada (CSC) April 11, 2002, posting date. Basic facts about federal corrections. Facilities. Correctional Service Canada. CSC: http://www.csc-scc.gc.ca/text/home_e.shtml. [Online.]

39. Correctional Service Canada (CSC) May 2, 2002, posting date. Commissioner's Directive. Health Services. CSC: http://csc-scc.gc.ca/text/plcy/cdshtm/800-cde.shtml. [Online.]

40. Couch RB. 2000. Influenza: Prospects for control. Ann Intern Med 133:992-998. [7143].

41. Couch RB, and Kasal JA. 1983. Immunity to Influenza in man. Annu Rev Microbiol 37:529-549.

42. Cox N, and Subbarao K. 1999. Influenza. Lancet 354:1277-1282. [8029].

43. Crete Conference 2001, posting date. Options for the control of influenza IV. http://www.medscape.com/Medscape/CNO/2001/CRETE/PrintDay.cfm?conference_id=97&day_num=1.html [8189]. [Online.]

44. Culver BH. 1999. Chapter 4. Physiology, p. 4.9-4.17. In Albert R, Spiro S, and Jett J (ed.), Comprehensive Respiratory Medicine. Mosby, London, Phyladelphia, St Louis, Sydney, Tokyo.

45. Dell KM, and Schulman SL. 1997. Rabdomyolysis and acute renal failure in a child with influenza A infection. Pediatr Nefrol 11:363-365.

46. Diepersloot RJA, Bouter KP, and Hoekstra JBL. 1990. Influenza infection and diabetes mellitus. Case for anual vaccination. Diabetes Care 13:876-882. [8059].

47. Dietzman DE, Schaler JG, Ray CG, and Reed ME. 1976. Acute myositis associated with influenza B infection. Pediatrics 57:255-258.

48. Dolin R, Richman DD, Murphy B, and Fauci AS. 1977. Cell-mediated immune responses in humans after induced infection with influenza A virus. J Infect Dis 135:714-719.

49. Drescher J, Zink P, Verhangen W, Flik J, and Milbradt H. 1987. Recent influenza virus A infections in forensic cases of sudden unexplained death. Arch Virol 92:63-76. [8236].

50. Duchini A, Viernes ME, Nyberg LM, Hendry M, and Pockros P. 2000. Hepatic decompensation in patients with cirrhosis during infection with influenza A. Arch Intern Med 160:113-115. [8221].

51. Dykes AC, Cherry JD, and Nolan CE. 1980. A clinical, epidemiologic, serologic and virologic study of influenza C virus infection. Arch Intern Med 140:1295-1298.

52. Eickhoff TC, Sherman IL, and Serfling RE. 1996. Observations on excess mortality associated with epidemic influenza. JAMA 176:776-782.

53. Engblom E, Ekfors TO, Meurman OH, Toivanen A, and Nikoskelainen J. 1983. Fatal influenza A myocarditis with isolation of virus from the miocardium. Acta Med Scandinav 213:75-78. [8319].

54. Essen GA, Kuijvenhoven MM, and Melker RA. 1997. Implementing the Dutch College of General Practitioner's guidelines for influenza vaccination: An intervention study. Br J Gen Pract 47:25-29.

55. Evans KD, and Kine MW. 1995. Prolongued influenza A infection responsive to amantadine therapy in human immunodeficiency virus infected child. Pediatr Infect Dis J 14:332-334.

56. Falsey AR, Cunningham CK, Barker WH, Kouides RW, Yuen JB, Menegus M, Weiner LB, Bonville CA, and Betts RE. 1995. Respiratory syncytial virus and influenza A infections in the hospitalized elderly. J Infect Dis 172:389-394. [4418].

57. Falsey AR, McCann RM, Hall WJ, Tanner MA, Criddle MM, Formica MA, Irvine CS, Kolassa JE, Barker WH, and Treanor JJ. 1995. Acute respiratory tract infection in daycare centers for older persons. J Am Geriatr Soc 43:30-36. [8042].

58. Falsey AR, Treanor JJ, Betts RF, and Walsh EE. 1992. Viral respiratory infections in the institutionalized elderly: clinical and epidemiologic findings. J Am Geriatr Soc 40:115-119.

59. Feigin RD, and Cherry JD. 1998. Influenza, p. 2024-2038, Textbook of Pediatric Infectious Diseases, vol. 2. Saunders Company.

60. Feldman C. 2001. Pneumonia in the elderly. Med Clin North Am 85:1441-1459. [7804].

61. Feldman S, Webster RG, and Sugg M. 1977. Influenza in children and young adults with cancer. Cancer 39:350-353.

62. Ferson MJ, Morton JR, and Robertson PW. 1991. Impact of influenza on morbidity in children with cystic fibrosis. J Pediatr Child Health 27:308-311.

63. Fine MJ, Thomas EA, Yealy DM, Baribara HH, Weissfeld LA, Singer DE, Coley CM, Marrie TJ, and Kapoor WN. 1997. A prediction rule to identify low risk patients with community acquired pneumonia. N Engl J Med 336:243-250. [6923].

64. Fishman PA, and Shay DK. 1999. Development and estimation of a pediatric chronic disease score using automated pharmacy data. Med Care 37:874-883.

