

Pandemic influenza and physician offices

Primary care physicians can prepare their offices and their staff for a pandemic by using a checklist that includes recommendations for infection control measures.

ABSTRACT: Front-line physicians have an important role to play in preparing for an influenza pandemic and in caring for patients during a pandemic. By improving infection control practices in their offices in the interpandemic period, physicians can reduce the spread of common respiratory viruses and improve preparation for any future pandemic. Standard infection control measures in offices should take into account patient flow, office cleaning, hand washing, and appropriate use of personal protective equipment. Providing influenza vaccination to office staff and eligible patients every year will increase capacity for vaccine delivery during pandemics, and ensuring that high-risk patients receive pneumococcal vaccination now will reduce their risk of bacterial pneumonia during seasonal influenza outbreaks as well as during a pandemic. However, providing patients with scripts for personal stockpiles of oseltamivir in anticipation of a pandemic is not recommended because inappropriate use of this antiviral agent may contribute to the evolution of resistant strains during a pandemic.

While no one can predict if influenza A/H5N1 will precipitate the next influenza pandemic, the appearance of human cases of influenza A/H5N1 in 1997 and subsequent widespread avian influenza outbreaks among poultry beginning in Asia in 2003 (and subsequently spreading to several countries in Europe and Africa) have prompted authorities around the world to update their pandemic influenza plans.

Planning in Canada began at the national level and has now proceeded to provincial and regional levels. Front-line physicians are currently being brought into the planning process, and are asking important questions about the H5N1 virus and how they can undertake their own pandemic planning for their practices:

- Should I be on the lookout for imported human cases of H5N1 or other novel influenza subtypes?
- Once a pandemic is declared, how will I know when a pandemic strain of influenza arrives in my area?
- What infection control precautions should I take in my office when a pandemic is declared?
- Should I provide patients with scripts for oseltamivir for personal stockpiling?

The following answers to these and other questions can help physicians prepare their practices, both in the pre-pandemic period and after a pandemic is declared.

Present risk of human cases of H5N1

To date, no imported human cases of H5N1 associated with avian influenza outbreaks in Asia have been identified in North America or elsewhere. All of the human H5N1 cases reported over the last 4 years in 12 countries have been acquired locally and most have occurred in rural areas. Almost all cases have been associated with direct contact with ill or dead poultry in areas experiencing avian outbreaks. There have been no reported cases among visiting tourists.¹ More than 10 years after it was first identified, H5N1 remains genetically a purely avian virus.

The risk of H5N1 for visitors to countries with avian outbreaks is considered extremely low and there are no current travel restrictions in place for

Dr Daly is a medical health officer and the medical director of Communicable Disease Control, Vancouver Coastal Health. She is also a clinical associate professor in the Department of Health care and Epidemiology at the University of British Columbia.

any countries with avian influenza outbreaks. Simple travel advice includes avoiding contact with ill poultry, live poultry markets, and poultry farms. Travelers to these countries are at far, far greater risk of returning with other infections such as hepatitis A or malaria. To put the risk in perspective: in 2005, there were 97 human cases of H5N1 identified and reported worldwide compared with an estimated 300 million cases of acute malaria.

No particular tests for H5N1 are presently recommended for returning travelers. If diagnostic testing is needed for other reasons, any patient presenting with influenza-like illness (ILI) can have a nasopharyngeal wash or swab for rapid influenza and other viral testing. If a physician is concerned about any unusual communicable disease in a returning traveler, this can be discussed with a local medical health officer.

Future plans to monitor arrival of pandemic influenza

The World Health Organization manages a worldwide laboratory system for influenza surveillance, which allows it to recommend appropriate strains for inclusion in each season's influenza vaccine and to monitor emergence of new influenza A subtypes such as H5N1. If influenza A/H5N1 were to evolve to become easily transmissible from person to person while still causing significant illness, or if another novel subtype were to arise with these characteristics, the World Health Organization would monitor its evolution and declare a pandemic when person-to-person transmission was widespread. Depending on where it arises, there will likely be a period of weeks or months before a new pandemic influenza strain arrives in BC. During that period, physicians will receive notifications

from the Provincial Health Officer and their local medical health officer, and surveillance for influenza-like illness cases and clusters will be heightened. Specific testing guidelines will be provided to ensure appropriate use of laboratory resources to detect the arrival of the pandemic subtype.

