



Resource – Clinical Management of Pandemic (H1N1) 2009

This resource is produced to provide guidance to clinicians on the clinical management of patients with presumptive or confirmed infection with Pandemic (H1N1) 2009. It should be read in conjunction with current advice on the diagnosis of this infection, as well as resources available concerning the current pandemic phase and the focus of investigation, treatment and public health measures at the time.

Summary

- The majority of people infected with Pandemic (H1N1) 2009 will have a self-limited illness, and will recover with rest at home and supportive measures alone.
- There are some people who will get a more severe illness, and may rapidly deteriorate. There should be a focus on early recognition and treatment of this group.
- People considered to be vulnerable to more severe outcomes, and who therefore should be specially monitored include those with the following:
 - Chronic respiratory conditions (asthma, COPD),
 - Pregnancy (2nd and 3rd trimesters),
 - Morbid obesity,
 - Indigenous people of any age (especially those with chronic conditions),
 - Other chronic conditions such as cardiac disease, diabetes mellitus, metabolic conditions, renal disease, haemoglobinopathies, immunosuppression, neurological conditions.
- Other groups where active monitoring is recommended include smokers, people with obstructive sleep apnoea, children under 5 years old, pregnancy in the first trimester, and health care workers working in units or settings with a high proportion of vulnerable patients.
- Severe illness tends to show as:
 - Early onset of a severe viral illness with respiratory failure,
 - Secondary bacterial pneumonia,
 - Destabilisation of a pre-existing chronic condition.
- Signs of deterioration to moderate or severe illness include:
 - Respiratory distress – high respiratory rate (>20 breaths per minute in adults) and increased work of breathing,
 - Abnormal pulse oximetry ($\leq 92\%$),
 - Generalised organ dysfunction – reduced baseline function or exercise capacity.
- Children and young people may not appear to be as ill as they actually are.
- Appropriate use of PPE, isolation, social distancing and other infection control measures are important to control spread and protect those at risk of infection.
- Antiviral medication is indicated for the treatment of those with moderate to severe disease, or members of a vulnerable group considered to be at risk of deterioration.
- Appropriate antibiotics should be commenced early in those suspected of developing a secondary bacterial pneumonia.
- Transfer to a facility with intensive care and ventilatory support should be considered early if deterioration is evident.

Introduction – nature of virus, spread, epidemiology and spectrum of illness to date

In April 2009, the WHO declared outbreaks of the novel Pandemic (H1N1) 2009 virus infection a Health Emergency of International Significance. On 11 June 2009 the WHO raised its level of pandemic alert to level 6 declaring a pandemic of this virus. This alert level is based on the geographical spread not the virulence of the virus.

From late April 2009 the delay of the virus entering Australia and the containment of small outbreaks has allowed time to better understand its key scientific and clinical characteristics.

H1N1 Virus

This virus is made up of swine, human and bird genetic components. Pandemic (H1N1) 2009 is a highly transmissible virus between humans. This genetic form is new and there is no immunity to this viral infection in the Australian population. However, the infection rates appear lower in people over 60 years for reasons that are not clear. It has been speculated that exposures to similar viruses in 1957 and 1968 may have conferred some protection. However expert advice to DoHA is that such minimal immunity, if present in some of over 60 year old Australians cannot be relied on as a public health measure. Therefore, we must consider the population is unprotected until a specific vaccine is available or people obtain immunity following infection.

We also know that such viruses drift genomically and their genome can reassort more substantially at anytime changing their virulence for the worse or attenuating the virulence. Such genetic changes could also confer antiviral drug resistance as is the case with some current seasonal influenza strains.

The clinical picture of the disease is now well described. Pandemic (H1N1) 2009 is a disease that is mild and self limited in the great majority of cases but severe in some. The overall characterisation of this infection is a moderate disease.

This virus appears more transmissible between individuals than seasonal influenza and because the population does not have immunity, it is expected that more people will be affected than with seasonal influenza.

