ASID (HICSIG) position statement: infection control guidelines for patients with influenza-like illnesses, including pandemic (H1N1) influenza 2009, in Australian health care facilities

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ABSTRACT

Standard and Droplet Precautions are considered adequate to control the transmission of influenza in most health care situations. Vaccination of health care staff, carers and vulnerable patients against seasonal and, eventually, pandemic influenza strains is an essential protective strategy.

Management principles include:

- performance of hand hygiene before and after every patient contact or contact with the patient environment, in accord with the national 5 Moments for Hand Hygiene Standard;
- disinfection of the patient environment;
- early identification and isolation of patients with suspected or proven influenza;
- adoption of a greater minimum distance of patient separation (2 metres) than previously recommended;
- use of a surgical mask and eye protection for personal protection on entry to infectious areas or within 2 metres of an infectious patient;
- contact tracing for patient and health care staff and restriction of prophylactic antivirals mainly to those at high risk of severe disease;
- in high aerosol-risk settings, use of particulate mask, eye protection, impervious long-sleeved gown, and gloves donned in that sequence and removed in reverse sequence, avoiding self-contamination;
- exclusion of symptomatic staff from the workplace until criteria for non-infectious status are met;
- reserving negative-pressure ventilation rooms (if available) for intensive care patients, especially those receiving non-invasive ventilation;
- ensuring that infectious postpartum women wear surgical masks when caring for their newborn infants and practise strict hand hygiene; and implementation of special arrangements for potentially infected newborns who require nursery or intensive care.

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The emergence of the novel pandemic (H1N1) 2009 strain has had a significant impact on Australian health care facilities. At the start of the pandemic, there was uncertainty about the modes of transmission. Infection control measures were designed to protect the vulnerable against a disease in which transmissibility was reported as substantially higher than that of seasonal influenza.[1,2] Initial evidence from animal transmission studies has now shown comparable transmissibility between the pandemic and seasonal strains.[3,4]

On 17 June 2009, the Australian Government announced a new pandemic response phase — "Protect" — and issued a new technical annex to the Australian Health Management Plan for Pandemic Influenza (AHMPPI) for this phase.[5] This annex included updated infection control advice replacing some of the recommendations in the original AHMPPI *Interim infection control guidelines for pandemic influenza in healthcare and community settings 2006*.[6]

The primary goal of infection control is to protect health care workers (HCWs), other patients and community members from acquiring a potentially serious disease. However, the Protect phase guidance on infection control has been considered not entirely workable, and has been inconsistently applied by some jurisdictions. The most serious technical concern is the recommendation that the adoption of Droplet Additional Precautions is required only in an area within 1 metre of an infectious patient, an approach that we believe does not achieve an appropriate level of safety and that is inconsistent with international recommendations. In addition, other infection control recommendations regarding the use of surgical masks during some aspects of clinical care differ from accepted Droplet Precautions, causing further confusion.

The purpose of this position statement from the Healthcare Infection Control Special Interest Group (HICSIG) of the Australasian Society for Infectious Diseases (ASID) is to propose standard measures for adoption across Australia that are practical and consistent with available evidence. The process of developing these guidelines is outlined in Box 1.

How is influenza transmitted?

Influenza may be spread by aerosols, large droplets and contact. The relative importance of these modes is still debated.

Droplet transmission

Droplet transmission occurs via large droplets (> 5 μm diameter) generated from the respiratory tract. Droplet transmission involves direct deposition of large droplets onto the nasal mucosa, conjunctiva and, less frequently, the mouth of the new host. The maximum distance for droplet transmission is unresolved. Historically, the area of risk was defined as a distance less than 1 metre around the patient, based on epidemiological and simulated studies of selected infections. Investigations during the 2003 outbreak of

1 Process of guideline development

Because of the rapidly evolving situation, an expedited process was used to develop these guidelines. The main authors reviewed the literature and current guidelines. New guidelines were formulated with substantial input from Australasian Society for Infectious Diseases (ASID) members, including members of the ASID Healthcare Infection Control Special Interest Group (HICSIG) and the Australian Government Department of Health and Ageing. The authors responded to all comments received. ◆

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2 Routine measures for infection prevention and control of influenza

Standard Precautions	Droplet Additional Precautions
• Hand hygiene by health care staff	• Early identification and isolation of cases
• Respiratory hygiene and cough etiquette by patients, visitors and health care staff	• Controlled de-escalation of precautions
• Personal protective equipment to prevent direct contact with blood or body fluids; for influenza, this includes routine use of protective eyewear	• Fluid-repellent surgical masks for health care staff or visitors who enter an isolation room or area
• Environmental cleaning and disinfection	• Charts to be kept outside an isolation room or area
• Safe linen, waste and sharps handling	• Safe patient transport
• Influenza vaccination	• Exclusion of symptomatic health care staff from clinical care for an appropriate time
• Prevent high-risk exposures of vulnerable health care staff	