Presuming that a new pandemic subtype will have similar epidemiological characteristics to other human influenza A viruses, it is unlikely that initial cases of pandemic influenza in BC will be identified from among returning travelers or visitors from pandemic areas because:

- The incubation period for influenza A is short (1 to 3 days).
- Individuals are usually infectious 1 day before the onset of symptoms.
- Most people with influenza are not sick enough to seek medical attention.

Because influenza is communicable before symptoms start and the incubation period is so short, returning travelers or visitors who may be infected will already have spread the virus by the time their symptoms develop and are recognized. Even if returning travelers and visitors become ill enough to seek medical attention, by the time they do so their contacts may already be ill themselves and have presented to their physicians. This is also why isolation of cases and quarantine of contacts during a pandemic is not likely to be effective in preventing spread at the population level. However, ill persons will be advised to stay home from school or work to reduce the risk of further exposing other individuals.

New strains of seasonal influenza arrive each fall and winter from other parts of the world, but the first cases physicians see in their offices are usually not visitors or returning travelers; pandemic influenza will likely be no different. Once a pandemic is declared, physicians should consider any patient

they see with influenza-like illness as potentially infected with the pandemic strain.

Infection control: Now and during a pandemic

Many physicians express concern about appropriate infection control measures in their offices during an influenza pandemic. Some are concerned about becoming infected and bringing the virus home to family members, perhaps due to the increased risk to health care workers during the 2003 outbreak of SARS. However, in contrast to SARS, influenza is spread primarily in community settings rather than health care settings; physicians are more likely to acquire influenza from their children than to bring the virus home to their children. Pandemic influenza is simply a new subtype of the influenza A virus. Most or all of the population will have no pre-existing immunity to the virus, but its transmission characteristics are not likely to differ from those of seasonal influenza A viruses.² Although a pandemic influenza strain may cause more severe illness, it will not be a new respiratory pathogen with entirely unknown epidemiology and transmission characteristics. Based on past pandemics, we know that spread will occur predominantly in the community.

In preparing for the next pandemic, physicians should consider how they currently manage cases of influenza in their office. Establishing good, basic infection control practices in the interpandemic period will reduce the spread of common respiratory viruses within office settings and help prepare physicians for a pandemic.

Influenza A and other common respiratory viruses are primarily transmitted through droplet spread and direct or indirect contact. Droplets are the respiratory particles that contain virus

and are produced when coughing or sneezing; they can travel approximately 1 m through the air and settle on environmental surfaces. Influenza A virus can survive on hard, nonporous surfaces such as stainless steel and plastic for 24 to 48 hours but is only transferable to hands after contact for 24 hours.³ Survival is much shorter on cloth, paper, and tissues, where the virus is only transferable to hands for 15 minutes. Virus can survive on hands for 5 minutes after transfer from environmental surfaces, allowing for autoinoculation of mucous membranes.³ For this reason, hand washing is an effective method of reducing the risk of infection with influenza and other respiratory viruses. Until a vaccine is developed for the pandemic strain, hand washing will be the most important method of preventing infection during a pandemic.

The possible role of airborne transmission versus droplet transmission of influenza virus is uncertain and derived largely from experimental studies involving animals, with little epidemiological or observational evidence.² Outbreak features during seasonal influenza are mostly consistent with droplet spread. Classically, airborne transmission refers to small particle size and has two requirements: first, capacity of particles to be inhaled deep into the lung, and second, capacity of particles to be carried over distances greater than 1 m. Most experts conclude there is no evidence for long-distance transmission of influenza viruses during seasonal influenza outbreaks or previous pandemic activity. Some inhalation of aerosolized virus, in addition to droplet spread at close contact, may be possible, but this has not been shown conclusively. Procedures such as intubation, suctioning, or delivery of nebulizer treatments in particular may serve to aerosolize the influenza virus.