65. Fleming DM, and Cross KW. 1993. Respiratory syncytial virus or influenza? Lancet 342:1507-1510. [8040].

66. Flewett TH, and Hoult JG. 1958. Influenzal encephalopathy and postinfluenzal encephalitis. Lancet 2:11-15.

67. FluWatch 2001, posting date. Definitions for the 2001-2002 season. http://www.hc-sc.gc.ca/pphb-dgspsp/fluwatch/01-02/def01-02_e.html. [Online.]

68. Forbes JA. 1973. Complications of influenza and their management. Med J Australia 1:28-33.

69. Fox JP, Hall CE, Cooney MK, and Foy HM. 1982. Influenza virus infections in Seattle families, 1975-1979. I. Study design, methods and the occurrence of infections by time and age. Am J Epidemiol 116:212-227. [8054].

70. Frank AL, Taber LH, Wells CR, Wells JM, Glezen P, and Paredes A. 1981. Patterns of shedding of myxoviruses and paramyxoviruses in children. J Infect Dis 144:433-441. [976].

71. Frank AL, Taber LH, and Wells J.M. 1985. Comparison of infection rates and severity of illness for Influenza A subtypes H1N1 and H3N2. J Infect Dis 151:73-80. [8016].

72. Freeman DW, and Barno A. 1959. Deaths from Asian influenza associated with pregnancy. Am J Obstet Ginecol 78:1172-1175. [8049].

73. Fujimoto S, Kobayashi M, Uemura O, Iwasa M, Ando T, Katoh T, Nakamura C, Maki N, Togari H, and Wada Y. 1998. PCR on cerebrospinal fluid to show influenza-associated acute encephalopathy or encephalitis. Lancet 352:873-875. [8190].

74. Geiss LS, and Thompson TJ. 1995. Are persons with diabetes more likely to die from pneumonia and influenza? Diabetes 44(suppl1):124A. [8058].

75. Glezen WP. 1996. Emerging infections: Pandemic influenza. Epidemiol Rev 18:64-76. [6471].

76. Glezen WP. 1983. Viral pneumonia as a cause and result of hospitalization. J Infect Dis 147: 765-770. [8021].

77. Glezen WP, and Couch RB. 1997. Influenza Viruses. Epidemiology and control., p. 473-505. In A. S. Evans and R.A. Kaslow (ed.), in: Viral infections of humans., 4th ed. ed. Plenum Book Company, N.Y.& London.

78. Glezen WP, Decker M, and Perrotta D.M. 1987. Survey of underlying conditions of persons hospitalized with acute respiratory disease during influenza epidemics in Houston, 1978-1981. Am. Rev. Respir. Dis. 136:550-555. [8015].

79. Glezen WP, Greenberg SB, Atmar RL, Piedra PA, and Couch RB. 2000. Impact of respiratory virus infections on persons with chronic underlying conditions. JAMA 283:499-505. [8018].

80. Glezen WP, Paredes A, and Taber LH. 1980. Influenza in children: Relation to other respiratory agents. JAMA 243:1345-1349. [8017].

81. Glezen WP, Payne AA, Nelson Snyder D, and Downs TD. 1982. Mortality and influenza. J Infect Dis 146:313-321. [8062].

82. Glezen WP, Taber LH, Frank AL, Gruber WC, and Piedra PA. 1997. Influenza virus infections in the first year of life. Pediatr Infect Dis J 11:1065-1068.

83. Golbe LI. 1987. Parkinson's disease and pregnancy. Neurology 37:1245-1249.

84. Gomolin IH, and Kathpalia RK. 2002. Influenza. How to prevent and control nursing home outbreaks. Geriatrics 57:28-30, 33-34. [8281].

85. Govaert TM, Dinant GJ, Aretz K, and Knottnerus JA. 1998. The predictive value of influenza symptomatology in elderly people. Fam Pract 15:16-22. [6840].

86. Greenberg M, Jacobziner H, Pakter J, and Weisl B. 1958. Maternal mortality in the epidemic of Asian Influenza, New York City, 1957. Am J Obstet Ginecol 76:897-902. [8048].

87. Gries RE, and Brooks LJ. 1996. Normal oxyhemoglobin saturation during sleep. How Low does it go? Chest 110:1489-1492. [8219].

88. Groupe de travail provincial sur l'influenza en milieu fermé. 2000. Prévention, surveillance et contrôle de l'influenza en milieu d'hébergement et de soins de longue durée au Québec. (Working copy). [8188].

89. Gubareva LV, Matrosovich WN, Brenner MK, Bethell RC, and Webster RG. 1998. Evidence for zanamivir resistance in an immunocompromised child infected with influenza B virus. J Infect Dis 178:1257-1262. [8230].

90. Gubareva LV, Webster RG, and Hayden FG. 2001. Comparison of the activities of zanamivir, oseltamivir, and RWJ-270201 against clinical isolates of influenza virus and neuraminidase inhibitor-resistant variants. Antimicrob Agents Chemother 45:3403-3408. [8283].

91. Hagell P, Odin P, and Vinge E. 1998. Pregnancy in Parkinson's disease: a review of the literature and a case report. Mov Disord 13:34-38. [8314].

