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## **10 Health system response: Infection Control**

### ***10.1 Introduction***

This chapter provides an overview of current information regarding influenza infectivity, modes of transmission and best practice for infection control for pandemic influenza in the acute care, primary care, and other institutional settings. Adherence by all health care workers to good infection control practices is extremely important to prevent and limit transmission of influenza as well as many other infectious diseases. Key infection control precautions such as hand hygiene, use of appropriate personal protective equipment (PPE), separation or cohorting of symptomatic patients, and appropriate environmental cleaning are applicable for all infectious diseases. Detailed guidance to accompany this chapter is provided in the appendix titled “Guidance for Pandemic influenza: Infection control in hospitals, community and primary care settings”. Information for the public on prevention and control of infection is detailed in Chapter 7.

Infection control guidance for avian influenza and other novel virus infections is dealt with separately in Chapter 11.

### ***10.2 Limitations to the infection control guidance***

In advance of a pandemic virus emerging, it is not possible to know its infectivity, pathogenicity, mode(s) of transmission, virulence, susceptibility of subgroups of the population, or period of communicability (infectious period).

We are assuming that:

The modes of transmission, incubation period and period of communicability are similar to seasonal influenza.

## 10.3 Key facts

### 10.3.1 Identification of Influenza

Influenza is an acute viral illness of the respiratory tract characterised by fever, headache, myalgia, prostration, coryza, sore throat and cough. Cough is often severe and protracted. Recovery usually occurs within 2-7 days. Gastrointestinal symptoms, such as nausea, vomiting and diarrhoea can accompany the illness particularly in children. The most common complication is pneumonia.

### 10.3.2 Incubation period

The incubation period is short, typically two days with a range of one to four days.<sup>(1)</sup>

### 10.3.3 Period of communicability

Persons are infectious from 24 hours pre onset of symptoms and during the most symptomatic period, usually three to five days from clinical onset in adults and up to seven days or longer in young children. Peak shedding occurs during the first 24-72 hours of illness and declines within several days. Shedding does not usually continue once the clinical illness has resolved. Duration of shedding is likely to be shorter with the use of antivirals. There is very limited information on transmission of infection in those who are in the incubation period of the disease. In a recent review article, the WHO writing group identified only one published report in which transmission occurred during the incubation period in a group of adults in New Zealand in 1991.<sup>(2)</sup>

### 10.3.4 Survival of virus

Studies have shown that it survives for 24-48 hours on hard, non-porous surfaces, eight to 12 hours on cloth, paper and tissue and five minutes on hands. When it is cold and humidity is low, survival of the virus is enhanced.<sup>(3)</sup>

### 10.3.5 Susceptibility

Susceptibility is general. It is expected that no one will have any immunity to the pandemic virus. It is not possible to predict in advance which subgroups of

the population will be at higher risk of infection. For planning purposes, WHO has recommended that planners aim for an infection rate of 50% and a clinical attack rate of 25%.

#### *10.3.6 Mode of transmission*

Animal studies and most influenza outbreaks amongst humans suggest that virus laden large droplets generated when infected persons cough or sneeze are the predominant mechanism of influenza virus transmission.<sup>(4)</sup> There is also some evidence for transmission via contaminated hands, other surfaces or fomites, and for transmission via droplet nuclei (airborne transmission). Overall information on transmission is limited, and there are no human experimental studies published in English delineating person-to-person transmission of influenza.

Salgado et al summarised the findings of 12 outbreaks of nosocomial influenza outbreaks.<sup>(5)</sup> In each of the outbreaks, the droplet and/or contact precautions, in conjunction with the use of antivirals, vaccines, and isolation were used to control spread. Airborne precautions were not used.

Bean et al investigated the transmission of influenza viruses via hands and environmental surfaces.<sup>(3)</sup> They found that human influenza viruses survived for 24-48 hours on hard non-porous surfaces such as stainless steel and plastic, but survived less than 8-12 hours on cloth, paper and tissues. They calculated that persons shedding significant quantities of virus could transmit infection via stainless steel surfaces for two hours and possibly up to eight hours, and via paper tissues for a few minutes (essentially before drying of the tissue). They also found that viruses survived on hands for up to five minutes after transfer from environmental surfaces. In an outbreak in Hawaii, transmission of oral secretions from patient to patient by staff not wearing gloves explained transmission in the outbreak.<sup>(6)</sup>

There is some limited evidence showing possible airborne transmission. In a point source outbreak due to an infected passenger on a delayed airplane with a non-functioning ventilation system, there was a 72% clinical attack rate

among those sitting throughout the cabin, the risk related to the amount of time spent on the airplane.<sup>(7)</sup> However as passengers moved freely around the cabin at that time, it's possible that large droplet transmission also occurred.

Recently a systematic review of the (English language) literature on modes of transmission of influenza A was carried out<sup>(8)</sup> Following initial searching, and consideration, 32 articles, including 8 relating to virus survival, 15 experimental and 9 outbreak reports were reviewed. They concluded that existing data are limited with respect to the identification of specific modes of transmission in the natural setting, but that transmission occurs at close range rather than over long distances, suggesting that airborne transmission is unlikely to be of significance in most clinical settings. Most natural influenza transmission occurs primarily through the droplet and contact routes.

#### ***10.4 Recommended infection control measures***

The balance of evidence points to droplet and direct and indirect contact as the most important routes of transmission. Airborne, or fine droplet transmission, may also occur.

**The Expert Group advises that Standard Infection Control Precautions and Droplet Precautions are the principal infection control strategies that should be rigorously followed for pandemic influenza.**

In certain circumstances (during aerosolising procedures) these control measures will need to be augmented with higher levels of respiratory protection i.e. through the use of Airborne Precautions. This approach is the same as the approach being promoted by WHO and the UK.