A number of practice recommendations, described below and summarized in the accompanying checklist (**Figure**) will allow primary care physicians to prepare their offices for a pandemic. Many of the recommendations are appropriate for the interpan-

tients should be directed to check in with reception upon arrival. If patients appear unannounced with ILI, they should be placed in an examining room immediately or in an area of the waiting room at least one 1 m away from other patients and staff.

Establishing good, basic infection control practices in the interpandemic period will reduce the spread of common respiratory viruses within office settings and help prepare physicians for a pandemic.

demic period. For example, ensuring all eligible patients receive pneumococcal polysaccharide vaccination *now* will reduce their risk of death from secondary bacterial pneumonia after influenza infection, both during seasonal outbreaks and during a pandemic. Standard infection control measures should take into account patient flow, office cleaning, and appropriate use of personal protective equipment.^{2,4-7}

During the interpandemic period

Physicians can implement the following measures now to reduce the risk of spread of common respiratory pathogens.

Triage patients before or upon arrival. Ideally, patients with symptoms of influenza-like illness should be seen when the waiting room is not full (e.g., at the beginning or end of the day, over the lunch hour). All pa-

Maintain separation of patients from staff. Large practices may consider installing a Plexiglas divider between patients checking in and reception staff. If this is not feasible, staff should maintain a minimum distance of 1 m from patients who are checking in.

Provide hand-washing facilities for staff and patients. Maintain a supply of liquid soap and paper towels in washrooms for patients and staff. Consider mounting a dispenser for alcohol-based hand sanitizer inside the office entrance, and encourage all patients to use it upon arrival in the office.

Reduce office fomites. Fomites such as magazines, toys, books, and soft furniture can be vehicles for pathogen transmission. Consider eliminating these articles from your waiting room. Any common toys in the waiting room should be durable and

Pandemic influenza: Checklist for physician offices.

Now

- Provide annual influenza vaccination to all office staff each fall.
- Provide annual influenza vaccination to all eligible patients each fall.
- Provide one dose of pneumococcal polysaccharide vaccine to all eligible patients (those 65 years and older, those with chronic health problems).
- Provide conjugate pneumococcal vaccine series to infants.

Now and during pandemic

- Post signs advising patients to check in with reception upon arrival.
- Separate patients from reception staff with Plexiglas partition *or* minimum distance of 1 m.
- Post cough etiquette signs in the waiting area.
- Provide liquid soap and paper towels in patient washrooms and at staff sinks.
- Provide staff with small bottles of alcohol-based hand sanitizer.
- Mount alcohol-based hand sanitizer dispenser at office entrance for patient use upon arrival.
- Provide disposable tissues and no-touch waste receptacles in waiting area.
- Replace cloth-covered furnishings with easy-to-clean furniture.
- Avoid carpeting in office.
- Provide surgical masks to be worn by ILI patients who are coughing or sneezing.
- Wash or sanitize hands before and after each patient contact.
- Wear surgical mask when face to face with ILI patients with cough.
- Wear fit-tested N95 respirator when face to face with suspected TB patients, ILI patients undergoing aerosolizing procedures, and patients who may be infected with emerging pathogens with suspected airborne transmission.
- Wear gown, gloves, and eye protection only as needed to avoid contact with blood or other infectious body fluids.
- Provide paper sheeting for exam tables and change between patients.
- Clean and disinfect medical devices (e.g., stethoscopes) between patients.
- Clean and disinfect exam rooms and waiting areas daily.

- Monitor staff illness and ensure staff with ILI remain off work.