Mild illness – expected symptoms and signs

Most people have a mild illness. From a report in MMWR on the initial outbreak in New York schools (*MMWR Weekly, May 8, 2009 / 58(17);470-472*) the most frequently reported symptoms are cough (98%), subjective fever (96%), fatigue (89%), headache (82%), sore throat (82%), runny nose (82%), chills (80%), and muscle aches (80%). Nausea (55%), stomach ache (50%), diarrhoea (48%), shortness of breath (48%), and joint pain (46%) are less frequently reported but still common. Among those patients who reported a maximum temperature, the mean was 39.0 °C. In total, 95% patients reported subjective fever plus cough and/or sore throat, meeting the CDC definition for influenza-like illness (ILI).

Vulnerable populations

Evidence from overseas indicates that the following groups are at an increased risk of severe Pandemic (H1N1) 2009 disease and also the secondary complications of influenza infection. While not every individual in these groups is necessarily more at risk, inclusion in the group is a signal to the treating medical practitioner for the need for investigation and clinical judgement. Indigenous Australians are included due to the potential presence of underlying chronic disease(s), some of which may be undiagnosed, and for their higher level of social disadvantage.

Table 1: Groups particularly vulnerable to the severe outcomes

Vulnerable Group	Evidence ^{1,2,3}
Chronic respiratory conditions including asthma (such as moderate persistent disease or worse as in <i>Asthma Management Handbook, 2006</i>) and Chronic Obstructive Pulmonary Disease (requiring daily treatment)	Increased hospitalisation, ICU admissions (Evidence from USA, Mexico, Canada, South America, United Kingdom)
Pregnant women (particularly in second and third trimesters)	Increased hospitalisation, ICU admissions, spontaneous abortion, premature rupture of membranes, foetal and maternal death (evidence from USA, Mexico, South America, UK)
Persons with morbid obesity	Increased hospitalisation, ICU admissions (evidence from USA, Mexico,)
Indigenous people of any age should be carefully monitored for underlying chronic conditions and household environments	Increased hospitalisation, ICU admissions (evidence from Canada)
Persons with chronic illness predisposing to severe influenza such as: <ul style="list-style-type: none"> • cardiac disease (excluding simple hypertension) • diabetes mellitus, • chronic metabolic diseases, • chronic renal disease (eGFR <30 mL/min), • haemoglobinopathies, • immunosuppressed (including cancers on active therapy, HIV/AIDS infection, drugs such as regular corticosteroid use) • chronic neurological conditions 	Increased hospitalisation, ICU admissions (Evidence from USA, Mexico, Canada, South America, United Kingdom)

A second group of patients require active monitoring by the treating clinician. This involves regular and timely review of those suffering an acute influenza-like illness to

¹ Louie, J, Winter, K, et al. Hospitalized Patients with Novel Influenza A (H1N1) Virus Infection --- California, April-May, 2009: MMWR, May 22, 2009 / 58(19):536-541
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5819a6.htm>

² WHO Weekly Epidemiological Record: 5 JUNE 2009, No. 23, 2009, 84, 213–236
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5819a6.htm>

³ WHO Weekly Epidemiological Record: 22 May 2009, No. 21, 2009, 84, 185–196
<http://www.who.int/wer/2009/wer8421.pdf>

monitor for clinical deterioration, as well as early reporting to the supervising clinician when it occurs.

Groups requiring active monitoring include:

- Smokers,
- People with obstructive sleep apnoea;
- Children under the age of 5 years; and
- Pregnant women in the first trimester.

Health care workers are considered to be a group of special interest, as pandemic (H1N1) 2009 disease in a health care worker in the healthcare setting can expose vulnerable patients to infection. Additionally reduction in health care worker numbers due to illness will adversely affect the care of vulnerable patients

Recognition of moderate to severe illness and deterioration – adults and children

Patients with moderate or severe illness, or those who are deteriorating, whether from a vulnerable group (see above) or not, need to be considered for administration of antiviral medication. The following is from *Clinical Detection of Sick Swine Flu cases, Thoracic Society of Australia and New Zealand, 2009*:

Severe illness following influenza infection occurs in at least 3 ways:

1. severe primary viral infection with respiratory distress occurring relatively early in the illness related to viral pneumonia or an acute lung injury syndrome.
2. bacterial pneumonia, frequently staphylococcal, complicating the initial bronchitis caused by the influenza, or following an apparent recovery from the initial illness.
3. destabilisation of pre-existing chronic condition. This may present as respiratory distress related to exacerbations of chronic obstructive lung disease (COPD), asthma or chronic heart failure (CCF). Influenza can also cause acute symptoms related to destabilisation of diabetes, chronic renal failure, chronic liver disease etc.