**As nebulisation is an aerosolising procedure, the Expert Group advises that the use of nebuliser therapies should be minimised wherever feasible without compromising patient care. To avoid unnecessary exposures, only those health care workers needed to perform the procedure should be present. See Supplement 10:5.3.3**

Prevention of influenza transmission in healthcare settings is based on:

- Strict adherence to infection control practices especially hand hygiene, containment of respiratory secretions and the use of personal protective equipment (PPE)
- Adherence to Standard Infection Control Principles and Droplet Precautions
- Administrative controls e.g., separation or cohorting of patients with pandemic influenza.
- Restriction of symptomatic workers and visitors
- Education of staff, patients and visitors

Hand hygiene is the single most important practice to reduce the transmission of infectious agents in the healthcare and the community setting. A universal respiratory hygiene strategy is an essential component of any healthcare organisation's preparedness plan for pandemic influenza. This strategy, which is outlined in Appendix A, includes the following elements:

- Posting of visual alerts for all patients or visitors to inform staff and take precautions if they have respiratory symptoms
- Providing a surgical mask for those with respiratory symptoms, or tissues if unable to use mask, and separating them from other patients
- Providing adequate handwashing facilities in the waiting area, tissues and disposal bins
- Using barriers at registration to protect staff from symptomatic patients' respiratory secretions

**The Expert Group advises that a universal respiratory hygiene strategy is adopted in all healthcare facilities.**

In the community setting it is very important that the public is aware of how to minimise potential influenza transmission through the following:

- Cover nose and mouth with disposable single-use tissues when sneezing, coughing, wiping and blowing nose
- Dispose of used tissues in the nearest waste bin
- Wash hands after coughing, sneezing, using tissues, or contact with respiratory secretions and contaminated objects
- Keep hands away from the mucous membranes of the eyes and mouth
- If sick with flu, stay at home to avoid spreading infection to others

**The Expert Group advises that the communications materials for the public contain these important messages on minimising transmission of influenza.**

The use of PPE is detailed in Supplement 10. PPE should be worn to protect staff from contamination with body fluids and thus reduce the risk of transmission of pandemic influenza between patients and staff and from one patient to another. It is very important that staff are trained in the proper use of PPE, including fit testing of respirators, if they will be carrying out aerosolising procedures.

In order to minimise the risk of spread of infection, patients with influenza should be separated from other non-influenza infected patients. This will require considerable planning in advance.

Education of staff, patients and visitors on influenza, its symptoms and prevention of transmission is essential. In addition, staff need to be familiar with the pandemic influenza plans for their healthcare institution, and his/her role in them.

**The Expert Group recognises that full implementation of the infection control guidance will be challenging, particularly in primary care settings, and advises that adequate resources are provided by the system to facilitate implementation of these recommendations.**

Detailed guidance providing specific recommendations, planning strategies, and tools for local public health and healthcare staff are provided in Supplement 10. This guidance includes sections on preparedness planning, occupational health, infection control precautions, and environmental infection control, as well as sections focusing on hospital, community and primary care specific-issues separately. This guidance is based on and adapted from Guidance developed by the Department of Health, England and the Health Protection Agency, with permission.

## 10.5 Reference List

- (1) Morris JA, Kasel JA, Saglam M, Knight V, Loda FA. Immunity to influenza to antibody levels. *N Engl J Med* 1966; 274(10):527-535.
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- (7) Moser MR, Bender TR, Margolis HS, Noble GR, Kendal AP, Ritter DG. An outbreak of influenza aboard a commercial airliner. *Am J Epidemiol* 1979; 110(1):1-6.
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## ***Appendix A Universal Respiratory Hygiene***

The following are components of a universal respiratory hygiene strategy to be adopted in all health care facilities.

- The posting of visual alerts at the entrances to all healthcare facilities, instructing patients and those who accompany them to:
  - Inform healthcare personnel of symptoms of a respiratory infection when they first register for care
  - Practice respiratory hygiene
  - Advise visitors with respiratory symptoms to defer their visit until symptoms have resolved
- All patients and visitors who have symptoms of an infectious respiratory illness (cough, runny nose, sore throat or sneezing) should be provided with a surgical mask and instructions on its proper use and disposal. They should also be provided with instructions on hand-hygiene.
- For those who cannot wear a mask, provide tissues and instructions on when to use them (i.e. when coughing, sneezing, or controlling nasal secretions), where they should be disposed of, and on the importance of hand-hygiene after using them
- Waste bins should be readily available for disposal of tissues.
- Provide hand-hygiene materials in the waiting room areas and encourage persons with respiratory symptoms to perform hand-hygiene
- Instruct registration, reception and triage staff of their risk of exposure to infections spread by droplets and to consider wearing masks whenever registering or assessing patients who have respiratory symptoms and are not wearing a mask. Instruct them to remain at least three feet from unmasked patients.
- Consider the use of Plexiglas barriers at the point of triage or registration to protect healthcare personnel from contact with respiratory droplets.
- Where possible, designate an area, cubicle or separate room in waiting areas where patients with respiratory symptoms can be segregated (ideally by at least 3 three feet) from others without respiratory symptoms.

- Commonly used surfaces such as door handles, handrails, table surfaces etc. should be cleaned first and then disinfected with a chlorine releasing disinfectant (1000 ppm) twice daily.
- Use droplet precautions to manage patients with respiratory symptoms until it is determined that the cause of the symptoms is not an infectious agent that requires more than standard precautions.