92. Hak E, Moons KG, Verheij TJ, and Hoes A. 2001. Clinical signs and symptoms predicting influenza infection. Arch Intern Med 161:1351-1352. [8037].

93. Hak E, Verheij TJ, van Essen GA, Lafeber AB, Grobbee DE, and Hoes AW. 2001. Prognostic factors for influenza-associated hospitalization and death during an epidemic. Epidemiol Infect 126:261-268. [7642].

94. Harris JW. 1919. Influenza occurring in pregnant women: a statistical study of thirteen hundred and fifty cases. JAMA 72:978-980. [8046].

95. Hatta M, Gao P, Halfmann P, and Kawaoka Y. 2001. Molecular basis for high virulence of Hong Kong H5N1 influenza A viruses. Science 293:1840-1842. [8238].

96. Hayden FG, Frayha H, Kattan H, and Mogarri I. 1995. Structured guidelines for the use of influenza vaccine among children with chronic pulmonary disorders. Pediatr Infect Dis J 14:895-899.

97. Hayden FG, Fritz RS, Lobo M, Alvord G, Strober W, and Strauss SE. 1998. Local and systemic cytokine responses during experimental human influenza A virus infection. J Clin Invest 101:643-649.

98. Hayden FG, and Hay AJ. 1992. Emergence and transmission of influenza A viruses resistant to amantadine and rimantadine. Curr Top Microbiol Immunol 176:119-130.

99. Health and Social Services. Government of the Northwest Territories. 2000. Outbreak management.

100. Health Canada. 1999. Routine practices and additional precautions for preventing the transmission of infection in Health Care facilities. CCDR Vol. 25S4.

101. Heikkinen T, Ruuskanen O, Waris M, Ziegler T, Arola M, and Halonen P. 1991. Influenza vaccination in the prevention of acute otitis media in children. Am J Dis Child 145:445-448.

102. Horman JT, Stetler HC, Israel E, Sorley D, Schipper M, and Joseph J. 1986. An outbreak of influenza A in a nursing home. Am J Public Health 76:501-504. [3815].

103. Horner FA. 1958. Neurologic disorders after Asian influenza. N Engl J Med 258:983-985.

104. Horner GJ, and Gray FD. 1973. Effect of uncomplicated, presumptive influenza on the diffusing capacity of the lung. Am Rev Respir Dis. 108:866-869. [8022].

105. Hurwitz ES, Nelson DB, Davis C, Davis C, Morens D, and Schonberger LB. 1982. National surveillance for Reye's syndrome: A five years review. Pediatrics 6:895-900.

106. Izurrieta HS, Thompson WW, Kramarz P, Shay D, Davis R, DeStefano F, Black S, Shinefield H, and Fukuda K. 2000. Influenza and the rates of hospitalization for respiratory disease among infants and young children. N Eng J Med 342:232-239. [6400].

107. Jacobs B, Young NL, Dick P, Ipp M, Dutkowski R, Davies HD, Langley J, Greenberg S, Stephens D, and Wang E. 2000. Canadian Acute Respiratory Illness and Flu Scale (CARIFS): Development of a valid measure for childhood respiratory infections. J Clin Epidemiol 53:793-799.

108. Jensen LA, Onyskiw JE, and Prasad NGN. 1998. Meta-analysis of arterial oxygen saturation monitoring by pulse oximetry in adults. Heart Lung 27:387-408. [8195].

109. Kaiser L, Fritz RS, Straus SE, Gubareva LV, and Hayden FG. 2001. Symptom pathogenesis during acute influenza: interleukin-6 and other cytokine responses. J Med Virol 64:262-268. [8217].

110. Kao HT, Huang YC, and Lin TY. 2000. Influenza A infection in infants. J Microbiol Immunol Infect 33:105-108. [8318].

111. Kapasi H, Kelly L, and Morgan J. 2000. Thrombolysis in the air. Air-ambulance paramedics flying to remote communities treat patients before hospitalization. Can Fam Physician 46:1313-1319. [8179].

112. Kark JD, Lebiush M, and Rannon L. 1982. Cigarette smoking as a risk factor for epidemic A(H1N1) influenza in young men. New Eng J Med. 307:1042-1046. [8024].

113. Kasai T, Togashi T, and Morishima T. 2000. Encephalopathy associated with influenza epidemics. Lancet 355:1558-1559.

114. Katagiri S, Ohizumi A, and Homma M. 1983. An outbreak of type C influenza in a children's home. J Infect Dis 148:51-56. [8183].

115. Kaufman A, Salentin R, Meyer R, Bussfeld D, Pauligk C, Fesq H, Hoffmann P, Nain M, Gemsa D, and Sprenger H. 2001. Defense against influenza A virus infection: Essential role of the chemokine system. Immunobiol. 204:603-613.

116. Kempe A, Hall CB, Mc Donald NE, Foye HR, Woodin KA, Cohen HJ, Lewis ED, Gullace M, Gala CL, Dulberg CS, and Katsanis E. 1989. Influenza in children with cancer. J of Pediatrics 115:33-39.

117. Kessler HA, Trenholme GM, Harris AA, and Levin S. 1980. Acute myopathy associated with influenza A/Texas/1/77 infection. Isolation of virus from a muscle biopsy specimen. JAMA 243:461-462.