A. Clinical detection of severity of influenza related illness

1. Respiratory distress –RR >20–24/min and increased work of breathing

Noticeable respiratory effort, rapid breathing or noisy breathing in a previously normal person at rest is abnormal. People can adopt different patterns of breathing when sick, but a respiratory rate greater than 20 breaths per minute is concerning and more than 24 per minute definitely abnormal.

People with pre-existing lung or heart conditions may already have some level of respiratory distress at rest. In general, this will be greatly accentuated if there are influenza complications such as exacerbations of COPD, asthma or CCF or bacterial pneumonia.

The finding of these abnormal respiratory signs raises the possibility but is not specific for respiratory complications due to influenza because fever, anxiety, anaemia and a metabolic acidosis can also alter the pattern of breathing.

2. Abnormal oximetry – Significant fall in SpO₂ (<92%)

Measurement of a low haemoglobin-oxygen saturation (SpO₂) using pulse oximetry can detect severe or complicated influenza in some cases. It will be most useful in people with pre-existing heart or lung conditions who already have a reduced SpO₂ (for example ≤ 92%). In these people a relatively small worsening of respiratory function due to influenza will cause a significant fall in SpO₂ (< 90%).

In people with normal pre-existing respiratory and cardiac function, SpO₂ below the mid 90's is abnormal and below the low 90s is **very abnormal** and indicates severe disease. However because people with pre-existing normal respiratory reserve can hyperventilate to compensate for acute gas exchange problems, SpO₂ can be relatively normal even with severe influenza (fortunately, the hyperventilation will probably be clinically apparent).

3. Generalised organ dysfunction – reduced baseline function or exercise capacity

“Loss of function” includes confusion, incontinence and falls which are common presenting features of severe influenza and pneumonia in the elderly. Hypotension, a marked tachycardia and marked hyperthermia or hypothermia are features of significant sepsis. People with diabetes and severe influenza may present with hyperglycaemia.

“Reduced exercise capacity” – some people, both normal and those with chronic medical conditions, have a very good appreciation of their usual exercise capacity. If this is significantly reduced because of worsening breathlessness during an episode of influenza, the possibility of respiratory complications should be considered, although this is a non-specific symptom.

B. Defining the cause of the severe clinical illness

1. Severe influenza - primary viral pneumonia or viral-induced acute lung injury usually occur within the first 4 days of the illness and are associated with respiratory distress and sometimes a dry cough, along with fever and the other symptoms of influenza like illness (ILI).

2. Destabilisation of pre-existing chronic condition – this can occur at anytime from the onset of the influenza infection, often at least a week from the first influenza symptoms. Clinical features will be a combination of the pre-existing condition and symptoms of an ILI. The severity of the presenting illness will partly depend on the severity of the pre-existing condition, and people with little pre-existing functional reserve can be markedly compromised by a relatively mild influenza infection. A biphasic temporal pattern may occur, whereby people appear to recover from their influenza symptoms but then deteriorate again, often some days later. The deterioration may be due to a pneumonic illness (see below) or to an exacerbation of their pre-morbid condition.

3. Bacterial pneumonia – is an important complication of pandemic influenza and presents as a biphasic illness with features of an ILI followed by a second rise in temperature or a persistent fever (more than 3 days from onset of ILI) along with purulent sputum. Distinguishing between acute bacterial bronchitis and bronchopneumonia without a chest X-ray can be difficult. A high persistent fever, pleuritic chest pain and respiratory distress all suggest pneumonia. In the setting of an influenza pandemic, the development of purulent sputum should trigger the use of empiric antibiotics.

Pneumonia in elderly people and young children, often presents in non-specific ways (lethargy, confusion, irritability, incontinence).

Although the clinical characteristics of the presenting illness (ILI present or not, baseline clinical status), its temporal evolution (monophasic versus biphasic) and the associated features (purulent sputum⁴, pleuritic chest pain, other etc) can be used to determine the likely cause of a severe influenza related illness, further investigation and appropriate early empirical management will always be required.