During pandemic

- Assign a staff member to coordinate pandemic planning and monitor public health advisories.
- Educate all staff about pandemic influenza.
- Maintain copies of pandemic educational materials and self-care guides for patients (provided by public health).
- Telephone triage all patient requests for visits.
- Postpone all nonessential patient visits (e.g., routine check-ups).
- If possible, schedule ILI patients during designated time slots.
- If possible, provide a separate entrance and waiting area for ILI patients *or* separate ILI patients from others in the waiting area by 1 m.
- Remove all magazines, books, and toys from the waiting area.
- Eliminate or limit use of shared items by patients (e.g., pens, clipboards, phones).
- Minimize ILI patients' time in the waiting area.
- If possible, designate one exam room for all ILI patients.
- In group practices, consider having one physician see all ILI patients.
- Assign staff who have recovered from pandemic influenza to care for ILI patients.
- Plan for disposition of all ILI patients:
 - Home with self-care guide.
 - Home with home care.
 - Admission to alternate-care site.
 - Admission to acute care.
- When referring ILI patients, notify receiving facility in advance.
- Clean ILI waiting area, exam rooms, and frequently touched surfaces such as doorknobs a minimum of twice daily and when visibly soiled.
- Ensure cleaners avoid vacuuming and dry dusting; damp dust only.
- Maintain a minimum 2-week supply of soap, paper towels, hand sanitizer, cleaning supplies, and surgical masks.
- Develop a contingency plan for staff shortages (e.g., use of volunteers)

Figure. Pandemic influenza: Checklist for physician offices.

amenable to daily cleaning and disinfection.

Clean waiting areas regularly.

Waiting rooms and other common areas should undergo regular cleaning and disinfection along with clinical areas, preferably daily. Ensure your cleaning services has acceptable protocols for cleaning, followed by disinfection. Disinfectants must be used according to manufacturers' instructions to ensure appropriate dilution and contact time. All standard disinfectants will kill influenza viruses. Waiting room furniture, particularly armrests, should be made of material that can be easily wiped and disinfected (e.g., plastic, metal, wood).

Maintain a supply of surgical masks and N95 respirators. Once influenza is circulating in the community, use of masks by health care workers to prevent exposure to influenza in health care settings has not been shown to be of great benefit.⁴ In fact, occupational and infection control experts emphasize the importance of using engineering and administrative controls in the workplace rather than relying on personal protective equipment to protect staff from nosocomial infection. Although there is currently debate about the potential role of airborne transmission versus droplet transmission of influenza and therefore the role of surgical masks versus N95 respirators, both are considered low on the hierarchy relative to other recommended infection control measures during a pandemic. In terms of personal protection, hand washing will be the most important measure for reducing the risk of transmission. Use of surgical masks or N95 respirators by health care workers may be prudent early in the course of a pandemic, or when dealing with patients with undiagnosed respiratory infections for which transmission dynamics are not yet characterized.

Ideally, the ILI patient should wear a surgical mask, particularly if coughing or sneezing, to avoid exposing others. Not all patients will feel comfortable wearing a mask. Surgical masks can be worn by primary care physicians providing face-to-face care within 1 m of ILI patients, particularly during examinations that may generate coughing, such as examination of the oropharynx. Currently, surgical masks are also recommended in Canada's national pandemic plan for health care workers providing face-to-face care within 1 m of ILI patients during a pandemic.⁴ N95-type respirators are recommended during aerosolizing procedures, but their use otherwise during a pandemic is still under review.⁵ A stockpile of N95 respirators in the office setting may still be of value, however, for physicians likely to see patients with tuberculosis. An N95 respirator can also be used when examining patients who may be infected with newly emerging respiratory pathogens for which airborne transmission is suspected.

It is important to note that N95 respirators require appropriate fit testing to be effective, and that all masks and respirators must be discarded carefully after use, and hands must be washed thoroughly.

Use eye protection. Consider wearing goggles during examinations or procedures likely to generate coughing, such as examination of the oropharynx.

Ensure immunization of office staff. Encourage all staff members to take advantage of the annual influenza vaccination that is provided free in BC to all health care workers. This will reduce workplace absenteeism and prevent staff from exposing vulnerable patients to influenza. Maintaining high rates of influenza vaccination during interpandemic periods will also increase capacity for vaccine manufac-

ture and delivery during a pandemic.

During a pandemic

Physicians who maintain good infection control practices in their offices in the interpandemic period will need to make few changes during a pandemic. However, they will need to manage patient appointments differently, ensure appropriate referral, and plan for staff absenteeism. They may also want to enhance infection control.

Manage patient appointments.

Physicians will face many challenges in managing patient appointments during a pandemic and might consider canceling or postponing all non-essential visits (e.g., routine check-ups), during peak pandemic periods. Altering appointment bookings so that patients with ILI are seen at separate times or in predetermined blocks might also be considered.