118. Khakpour M, Saidi A, and Naficy K. 1969. Proved viremia in Asian influenza (Hong-Kong variant) during incubation period. BMJ 4:208-209.

119. Kim HW, Brandt CD, Arrobio JO, Murphy B, Chanock RM, and Parrott RM. 1979. Influenza A and B virus infection in infants and young children during the years 1957-1976. Am J of Epid 109:464-479. [8027].

120. Kirshon B, Faro S, Zurawin RK, Samo TC, and Carpenter RJ. 1988. Favorable outcome after treatment with amantadine and ribavirin in a pregnancy complicated by influenza pneumonia: a case report. J Reprod Med 33:399-401. [8052].

121. Klein JO. 1998. Bacterial Pneumonias, p. 273-284. In Feigin RD and Cherry JD (ed.), Textbook of pediatric infectious diseases. Saunders Company.

122. Klimov A, Simonsen L, Fukuda K, and Cox N. 1999. Surveillance and impact of influenza in the United States. Vaccine 17 Suppl 1:S42-46. [7639].

123. Kort BA, Cefalo RC, and Baker VV. 1986. Fatal influenza A pneumonia in pregnancy. Am J Perinatol 3:179-182.

124. Koziel H, and Koziel MJ. 1995. Pulmonary complications of diabetes mellitus: pneumonia. Infect Dis Clin North Am 9:65-96.

125. Kurtz J, Manvel RJ, and Banks J. 1996. Avian influenza virus isolated from a woman with conjunctivitis. Lancet 348:901-902. [8035].

126. Lamb RA, and Krug RM. 1996. Orthomyxoviridae: The viruses and their replication. In B. N. Fields, D. M. Knipe, and P. M. Howley (ed.), in: Fields Virology., 3rd ed. ed, vol. Volume 1. Lippincott-Raven publishers., Philadelphia & New York.

127. Levesque BM, Pollack P, Griffin B, and Nielsen H. 2000. Pulse oximetry: What is normal in the newborn nursery? Paediatric Pulmonol 30:406-412. [8301].

128. Lewis DE, Gilbert BE, and Knight V. 1986. Influenza virus infection induces functional alterations in peripheral blood lymphocytes. J Immunol 137:3777-3781. [

129. Lichtenstein PK, Heubi JE, Daugherty CC, Farrell MK, Sokol RJ, Rothbaum RJ, Suchy FJ, and Balistreri WF. 1983. Grade 1 Reye's syndrome. A frequent case of vomiting and liver dysfunction after varicella and upper-respiratory-tract infection. N Eng J Med 309:133-139.

130. Lim WS, Macfarlane JT, Boswell TC, Harrison TG, Rose D, Leinonen M, and Saikku P. 2001. Study of community acquired pneumonia aetiology (SCAPA) in adults admitted to hospital: implications for management guidelines. Thorax 56:296-301. [8023].

131. Lin CY, Kuo YC, Liu WT, and Lin CC. 1988. Immunomodulation of influenza virus infection in the precipitating asthma attack. Chest 93:1234-1238.

132. Lin JC, and Nichol KL. 2001. Excess mortality due to pneumonia or influenza during influenza seasons among persons with acquired immunodeficiency syndrome. Arch Intern Med 161:441-446. [8060].

133. Little JW, Hall WJ, Douglas RG, Mudholkar GS, a. Speers DM, and K. Patel. 1978. Airway hyperreactivity and peripheral airway dysfunction in influenza A infection. Am Rev Resp Dis 118:295-303. [8020].

134. Ljungman P, Anderson J, Aschan J, Barkholt L, Ehrnst A, Johansson M, and Weiland O. 1993. Influenza A in immunocompromised patients. Clin Infect Dis 17:244-247.

135. Long CE, Hall CB, Cunningham CK, Weiner LB, Alger KP, Gouveia M, and Colella CB. 1997. Influenza surveillance in community-dwelling elderly compared with children. Arch Fam Med 6:459-465.Comment in: Arch Fam Med. 1997;6:466-7. [7647].

136. Loukides S, and Polyzogopoulos D. 1996. The effect of diabetes mellitus on the outcome of patients with chronic obstructive pulmonary disease exacerbated due to respiratory infections. Respiration 63:170-173.

137. Lumb Andrew. 2000. Oxygen, p. 249-298, Nunn's applied respiratory physiology, 5th ed. Butterworth&Heinemann, Oxford, Auckland, Boston, Johannesburg, Melbourne, New Delhi.

138. Mac Donald KL, Osterholm MT, Hedberg CW, Schrock CG, Peterson GF, Jentzen JM, Leonard SA, and Schlievert PM. 1987. Toxic shock syndrome: A newly recognized complication of influenza and influenza like illness. JAMA 257:1053-1058. [8186].

139. Mac Leod M, Browne AJ, and Leipert B. 1998. Issues for nurses in rural and remote Canada. Aust J Rural Health 6:72-78. [8204].