Further assessment

In a sick-looking person with influenza, after a careful clinical examination, several investigations are likely to be warranted including a measurement of the oxygenation of blood (oximetry or arterial blood gases) and a chest x-ray if there is respiratory distress, clinical features of pneumonia or if the person is non-specifically unwell, especially if very young or very elderly.

Blood tests including full blood examination, electrolytes and renal function, tests to assess pre-existing conditions such as diabetes liver and heart disease and microbiological studies may also be indicated.

Assessment of pneumonia severity using standardised scores such as the Pneumonia Severity Index (PSI) or CURB-65 can be misleading in younger people, often under-estimating severity and need for admission.

The safety of the patient is of prime importance and in a very sick patient these assessments should not delay their transportation to a hospital or other appropriate medical facility. During the initial assessment and subsequent transportation of sick swine influenza patients standard infection control measures should be observed.

Children and young people may not appear to be as unwell as they actually are. The recognition of severe disease and deterioration in children may be assisted by the

⁴ *Purulent sputum* - in normal people the development of green or yellow sputum correlates reasonably well with bacterial bronchitis or pneumonia. Increasing volume of sputum or deepening colour (dark yellow or green) of sputum in someone with COPD or chronic bronchitis also correlates with bacterial infection. People with asthma can produce coloured sputum due to eosinophilic inflammation, but in the context of an acute exacerbation triggered by influenza, secondary bacterial infection should be considered.

following tables (from *Recognition of a sick child in Emergency Departments, NSW Department of Health, January 2005*):

Table 2: Key clinical indicators to assist in the identification of sick children and babies

Alertness and arousal*	Breathing*	Circulation*	Fluids in*	Fluids out*	Miscellaneous
<p>Alertness</p> <ul style="list-style-type: none"> - Drowsy - Decreased activity - Prolonged sleeping - Weak cry - Floppy <p>Arousal</p> <ul style="list-style-type: none"> - Poor response to stimulation - Agitation - Irritability 	<p>Apnoea</p> <ul style="list-style-type: none"> - Including history of apnoea <p>Respiratory rate*</p> <ul style="list-style-type: none"> - Tachypnoea <p>Effort</p> <ul style="list-style-type: none"> - Recession and tug - Nasal flare <p>Colour and noises</p> <ul style="list-style-type: none"> - Cyanosed - Wheeze - Poor air entry - Stridor 	<p>Pulse*</p> <p>(Rate and character)</p> <ul style="list-style-type: none"> - Tachycardia - Thready pulse - Bradycardia <p>Colour</p> <ul style="list-style-type: none"> - Cyanosis - Mottled - Delayed capillary refill (> 2 sec) - Pale - Profuse bleeding 	<ul style="list-style-type: none"> - Feeding: <50% of normal intake - Dry mucous membranes 	<p>History of reduced urine output or anuria or excessive urine output*</p> <p>Wet nappies: < 4 in 24 hours</p> <p>Vomiting</p> <ul style="list-style-type: none"> - Persistent - Bile - Blood - Coffee grounds - Stools with blood 	<p>Pain</p> <ul style="list-style-type: none"> - Obvious distress/painful injury - Pain rating with pain scale <p>Fever* (See Table 2)</p> <ul style="list-style-type: none"> - Infant < 3 months higher risk of serious infection - History of fever and/or medication with antipyretics important, even if the infant or child is afebrile at Triage <p>Rash</p> <p>Eg:</p> <ul style="list-style-type: none"> - Petechiae (non blanching pinpoint) - Purpura (non-blanching red/purple larger lesions)
<p>AVPU is useful as a screen. (Alert, responds to Voice, responds to Pain, Unresponsive)</p>	<p>See 'Vital Signs by Age' Chart</p> <p>Pulse rate, respiratory rate and BP</p>	<p>Actual oral fluid type is often important</p>	<p>With diarrhoea it maybe difficult to ascertain urine output</p>	<p>Temperature*</p> <p>Although there is no absolute consensus, temperatures of 38.5°C or higher may be regarded as a fever. In an infant < 3 months, low grade fevers (i.e. 37.5–38.50C) warrant concern. Tympanic thermometers are variable and not recommended. Per axilla is acceptable, although may underestimate the actual core body temperature, particularly in a very unwell patient. In a critically ill child, per rectum temp monitoring should be considered. Rectal thermometers maybe used, but a rectal probe is preferable. Glass thermometers should generally NOT be used rectally.</p>	