Acute care hospitals may cancel or postpone elective surgeries and non-urgent medical admissions during a pandemic. This information will be communicated to physicians by their regional health authority. This may in turn put pressure on front-line physicians to manage these patients in the community, and may delay the referral of patients for specialist care. Contingency plans will be provided to physicians to manage these scenarios.

Ensure appropriate referral of influenza cases. Most patients with pandemic influenza will not require a physician visit or hospital admission. To ensure appropriate disposition of those patients who do require a physician visit, regional health authorities will likely provide primary care physicians with triage protocols. The majority of patients will be sent home with self-care guides, which will include information on self-management and advice on when follow-up may be required. For those patients requiring a higher level of care, protocols will be

provided for referral to home care or admission to acute care hospitals. Some health authorities may also establish alternate-care sites for pandemic influenza cases.

Manage staff absenteeism. In addition to the potential increase in demand for patient appointments, physicians will be faced with increased staff absenteeism during a pandemic. At its peak, staff absenteeism rates may approach 20%, although this should last only 2 to 3 weeks. Physicians can mitigate high absenteeism

characterized. Staff who have recovered from pandemic influenza can be considered immune and assigned to provide care to ILI patients.

Enhance infection control. During a pandemic physicians might consider removing all office fomites (e.g., magazines, toys) and upgrading office cleaning and disinfection protocols. Regular cleaning might be done twice daily, with cleaning of frequently touched surfaces more often if resources permit. Offices should also have at least a 2-week supply of essen-

demically to reduce morbidity and mortality while awaiting the development of a vaccine.

Oseltamivir is licensed in Canada to treat and prevent infections with influenza A and B. It is used currently by public health for management of influenza outbreaks in residential care facilities. Treatment should be initiated as soon as possible after symptom onset (within 48 hours) to be of optimal benefit. Patients who fear they won't have access to treatment in a timely manner during a pandemic may request a script in advance.

Physicians receiving requests to prescribe oseltamivir for stockpiling must consider the benefits and risks to both the individual patient and to public health.^{8,9} Recent reports of influenza resistance to oseltamivir suggest misuse could lead to the emergence of resistant influenza strains. In a Japanese study of 50 children infected with influenza A/H3N2 (seasonal influenza) in 2002–03 and treated with oseltamivir, resistance developed in 18% of the patients.¹⁰ In all children, treatment was initiated within 48 hours of symptom onset with recommended doses, although dosage recommendations for children in Japan were lower than those in North America; children are known to clear oseltamivir more readily than adults and under-dosing of children in particular may increase the risk of resistance. In another Roche-sponsored trial of 43 Japanese children in 2000–01, when influenza H1N1 was the predominant circulating strain, resistance developed in 16.3% of those treated.¹¹ In December 2005, oseltamivir-resistant strains of influenza A/H5N1 were reported to have developed in two of eight Vietnamese patients who received oseltamivir treatment for avian influenza.¹² Both patients died, despite early initiation of treatment in one case. In January 2007, two H5N1 patients in Egypt

When considering patient requests for oseltamivir scripts for personal stockpiling, physicians must consider the benefits and risks to both the individual patient and to public health.

in their practices by cross-training their staff to cover a number of duties and identifying part-time staff or volunteers (including family members) who can be trained and brought in to assist as required. Staff who become ill during the pandemic should remain off work until their symptoms resolve and they are no longer infectious. Adults with seasonal influenza A are generally infectious for 5 days after onset of symptoms; this may be different during a pandemic, and public health officials will advise physicians of the epidemiological features of the pandemic strain as soon as these are

tial items such as hand washing and cleaning supplies.

Patient stockpiles of oseltamivir

With public concern about a possible influenza pandemic, patients may ask primary care physicians to provide scripts for oseltamivir for stockpiling. Oseltamivir (Tamiflu) is a neuraminidase inhibitor that is the treatment of choice for humans infected with the H5N1 virus.¹ Oseltamivir is being stockpiled by the Public Health Agency of Canada and the BC Ministry of Health to be used in an influenza pan-

receiving oseltamivir treatment at appropriate doses were found to harbor viruses with moderately reduced susceptibility to oseltamivir. Both patients died, although treatment was not initiated early in either case.¹

One explanation for these findings is that primary influenza A infection is associated with higher rates of viral replication than subsequent infections, which may favor development of resistance.¹² Among children never before infected with influenza A, or in a pandemic without any pre-existing immunity among the population, everyone will have a primary infection and there may be increased risk of developing resistance with under-dosing of antivirals in the context of high rates of viral replication. Use of personal stockpiles of oseltamivir at inappropriate doses may fuel this development.