140. Mandell LA, Marrie TJ, Grossman RF, Chow AW, Hyland RH, and the Canadian Community-Acquired Pneumonia Working Group. 2000. Canadian Guidelines for the initial management of Community-Acquired pneumonia: An evidence-based update by the Canadian Infectious Diseases Society and the Canadian Thoracic-Society. Clin Inf Dis 31:383-421. [6925].

141. Markson LE, Turner BT, and Fanning TR. 1992. Duration of Medicaid AIDS hospitalizations: variations by season, stage and year. Am J Public Health 82:578-580.

142. Mc Cullers JA, Facchini S, Chesney PJ, and Webster RG. 1999. Influenza B virus encephalitis. Clin Infec Dis 28:898-900.

143. Mc Intosh K. 2002. Community-acquired pneumonia in children. N Eng J Med 346:429-437.

144. Mc Kinney WP, Volkert P, and Kaufman J. 1990. Fatal swine influenza pneumonia during late pregnancy. Arch Intern Med 150:213-215. [8050].

145. Minow RA, Gorbach RS, Johnson BL, and Dornfeld L. 1974. Myoglobinuria associated with influenza A infection. Ann Intern Med 80:359-361.

146. Monto AS, Gravenstein S, Elliott M, Colopy M, and Schweinle J. 2000. Clinical signs and symptoms predicting influenza infection. Arch Intern Med 160:3243-3247. [8055].

147. Monto AS, Ohmit SE, Margulies JR, and Talsma A. 1995. Medical practice-based influenza surveillance: viral prevalence and assessment of morbidity. Am J Epidemiol 141:502-506. [8033].

148. Monto AS, and Ross HW. 1978. The Tecumseh study of respiratory illness. Am J Epidemiol 107:57.

149. Moreno C, Ardanaz E, Oliveira JE, Castilla J, and de Pedro-Cuesta J. 1994. A temporal-spatial cluster of sudden infant death syndrome in Navarre, Spain. Eur J Epidemiol 10:129-134. [8227].

150. Morton SE, Mathai M, Byrd RP, Fields C, and Roy T. 2001. Influenza A pneumonia with rhabdomyolisis. South Med J 94:67-69. [8240].

151. Murphy BR, and R. G. Webster. 1996. Orthomyxoviruses., p. 1397-1445. In B. N. Fields, D. M. Knipe, and P. M. Howley. (ed.), in: Fields Virology., 3rd ed. ed, vol. Volume 1. Lippincott-Raven publishers., Philadelphia & New York.

152. NACI August 1, 2001, posting date. Statement on influenza vaccination for the 2001-2002 season. http://www.hc-sc.gc.ca/pphb-dgspsp/publicat/ccdr-rmtc/01vol27/27sup/acs4.html. [7600]. [Online.]

153. Naficy K. 1963. Human influenza infection with proved viremia. N Eng J Med 269:964-966.

154. Narukawa M, Minezaki K, Okubo M, and Kario K. 2001. Impact of an influenza pandemic on the mortality of congestive heart failure in older Japanese: the 1998 Japanese influenza pandemic. J Am Geriatr Soc 49:689-690. [7643].

155. Nathan RA, Geddes D, and Woodhead M. 2001. Management of influenza in patients with asthma or chronic obstructive pulmonary disease. Ann Allergy Asthma Immunol 87:447-454, 487.

156. Nelson KE, Greenberg MA, Mufson MA, and Moses V. 1975. The sudden infant death syndrome and epidemic viral disease. Am J Epidemiol 101:423-430. [8222].

157. Nelson WE. 2000. Nelson Textbook of Pediatrics, 16th ed. WB Saunders Company, Philadelphia, London, Toronto, Montreal, Sydney, Tokyo.

158. Neuzil KM, Reed GW, Mitchel EF, and Griffin MR. 1999. Influenza-associated morbidity and mortality in young and middle-aged women. JAMA 281:901-907. [8032].

159. Neuzil KM, Reed GW, Mitchel EF, Simonsen L, and Griffin MR. 1998. Impact of influenza on acute cardiopulmonary hospitalizations in pregnant women. Am J Epidemiol 148:1094-1102. [8045].

160. Neuzil KM, Wright PF, Mitchel EF, and Griffin MR. 2000. The burden of influenza illness in children with asthma and other chronic medical conditions. J Pediatr 137:856-864. [8036].

161. Neuzil MK, Mellen BG, Wright PF, Mitchel E, and Griffin M. 2000. The effect of influenza on hospitalizations, outpatient visits, and courses of antibiotics in children. N Eng J Med 342:225-231. [6401].

162. Nguyen-Van-Tam JS, Brockway CR, Pearson JC, Hayward AC, and Fleming DM. 2001. Excess hospital admissions for pneumonia and influenza in persons >65 years associated with influenza epidemics in three English health districts: 1987-95. Epidemiol Infect 126:71-79. [7641].

163. Nichol KL, Worenma J, and von Sternber T. 1998. Benefit of influenza vaccination for low-, intermediate-, and high risk senior citizens. Arch Intern Med 158:1769-1776. [8220].

164. Nicholson KG, Aoki FY, Osterhaus AD, Trottier S, Carewicz O, Mercier CH, Rode A, Kinnersley N, and Ward P. 2000. Efficacy and safety of oseltamivir in treatment of acute influenza: a randomized controlled trial. Lancet 355 .1845-1850. [6399].