Table 3. Normal vital signs for children and babies

Age (years)	Vital signs by age (normal range)		
	Respiratory rate	Heart rate	BP (systolic) mmHg
<1	30-40	110-160	70-90
1-2	25-35	100-150	80-95
2-5	25-30	90-140	80-100
5-12	20-25	80-120	90-110
>12	15-20	60-100	100-120

Management Considerations

General Considerations

Specific management considerations are described below. There should be a low threshold for the use of oxygen therapy and early consideration of the need for ventilatory support.

It is also important to practice appropriate infection control principles in order to limit spread of this illness to health care workers, other patients and visitors. This includes the following advice from the *PROTECT Phase annex, Australian Medical Plan for Pandemic Influenza, 2009*:

Health Care Workers at Increased Risk of Complications from Pandemic (H1N1) 2009 Infections

- Health care workers who are at increased risk of complications from pandemic (H1N1) 2009 and who are likely to be in direct contact with patients who have Pandemic (H1N1) 2009 infections, should be considered for redeployment to lower risk activities.
- If redeployment is not possible, health care workers who are at increased risk of complications from pandemic (H1N1) 2009 infection should maintain a distance of one metre from pandemic (H1N1) 2009 patients and not participate in procedures with these patients that may generate small particles or aerosols of respiratory secretions.

Hand Hygiene

- Health care workers and visitors must perform hand hygiene regularly, including when removing gloves.
- Patients with ILI should be encouraged to perform hand hygiene frequently.

Personal Protective Equipment (PPE) – General Advice

- Anyone with an ILI should wear a surgical mask when not in isolation in a single room and stay at least a metre distant from others.

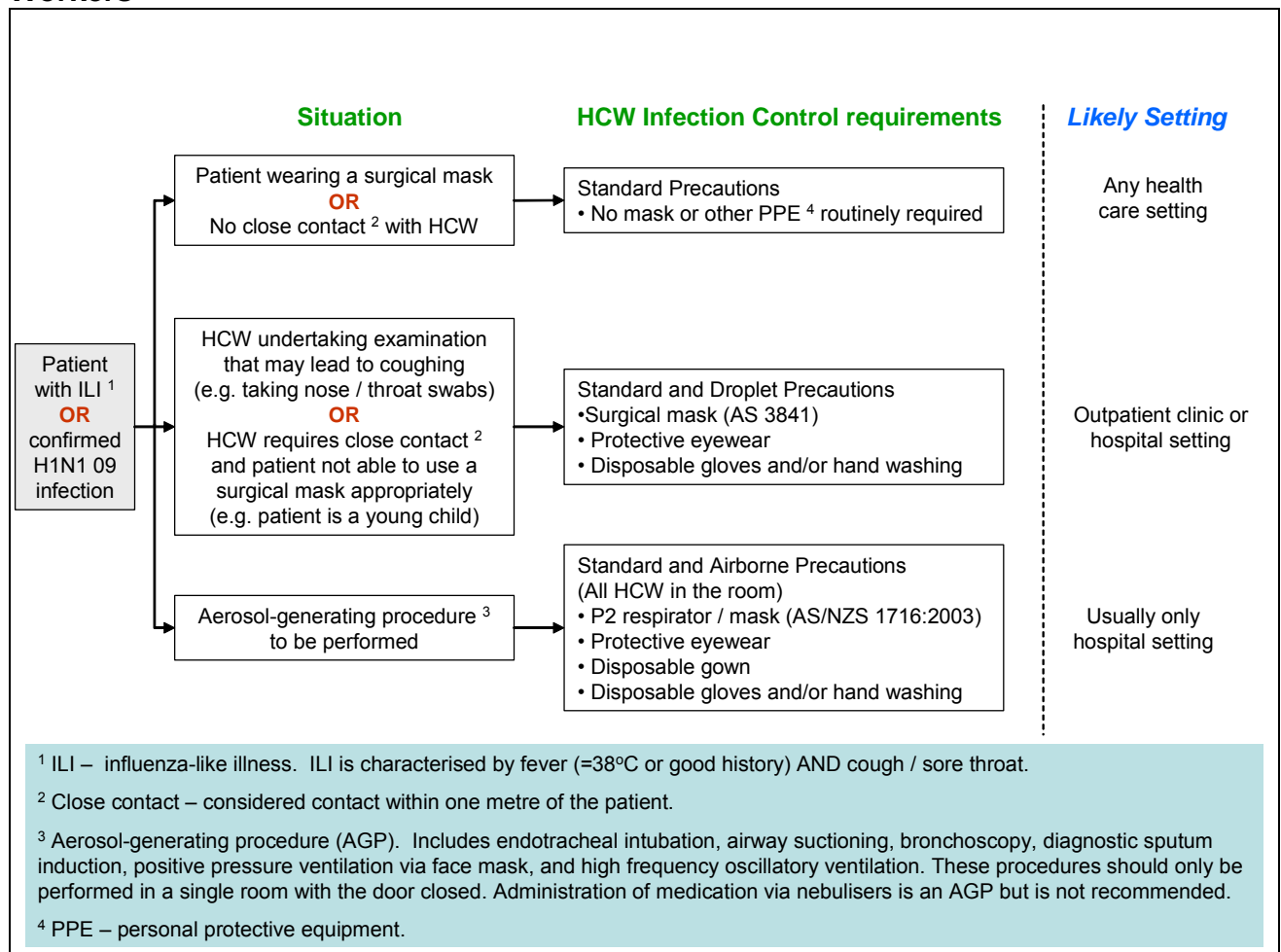
Personal Protective Equipment (PPE) – Advice for use during Procedures (including Collection of Swabs for Influenza Diagnosis)