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severe acute respiratory syndrome (SARS) suggest that droplets could reach individuals located ⩾ 2 metres from their source.[7] The distance droplets can travel depends on the velocity and mechanism by which they are produced, the density of respiratory secretions, and factors such as temperature and humidity.[8] From a sneeze or cough, large droplets may be propelled up to 6 metres or 2 metres, respectively, before settling or evaporating.[8] The US Centers for Disease Control and Prevention (CDC) recommend donning a surgical mask within 2–3 metres (6–10 feet) of the patient, or on entry into the patient's room or bed space.[9] Although evidence suggests that surgical masking of patients reduces the potential for transmission by filtering out virus,[10] in practice these masks become saturated after 10–15 minutes of use and lose their efficacy. In terms of HCW protection, a recent evidence review indicates that particulate (P2) masks are more effective than surgical masks and may be preferred in high transmission-risk settings.[11]

Contact transmission

Influenza is also transmitted by direct and indirect contact via inoculation of the respiratory mucosa by hands. The virus survives on surfaces for extended periods: up to 48 hours on non-porous surfaces and 30 minutes on unwashed hands.[12] Contact transmission can be controlled by use of Standard Precautions, particularly hand hygiene, respiratory hygiene and cough etiquette, and environmental controls.[9] These measures specify the use of protective eyewear during close contact to avoid direct contamination by respiratory secretions.

Airborne transmission

Small-particle (< 5 μm) aerosols are created by most respiratory processes and secondarily by evaporation of large droplets. Analysis of seasonal influenza outbreaks has failed to demonstrate significant airborne transmission over long distances.[13,14] However, aerosol transmission within confined spaces may be important, especially when there is a large airborne infectious burden.

Infection prevention and control recommendations

The 2007 CDC evidence review and guideline[9] is acknowledged internationally as the primary reference for Infection Control Precautions. Patients with suspected or laboratory-confirmed seasonal or pandemic (H1N1) 2009 influenza should be managed with Standard Precautions plus Droplet Additional Precautions (Box 2).[9,15]

Vaccination of patients and HCWs against seasonal influenza is an essential preventive measure; vaccination is expected to be available for pandemic (H1N1) 2009 influenza later in 2009.[16]

Standard Precautions (Box 2)

These generic preventive practices protect against contact transmission of many infectious agents among patients and HCWs.

Hand hygiene

- Hand hygiene should be performed before and after patient care in accord with the Australian 5 Moments for Hand Hygiene Standard.[17]
- Hand hygiene is also required after contact with the patient environment, even if the patient has not been touched.

Personal protective equipment

- Use protective eyewear (wrap-around glasses, goggles or an integrated face shield/mask) for close contact with an influenza patient — within 2 metres or inside the patient's room.
- If contact with blood or body fluids is anticipated, an impervious gown/apron and gloves are required.

Environmental hygiene

- Dedicated or disposable equipment for the isolation/cohort area is recommended. Equipment for re-use should be disinfected after use with a large alcohol wipe.
- Clean isolation and cohort areas, including toilets, daily.
- Clean and disinfect all surfaces and equipment at patient discharge. A virucidal disinfectant is required, such as hypochlorite, Viraclean (Whiteley Medical, Sydney, NSW) or Chlor-Clean (Guest Medical, Edenbridge, UK).
- Change cubicle/bed curtains at patient discharge.
- Staff involved in surface cleaning of potentially contaminated areas should wear a surgical mask, protective eyewear, disposable impervious gowns and gloves.

Droplet Additional Precautions (Box 2)

Identification of patients with influenza

- Influenza-like illness (ILI) is defined as sudden onset of fever with a temperature > 38° C and cough or sore throat in the absence of other diagnoses.[18]
- Patients who require admission with an ILI, including pneumonia, should be tested for influenza and placed in isolation while results are awaited. Influenza subtype-specific testing should be used if available.

3 Aerosol-generating procedures

- Endotracheal intubation
- Open airway suctioning or opening a ventilator circuit
- Bronchoscopy
- Gastroscopy
- Non-invasive ventilation (CPAP or biPAP)
- Nasopharyngeal aspirate collection
- Diagnostic sputum induction*
- Aerosolised or nebulised medication administration*

* Sputum induction and nebuliser use are strongly discouraged. Spacer devices should be used instead of nebulisation.
CPAP = continuous positive airways pressure.
biPAP = bilevel positive airways pressure. ◆

- Patients who present with an afebrile acute respiratory illness and require hospital admission should be tested on admission and placed in isolation while results are awaited.
- Rapid antigen tests have poor sensitivity and should not be used to exclude influenza. Where available, nucleic acid testing (by polymerase chain reaction [PCR]) should be performed (a bronchoalveolar lavage sample is preferred for intensive care patients).