165. Nickerson BG, Sarkisian C, and Tremper K. 1988. Bias and precision of pulse oximeters and arterial oximeters. Chest 93:515-517.

166. Nicolle LE. 2001. Extended Care Facilities and Nursing Homes., p. 95-97. In Abrutyn E, Goldmann DA, and Scheckler WE (ed.), Saunders Infection control: The expert guide to the guidelines, 2nd ed. WB Saunders company, Philadelphia, London, Montreal, Sydney, Tokyo, Toronto. [7837].

167. Nolte KB, Alakija P, Oty G, Shaw MW, Subbarao K, Guarner J, Shieh WJ, Dawson JE, Morken T, Cox NJ, and Zaki SR. 2000. Influenza A virus infection complicated by fatal myocarditis. Am J Forensic Med Pathol 21:375-379. [7646].

168. Oliveira EC, Marik PE, and Colice G. 2001. Influenza pneumonia: a descriptive study. Chest 119:1630-1632. [8225].

169. Onitsuka H, Imamura T, Miyamoro N, Shibata Y, Kashiwagi T, Ayabe T, Kawagoe J, Matsuda J, Ishikawa T, Unoki T, Takenaga M, Fukunaga T, Nakagawa S, Koiwaya Y, and Eto T. 2001. Clinical manifestations of influenza A myocarditis during the influenza epidemic of winter 1998-1999. J Cardiol 37:315-123. [8310].

170. Paisley JW, Bruhn FW, Lauer BA, and McIntosh K. 1978. Type A2 influenza viral infections in children. Am J Dis Child 132:34-36. [8026].

171. PIP Australia June 1999, posting date. A framework for an Australian influenza pandemic plan. From the Pandemic Influenza Planning Committee of the Communicable Diseases Network Australia New Zealand. Appendix I. An Influenza Pandemic Contingency Plan for Health Care Institutions (draft). http://www.health.gov.au/pubhlth/publicat/document/influenza.pdf. [8187]. [Online.]

172. Poets CF, and Southall DP. 1994. Noninvasive monitoring of oxygenation in infants and children: practical considerations and areas of concern. Pediatrics 93:737-746 Comment in Pediatrics 1995;95:161-162. [8194].

173. Poets CF, Stebbens VA, Lang JA, O'Brien LM, Boon AW, and Southall DP. 1996. Arterial oxygen saturation in healthy term neonates. Eur J Pediatr 155:219-223. [8302].

174. Puck JM, Glezen P, Frank AL, and Six HR. 1980. Protection of infants from infection with influenza A virus by transplacentally acquired antibody. J Infect Dis 142:844-849.

175. Radwan HM, Cheeseman SH, Lai KK, and Ellison RT. 2000. Influenza in human immunodeficiency virus-infected patients during the 1997-1998 influenza season. Clin Infect Dis 31:604-606. [8226].

176. Ray CG, Icenogle TB, Minnich LL, Copeland JG, and Grogan TM. 1989. The use of intravenous ribavirin to treat influenza virus-associated acute myocarditis. J Infect Dis 159:829-836. Erratum in J Infect Dis 1989;160:564. [8229].

177. Reuters Medical News 2002, posting date. Single dose of dimerized zanamivir shows efficacy against influenza. Medscape http://www.medscape.com/viewarticle/430488. [Online.]

178. Ritova VV, Schastnyi EI, Ratushkina LS, and Shuster Y. 1979. Investigation of the incidence of influenza A viraemia caused by virus strains circulating among children in 1968-1977. J Hyg Epidemiol Microbiol Immunol 23:35-41. [8326].

179. Roberts GT, and Roberts JT. 1976. Postesplenectomy sepsis due to influenzal viremia and pneumococcemia. Am Med J 115:435-436. [8323].

180. Rocha E, Cox NJ, Black RA, Harmon MW, Harrison CJ, and Kendal AP. 1991. Antigenic and genetic variation in influenza A (H1N1) virus isolates recovered from persistently infected immunodeficient child. J Virol 65:2340-2350.

181. Rodriguez R, and Gene Hern H. 2001. An approach to critically ill patients. West J Med 175:http://medscape.com/viewarticle/421051.

182. Ruff RL, and Secrist D. 1982. Viral studies in benign acute childhood myositis. Arch Neurol 39:261-263. [8321].

183. Ryan-Poirier KA. 1995. Influenza virus infection in children. Adv Pediatr Infec Dis 10:125-156. [7640].

184. Safrin S, Rush JD, and Mills J. 1990. Influenza in patients with human immunodeficiency virus infection. Chest 98:33-37.

185. Salonen O, Koshkiniemi M, Saari A, Myllyla V, Pyhala R, Airaksinen L, and Vaheri A. 1997. Myelitis associated with influenza A virus infection. J Neurovirol 3:83-85.

186. Sang Heui Seo, Hoffmann E, and Webster RG. 2002. Lethal H5N1 influenza viruses escape host anti-viral cytokine responses. Nat Med on line: www.nature.com/cgi-taf/Dyna...mal/vaop/ncurrent/full/nm757.html.