- Health care workers should consider any guidance available from their State or Territory health department before making a decision to collect clinical swabs from a patient for influenza diagnosis, including pandemic (H1N1) 2009.
- Health care workers who can maintain a metre distance from an individual with an influenza like illness should practice standard infection control precautions but do not need to routinely wear a facemask or other personal protective equipment.
- Health care workers should apply additional droplet transmission precautions if they are undertaking an examination of an individual with an influenza like illness that may lead to coughing (e.g. collecting nose and/or throat swabs), or where the HCW is within a metre of the patient and the patient is not able to use a

surgical mask appropriately. This includes the use of a surgical mask, protective eyewear, along with disposable gloves and/or hand washing.

- All persons in the same room when aerosol-generating procedures are undertaken on ILI patients should apply additional airborne transmission precautions. This includes the use of P2 respirators, protective eyewear, a disposable gown, along with disposable gloves and/or hand washing. Aerosol-generating procedures include endotracheal intubation, nebulised medication administration, airway suctioning, bronchoscopy, diagnostic sputum induction, positive pressure ventilation via face mask, and high frequency oscillatory ventilation. These procedures should only be performed in a single room with the door closed, separated from other patients and visitors.
- Administration of medication via nebulisers is not recommended. Use spacers where possible. When the use of nebulisers cannot be avoided the practice should be considered an aerosol-generating procedure and managed with additional airborne transmission precautions (see above).
- Health care workers in the vulnerable category should not be in contact with patients during aerosol generating procedures or collection of nose and throat swabs.

Figure 2: Decision Tree for Infection Control Precautions for Healthcare Workers



In- Patient Isolation

- Single room accommodation should be used for pandemic (H1N1) 2009 inpatients and people with ILI presenting in clinical settings, wherever possible.
- If single rooms for pandemic (H1N1) 2009 inpatients are not available, cohorting of pandemic (H1N1) 2009 patients should be practised wherever possible, maintaining at least 1 m spacing between patients at all times. Confirmed pandemic (H1N1) 2009 cases should not be cohorted with confirmed seasonal influenza cases.
- Vulnerable patients at risk of severe disease should not be co-located with patients with ILI.

Management of Visitors

- Limit visitors for patients who are in isolation to those persons who are necessary for the patient's emotional wellbeing and care.

Duration of Precautions

Persons with pandemic (H1N1) 2009 infection should be considered potentially contagious from one day before to 7 days following illness onset. Persons who continue to be ill longer than 7 days after illness onset should be considered potentially contagious until fever has resolved. Children, especially younger children, might be contagious for longer periods.