Patient isolation and cohorting

- Wherever possible, provide a single room with a separate toilet for inpatients with suspected or proven influenza, including pandemic (H1N1) 2009. If single rooms are limited, give priority to patients awaiting confirmation.
- If single rooms are not available, cohorting should be practised. Recommended cohorting practice:
  - Do not cohort patients with confirmed pandemic (H1N1) 2009 together with patients with confirmed seasonal influenza.
  - Place beds at least 2 metres apart. If this is not possible, use between-bed curtains and space beds at least 1 metre apart.
  - Draw curtains between adjacent beds of a cohort area to impede the direct spread of droplets.[9]
  - Designate a separate toilet/bathroom/commode for the cohorted patients.
  - Cohorted patients requiring an aerosol-generating procedure (Box 3) should be transferred to a dedicated room for the duration of this procedure.
- Patients who leave their rooms (or cohort bay) should wear a surgical mask if tolerated, and should be encouraged to perform hand hygiene and follow respiratory hygiene and cough etiquette practice.
- Patients' charts should be placed in a plastic bag while patients are being transported.

Duration of isolation

- Isolation should continue until 7 days after illness onset, or until the fever has been resolved for 24 hours — whichever is longer. Children under 2 years may shed virus for more than 7 days; therefore, consider longer isolation (eg, 10 days).[19]
- Antiviral therapy prescribed within 48 hours of symptom onset decreases viral shedding.[20] Patients receiving antiviral therapy can cease isolation 72 hours after commencing therapy, or 24 hours after resolution of fever — whichever is longer.
- Viral shedding is often prolonged for several weeks in oncology patients receiving chemotherapy and in patients with severe immunosuppression. The infectious duration is therefore undefined for this group.
- For other immunocompromised and intensive care patients, precautions should be de-escalated based on clinical grounds. The utility of additional laboratory testing to establish the absence of viral shedding is unclear. PCR tests are more sensitive than tests to detect influenza antigen (eg, immunofluorescence and rapid point-of-care tests) but cannot distinguish viable (infectious) virus from non-viable RNA. Hence, no guidance can be given on the value of sequential PCR testing for infection control.

Health care workers' personal protection

- HCWs entering an isolation room (or bay) should wear a fluid-repellent surgical mask applied well to the face, and protective eyewear. (The donning of protective eyewear is a requirement of Standard Precautions when procedures or clinical care are likely to lead to mucosal exposure by splashes or sprays of blood, or body fluid such as respiratory secretions.)
- Masks must be changed when moist or damp; touching of mask surfaces should be avoided as they are contaminated.
- HCWs exposed to aerosol-generating procedures (Box 3) should wear P2 (N95) particulate filter masks, protective eyewear, disposable impervious gowns and gloves. HCWs must be trained in the safe sequence for donning and removing this equipment.[21] All personal protective equipment (PPE) may be contaminated, and HCWs should assume their hands will become contaminated during removal of PPE. Great care must be taken to avoid touching mucous membranes. There is no direct evidence that fit-testing of P2 (N95) masks achieves greater levels of protection and therefore no direct guidance can be given concerning fit-testing requirements.
- HCWs in the "vulnerable" category (Box 4) should not be exposed to aerosol-generating procedures. Where possible, vulnerable HCWs should not care directly for patients with suspected or confirmed influenza.

Management of ill health care workers

Health facilities should ensure that:

- HCWs who develop an ILI notify their manager and exclude themselves from work immediately.
- Vulnerable HCWs (Box 4) receive early antiviral treatment for ILI.
- Infected HCWs return to work no earlier than 24 hours after the resolution of fever, provided either they have received 72 hours of antiviral treatment or 7 days have elapsed since onset of respiratory symptoms.
- For HCWs in units with severely immunocompromised patients (eg, haematology and transplantation wards), a longer duration of exclusion (up to 5 days following commencement of antiviral treatment) should be considered.

Visitor policy

- Only HCWs necessary for patient care should enter the isolation room (or bay).
- Family members and visitors should be kept to a minimum.
- Individuals from vulnerable groups (Box 4) should avoid visiting.
- Visitors should be required to don surgical masks and protective eyewear and to perform hand hygiene on arrival and leaving.