187. Sang Heui Seo, and Webster RG. 2002. Tumor necrosis factor alpha exerts powerful anti-influenza virus effects in lung epithelial cells. J Virol 76:1071-1076.

188. Sato S, Kumada S, Koji T, and Okaniwa M. 2000. Reversible frontal lobe syndrome associated with influenza virus infection. Pediatr Neurol 22:318-321. [8300].

189. Schoenbaum SC, and Weinstein L. 1979. Respiratory infection in pregnancy. Clin Obstet Gynecol 22:293-300. [8051].

190. Shaw MW, Cooper L, Xu X, Thompson W, Krauss S, Guan Y, Zhou N, Klimov A, Cox N, Webster R, Lim W, Shortridge K, and Subbarao K. 2002. Molecular changes associated with the transmission of avian influenza A H5N1 and H9N2 viruses to humans. J Med Virol 66:107-114. [8218].

191. Shay DK, Holman RC, Newman RD, Liu LL, Stout JW, and Anderson LJ. 1999. Bronchiolitis associated hospitalizations among US children, 1980-1996. JAMA 282:1440-1446.

192. Simonsen L. 1999. The global impact of influenza on morbidity and mortality. Vaccine 17 Suppl 1:S3-10. [7638].

193. Simonsen L, Clarke MJ, Schonberger LB, Arden NH, Cox NJ, and Fukuda K. 1998. Pandemic versus epidemic influenza mortality: a pattern of changing age distribution. J Infect Dis 178:53-60. [7145].

194. Simonsen L, Clarke MJ, Stroup DF, Williamson GD, Arden NH, and Cox NJ. 1997. A method for timely assessment of influenza-associated mortality in the United States. Epidemiology 8:390-395. [8061].

195. Simonsen L, Clarke MJ, Williamson GD, Stroup DF, Arden NH, and Schonberger LB. 1997. The impact of influenza epidemics on mortality: introducing a severity index. Am J Public Health 87:1944-1950. [7158].

196. Simonsen L, Fukuda K, Schonberger LB, and Cox NJ. 2000. The impact of influenza epidemics on hospitalizations. J Infect Dis 181:831-837. [7190].

197. Singarayar EJ, Ellul J, Barer D, and Lye M. 1993. Arterial oxygen saturation and posture in acute stroke. Age Ageing 22:269-272.

198. Smith DC, Canning JJ, and Crul JF. 1989. Pulse oximetry in the recovery room. Anaesthesia 44:345-348. [8320].

199. Sperber SJ, and Francis JB. 1987. Toxic Shock Syndrome during an Influenza Outbreak. JAMA 257:1086-1095. [8192].

200. Spillet D. 2001. Caring for your self during the flu season. Alberta Health and Wellness. [8199].

201. Statistics Canada 2002/4/7, 2002, posting date. The health of Canada's communities. The Daily, http://www.statcan/Daily/English/020704/d020704b.htm. [Online.]

202. Statistics Canada 2002/03/05, 2001, posting date. Highlights from the 2001 Census of Population. Statistics Canada. http://www12.statscan.ca/english/census01/products.cfm. [Online.]

203. Statistics Canada 1996, posting date. Population in collective dwellings.1996 Census, Canada. http://www.statcan.ca/english/Pgdb/People/Families/famil62a.htm. Statcan. [Online.]

204. Stevenson CG, Mc Arthur MA, Naus M, Abraham E, and McGeer A. 2001. Prevention of influenza and pneumococcal pneumonia in Canadian long-term care facilities: how are we doing? CMAJ 164: 1413-1419. Comment in 164:1447-1448. [8224].

205. Sugaya N, Nerome K, Ushida M, Nerome K, Nagae M, Takeuchi Y, and Osano M. 1992. Impact of influenza virus infection as a cause of pediatric hospitalization. J Infect Dis 165:373-375. [8184].

206. Tamblyn S. 1994. Pandemic planning in Canada. European J of Epid 10:503-505.

207. Taylor JL, Dwyer DM, Coffman T, Groves C, Patel J, and Israel E. 1992. Nursing home outbreak of influenza A (H3N2): evaluation of vaccine efficacy and influenza case definitions. Infect Control Hosp Epidemiol 13:93-97. [7636].

208. Teichtahl H, Buckmaster N, and Pertnikovs E. 1997. The incidence of respiratory tract infection in adults requiring hospitalization for asthma. Chest 112:591-596.

209. Thomson M. 1994. Otitis media. How are First Nations children affected? Can Fam Physician 40:1943-1950. [8180].

210. Treanor JJ. 2000. Influenza Virus, p. 1823-1849. In Mandell GL, Bennett JE, and Dolin R (ed.), Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases, 5th ed, vol. 2. Churchill Livingstone. [8244].

211. Treanor JJ. 2002. Influenza: New options for prevention and treatment. Infect Med 19:66-71, http://www.medscape.com/viewarticle/429478 [8197] [Online].

212. Treanor JJ 2001, posting date. Update on Neuraminidase Inhibitors: The other weapon. Medscape http://www.medscape.com/viewarticle/412881 [8200]. [Online.]

213. Treanor JJ, Hayden GF, Vrooman PS, Barbarash R, Bettis R, Riff D, Singh S, Kinnersley N, Ward P, and Mills R. 2000. Efficacy and safety of the oral neuraminidase inhibitor oseltamivir in treating acute influenza: a randomized controlled trial. 1016-1024. JAMA 283:1016-1024. [8223].