- Isolation precautions should be continued for 7 days from symptom onset or until the resolution of fever, whichever is longer.
- Isolation precautions may also be discontinued when patient has had 72 hours of influenza antiviral treatment provided they have no fever for 24 hours in the absence of antipyretics.

Cleaning Pandemic (H1N1) 2009 In-Patient Rooms

- Daily and on discharge - clean with a neutral detergent. The room can be used immediately following cleaning
- Management of laundry and utensils should be performed in accordance with procedures followed for seasonal influenza.

Waste

- Treat waste as general medical waste.
- Used tissues are disposed of in general waste.

Surveillance and management of healthcare personnel

- Health care workers should be monitored for illness and those who develop influenza-like illness (ILI) should be instructed not to report to work, or if at work, should cease patient care activities and notify their supervisor and infection control personnel.

- It is also important to identify health care workers who may be considered vulnerable i.e. in whom pandemic (H1N1) 2009 may be severe (e.g. pregnant women) and manage as appropriate (see **section Health Care Workers at Increased Risk of Complications from Pandemic (H1N1) 2009 Infections**).

Management of Ill Health Care Workers

Details on the use of antivirals in specialised health care settings to protect the vulnerable is outlined in the *CDNA Pandemic (H1N1) 2009 Infection 'Protect Phase': Guidelines for Australian Public Health Units*.

[http://www.healthemergency.gov.au/internet/healthemergency/publishing.nsf/Content/477A0768B005A41DCA2575A800210183/\\$File/CDNA-H1N1-Protect-SoNG.pdf](http://www.healthemergency.gov.au/internet/healthemergency/publishing.nsf/Content/477A0768B005A41DCA2575A800210183/$File/CDNA-H1N1-Protect-SoNG.pdf)

Face Mask Information

- Surgical Masks
 - The term 'surgical mask' refers to a disposable fluid-repellent, paper filter mask that complies with the Australian standard for single-use masks for use in health care (AS 4381-2002). This may include masks labelled as surgical, dental, medical procedure, isolation, or laser masks.
 - It is important to ensure that surgical masks are worn and disposed of correctly. Make sure the mask is correctly fitted by ensuring that it covers your nose and mouth and that it is secured at the back of your head.
 - Avoid touching your face while wearing the mask. Replace the mask whenever it is moist. A mask that has been removed should not be reused.
 - Remove the mask by only touching the straps and put the used mask in a bin. Wash your hands well with soap and water straight away and dry with a paper towel.
- P2 Respirators
 - P2 respirators (P2 masks) are designed to provide high-level protection to the wearer's respiratory tract from small infectious particles. They are particulate filter, personal respiratory protection devices which, when tested against the Australian standard for Respiratory Protective Devices (AS/NZS 1716:2003), filter out at least 95% of particles of 0.3 micrometres diameter.
 - Testing is required so that P2 masks fit properly. Fit Checking for staff wearing a P2 mask is the appropriate minimum standard for health care workers each time they need to use a P2 mask for dealing with potentially infectious cases. Formal Fit Testing is recommended where available.
 - Fit Checking should be done in accordance with the mask manufacturer's instructions to ensure there is no air leakage around the mask. This is usually done after the mask is compressed over the nose and across the cheeks and face to create a firm seal. The wearer then gently inhales - the mask should draw in slightly towards the face and collapse – and then gently exhales - the mask should fill up with air. A fit check should be done each time a P2 mask is worn.
 - In some areas formal Fit Testing for health care workers is provided and required prior to wearing P2 masks in clinical settings. Health care workers

should consult with their OH&S or infection control practitioners for specific guidance.

Antiviral Medication Therapy

There are two antiviral agents known to be active against infection with Pandemic (H1N1) 2009 – Oseltamivir (Tamiflu®) and Zanamivir (Relenza®). Both agents block the action of viral neuraminidase, and have been demonstrated to reduce viral load and shedding in patients, as well as potentially reduce the severity of illness and speed recovery.

Optimally, therapy should be commenced within 48 hours of the onset of symptoms. It should be considered for those patients with moderate or severe disease (see above for indications of this), or those from a vulnerable group, even if only with mild disease, but where clinical assessment indicates a significant risk of deterioration.