4 Vulnerable groups, and conditions that render patients and staff at higher risk of severe influenza[5]

Chronic respiratory conditions
Asthma
Chronic obstructive pulmonary disease
Pregnancy
Particularly in second and third trimesters
Morbid obesity
Indigenous people of any age
Immunosuppression
Cancers
HIV/AIDS
Drugs
Chronic illness
Cardiac disease (excluding simple hypertension)
Diabetes mellitus
Chronic metabolic diseases
Chronic renal disease
Haemoglobinopathies
Chronic neurological conditions
Chronic liver disease ◆

- Health care facilities should actively discourage outpatients or visitors with recent ILI from visiting the hospital.
- Signs should be posted at ward entry to (a) warn symptomatic visitors against visiting, (b) specify that symptomatic visitors who regard their visit as essential must consult with ward staff on entry, and (c) encourage all visitors to use alcohol hand rub on entry to, and departure from, the ward.

Intensive care unit considerations

- Patients with suspected or proven influenza who require non-invasive ventilation should have priority for negative-pressure rooms if available and/or rooms with 100% exhaust capability.
- Patients with ongoing respiratory illness following a diagnosis of influenza should be regarded as potentially infectious for at least 7 days.
- Decisions regarding the ongoing need for isolation should be made on a clinical basis (in consultation with infectious diseases or microbiology staff), taking into account the availability of isolation facilities.
- As intensive care staff may spend prolonged periods with infected patients and there is potential for unexpected exposures (eg, ventilator disconnections), P2 (N95) masks may be substituted for surgical masks. However, prolonged use of P2 (N95) masks has been associated with headache and other side effects.
- Closed-ventilation suction circuits should be used where available, with bacterial and viral filters placed over the expiratory port where these do not interfere with ventilator operation.

Pregnant women with ILI, including pandemic (H1N1) 2009, and their newborns

Pregnant and postpartum women are at higher risk of complications of influenza. Initial experience with pandemic (H1N1) 2009 indicates that severe influenza in pregnancy often presents with early viral pneumonitis.[22,23] Cases have occurred in all trimesters of pregnancy and in the puerperal period. The neonates of five women with fatal pandemic (H1N1) 2009 infections did not show significant illness.[23]

- A full-term baby may "room-in" with the infectious mother, with the cot placed more than 2 metres away from the mother's bed.
- Breastfeeding should be encouraged; while the mother is infectious (see above), she should wear a surgical mask while caring for her baby; and hand hygiene should be encouraged.
- If the neonate requires special or intensive care, the mother may visit (see above for precautions) and attend for breastfeeding and breast-milk expression. A cleaned side room should be provided for the mother to feed her baby or express milk. The mother should wear a surgical mask while in the neonatal unit. The breast pump and side room should be cleaned and disinfected after use.
- Asymptomatic neonates who require special or intensive care should be managed with Droplet Additional Precautions until their infectious status is clarified.

Contact tracing

- HCWs and patient contacts may benefit from antiviral prophylaxis or treatment and should be identified where possible to evaluate the need for this.[24] The number of individuals receiving antiviral prophylaxis should be limited to reduce selective pressure for antiviral resistance and to conserve stocks of antivirals that are needed for treatment.

Health care staff

- As infection control measures effectively reduce the risk of acquisition, and as most disease caused by seasonal or pandemic (H1N1) 2009 is mild, antiviral prophylaxis is usually reserved for vulnerable staff who have a significant unprotected exposure.
- Unprotected exposure to an infectious patient with confirmed H1N1 during an aerosol-generating procedure denotes high-risk contact.[25]
- Patient care (within the patient's room or within 2 metres of the patient) for longer than 15 minutes without use of a surgical mask and protective eyewear denotes moderate-risk contact.
- Antiviral prophylaxis should be given within 48 hours of contact as efficacy has been demonstrated only before this time. If more time has elapsed, expert advice should be sought. If exposed staff are not provided with prophylaxis, they should have access to early treatment if required.
- Those who do not require prophylaxis should be counselled to watch for symptoms of ILI and not to come to work if these develop.

Patients

- For patients, significant contact is arbitrarily defined as:
  - More than 15 minutes of face-to-face contact with another patient with confirmed influenza, including pandemic (H1N1) 2009.
  - More than 24 hours spent in the same room as the index patient, when the index patient is mobile and sharing facilities.
  - More than 24 hours spent in the same room as the index patient, when the index patient is not mobile, but beds are placed less than 2 metres apart and a curtain has not been drawn between them.

- Care by an HCW with confirmed influenza A, including pandemic (H1N1) 2009, for > 15 minutes while the HCW is infectious (1 day before symptom onset until 7 days after if the HCW has not received antiviral treatment, or 3 days after if the HCW has received antiviral treatment).

• Vulnerable patients (Box 4) and those with significant contact with suspected or proven influenza should be offered prophylaxis within 48 hours.

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Competing interests

None identified.

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