214. Tremper KK, and Barker SJ. 1987. Transcutaneous oxygen measurement: experimental studies and adult applications. Int Anestesiol Clin 25:67-96. [8316].

215. Turner EA, Thompson HD, Reddy CM, South MA, Garrett-Ellis BR, and Mirkovic RR. 1992. Sickle cell disease with complicated influenza B virus infection. J Natl Med Assoc 84:524-527. [8315].

216. Valdez R, Venkat -Narayan KM, Geiss LS, and Engelgau MM. 1999. Impact of Diabetes mellitus on mortality associated with pneumonia and influenza among non-hispanic black and white US adults. Am J Public Health 89:1715-1721. [8057].

217. Van Caeseele, Macaulay A, Orr P, Aoki F, and Martin B. 2001. Rapid pharmacotherapeutic intervention for an influenza A outbreak in the Canadian Arctic: Lessons from the Sanikiluaq experience. International J of Circumpolar Health 60:640-648.

218. Verel D, Warrack AJN, Potter CW, Ward C, and Rickards DF. 1976. Observations of the A2 England influenza epidemic. Am Heart J 92:290-296.

219. Wald TG, Miller BA, Shult P, Drinka P, Langer L, and Gavenstein S. 1995. Can RSV and influenza A be distinguished clinically in institutionalized older persons? JAm Geriatr Soc 43:170-174. [8056].

220. Weber J, Yang JC, Topalian SL, Parkinson DR, Schwartzentruber DS, Ettinghausen SE, Gunn H, Mixon A, Kim H, Cole D, Levin R, and Rosenberg S. 1993. Phase I trial of subcutaneous interleukin-6 in patients with advanced malignancies. J Clin Oncol 11:499-506.

221. Whimbey E, and Bodey GP. 1992. Viral pneumonia in the immunocompromised adult with neoplastic disease: The role of common community respiratory viruses. Semin Respir Infect 7:122-131.

222. WHO 1995, posting date. The management of acute respiratory infections in children. Practical guidelines for outpatient care. World Health Organization Geneva. WHO, http://oms2.b3e.jussieu.fr/flunet/docs.html. [8191]. [Online.]

223. WHO April 1999, posting date. WHO pandemic plan. WHO, http://www.who.int/emc-documents/influenza/whocdscredc991c.html. [7464]. [Online.]

224. Widelock D, Csizmas L, and Klein S. 1963. Influenza, pregnancy, and fetal outcome. Public Health Rep 78:1-11.

225. Williams AL, Uren EC, and Bretherton L. 1984. Respiratory viruses and sudden infant death. BMJ 288:1491-1493. [8322].

226. Williams KM, Jackson MA, and Hamilton M. 2002. Rapid diagnostic testing for URIs in children: Impact on physician decision making and costs. Infections in Medicine 19:109-111.

227. Wilson AB, Planterose DN, Nagington J, Park JR, Barry RD, and Coombs RR. 1976. Influenza A antigens on human lymphocytes in vitro and probably in vivo. Nature 259:582-584.

228. Winkelstein A, Sacher R, Kaplan S, and Roberts G. 1998. Phagocytic systems (neutrophils, monocytes, eosinophils, and basophils), p. 39-69. In F. Davis (ed.), White cell manual, 5th ed. FA Davis Company, Philadelphia, PA.

229. Wintrobe MM. 1981. Clinical hematology, 8th ed. Lea & Febiger, Philadelphia.

230. Wong WY. 2001. Prevention and management of infection in children with sickle cell anemia. Paediatric Drugs 3:793-801. [8282].

231. Woolston WJ, and Conley DO. 1918. Epidemic pneumonia (Spanish influenza) in pregnancy. JAMA 71:1898-1899. [8047].

232. Wright P. 1996. Influenza Viral Infections, p. 901-903. In WE Nelson (ed.), Nelson Textbook of Pediatrics, 15th ed. W Saunders company, Philadelphia, London, Toronto, Montreal, Sydney, Tokyo.

233. Wright PF, Thompson J, McKee KT, Vaughn WK, Sell SHW, and Karzon DT. 1981. Patterns of illness in the highly febrile young child: Epidemiologic, clinical and laboratory correlates. Pediatrics 67:694-700. [8025].

234. Yoshino M, Suzuki S, Adachi K, Fukayama M, and Inamatsu T. 2000. High incidence of acute myositis with type A influenza virus infection in the elderly. Intern Med 39:431-432. [8317].

235. Yuen KI, Chan PKS, Peiris M, Tsang D, Que T, Shortridge K, Cheung P, To W, Ho E, Sung R, Cheng A, and and members of the H5N1 study group. 1998. Clinical features and rapid viral diagnosis of human diseases associated with avian influenza A H5N1 virus. Lancet 351:467-471. [8030].

236. Zink P, Drescher J, Verhangen W, Flik J, and Milbradt H. 1987. Serological evidence of recent influenza virus A (H3N2) infections in forensic cases of the sudden infant death syndrome (SIDS). Arch Virol 93:223-232. [8235].