Table 4. Treatment dosage recommendations for antiviral therapy

Treatment	Dose, interval, duration
Oseltamivir	<i>Oral dosing for 5 days</i>
Adults/children over 13 years	75 mg twice daily
Renal impairment (creatinine clearance 10-30 mL/min)	75 mg once daily
Children 1-13 years	
< 15 kg	30 mg twice daily
15-23 kg	45 mg twice daily
23-40 kg	60 mg twice daily
> 40 kg	75 mg twice daily
Zanamivir	<i>Inhalations</i>
Adults and children > 5 years	10 mg (2 inhalations) twice daily

Notes:

- Whilst antiviral therapy is optimal if commenced within 48 hours of symptom onset, commencement of therapy after this period may be indicated on clinical grounds (severe disease, very high risk)
- Oseltamivir is not registered with TGA for use in children under 1 year of age, due to limited safety data and evidence of central nervous system accumulation in animal studies. It should only be used under specialist advice where benefit is believed to outweigh the potential risks. The dose is 2 mg/kg/dose.
- Oseltamivir is renally excreted, therefore dosing needs to be adjusted in patients with renal impairment, and is contraindicated for patients on dialysis. Zanamivir may be used as an alternative.
- 2%-10% of patients on Oseltamivir develop gastrointestinal side effects, such as transient nausea, vomiting and abdominal pain. This may be mitigated by co-administration with food or use of antiemetics
- Zanamivir is delivered via oral inhalation, therefore is difficult to administer in children under 5 years and older adults
- Zanamivir may cause cough or transitory increased dyspnoea, and so those patients with chronic respiratory diseases should have access to a rapid-acting bronchodilator.
- Oseltamivir and Zanamivir are pregnancy class B1 agents, and are generally regarded as safe to use in pregnancy.
- There is no parenterally-administered neuraminidase inhibitor available.

Antibiotic therapy

Whilst routine antibiotic therapy is not indicated in Pandemic (H1N1) 2009 infection, where there is evidence of a possible secondary bacterial pneumonia (see above), empiric antibiotics should be considered at an early stage. Noting the statements

above around the risk of underestimation of risk by pneumonia scoring systems, patients would generally be treated as Pneumonia Severity Score class III or IV if moderately ill, or class V if severely ill. In general, the following antibiotics should be considered (see *Therapeutic Guidelines – Antibiotic (2006)* under “Community-acquired Pneumonia” for further information):

Moderate disease

Benzylpenicillin 1.2 g IV q6h or
Ampicillin 1 g IV q6h or

Ceftriaxone 1 g IV daily or
Cefotaxime 1 g IV q8h (if there is a penicillin hypersensitivity)
or

Moxifloxacin 400 mg PO daily (if there is *immediate* penicillin hypersensitivity)

Plus

Doxycycline 100 mg PO q12h or
Clarithromycin 500 mg PO q12h or
Roxithromycin 300 mg PO daily

Severe disease

Azithromycin 500 mg IV daily or
Erythromycin 500 mg – 1 g q6h (via central line)

Plus either

Ceftriaxone 1 g IV daily or cefotaxime 1 g IV q8h or both
Benzylpenicillin 1.2 g IV q4h and gentamicin 4-6 mg/kg IV daily
Moxifloxacin 400 mg IV daily can be used where there is immediate penicillin hypersensitivity

If staphylococcal pneumonia is a consideration:

Vancomycin 25 mg/kg (max 1 g) IV q12h plus
Flu- or dicloxacillin 2 g IV q6h.

Note that a number of these drugs require central venous access and/or close monitoring of drug levels.

Considerations for ongoing referral

The presence of severe illness or evidence of rapid deterioration indicates the need for consideration of early discussion with and referral to a facility with the ability to provide intensive care and expert ventilatory support.

Transfer should be undertaken at an early rather than late stage, with appropriate infection control precautions for those involved in the transport of the patient.

Additional Resources

Additional resources are available on the Department of Health and Ageing's Health Emergency website:

www.healthemergency.gov.au

Thanks to the Chief Medical Officer's Clinical Specialist Advisory Group, and the staff of the National Incident Room, Office of Health Protection, Department of Health and Ageing.

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