Physicians are not obligated to prescribe medication for hypothetical scenarios that may not benefit their patients. Personal stockpiles may be used chaotically and inappropriately for other viral illnesses or shared with others, contributing to the development of resistance and thereby diminishing the effectiveness of the primary tool available in the early stages of a pandemic. While the decision to prescribe is ultimately made after discussions between the physician and patient, physicians are advised to turn down patient requests for oseltamivir stockpiles. Instead, patients should be reassured that governments across Canada are establishing robust public stockpiles of oseltamivir with a view to providing early treatment to those who need it during a pandemic.

Summary

Physicians should review the pandemic plans in their own health authority and feel welcome to participate in the planning process. While no one can predict when the next influenza pan-

dem ic will occur, planning in the inter-pandemic period and implementing basic infection control measures, particularly hand washing and influenza and pneumococcal vaccination, will benefit physicians and their patients now and reduce the changes required during a pandemic. Once a pandemic is declared, physicians should be ready to enhance their infection control practices and make appropriate changes regarding patient referral and staffing.

Competing interests

Dr Daly has received honoraria for educational sessions on unrelated topics from pharmaceutical companies that manufacture vaccines mentioned in these articles.

References

1. World Health Organization. Avian Influenza. www.who.int/csr/disease/avian_influenza/en/index.html (accessed 9 May 2007).
2. Department of Health, England Health Protection Agency. Guidance for pandemic influenza: Infection control in hospitals and primary care settings. 19 October 2005. www.dh.gov.uk/assetRoot/04/12/17/54/04121754.pdf (accessed 23 January 2007).
3. Bean B, Moore BM, Sterner B, et al. Survival of influenza viruses on environmental surfaces. *J Infect Dis* 1982;146:47-51.
4. Public Health Agency of Canada. Annex F: Part B. Pandemic influenza in traditional settings. In: The Canadian Pandemic Influenza Plan for the Health Sector. Ottawa: Public Health Agency; 2004. www.phac-aspc.gc.ca/cpip-pclcpi/index.html (accessed 23 January 2007).
5. World Health Organization. Clarification: Use of masks by health-care workers in pandemic settings. November 2005. www.who.int/csr/resources/publications/influenza/Mask%20Clarification10_11.pdf (accessed 23 January 2007).
6. World Health Organization. Avian influenza, including influenza A (H5N1), in humans: WHO interim infection control

guideline for health care facilities. 24 April 2006. www.who.int/csr/disease/avian_influenza/guidelines/infectioncontrol1/en/index.html (accessed 23 January 2007).

7. U.S. Department of Health and Human Services. Medical offices and clinics pandemic influenza planning checklist. Version 2.2. 6 March 2006. www.pandemicflu.gov/plan/medical.html (accessed 23 January 2007).
8. Moscona A. Oseltamivir resistance—disabling our influenza defenses. *N Engl J Med* 2005;353:2633-2636.
9. Brett AS, Zuger A. The run on Tamiflu—should physicians prescribe on demand? *N Engl J Med* 2005;353:2636-2637.
10. Kiso M, Mitamura K, Sakai-Tagawa Y, et al. Resistant influenza A viruses in children treated with oseltamivir: Descriptive study. *Lancet* 2004;364:759-765.
11. Ward P, Small I, Smith J, et al. Oseltamivir (Tamiflu) and its potential for use in the event of an influenza pandemic. *J Antimicrob Chemother* 2005;55(suppl 1):i5-i21.
12. de Jong MD, Tran TT, Truong HK, et al. Oseltamivir resistance during treatment of influenza A (H5N1) infection. *N Engl J Med* 2005;353:2667-2672. **BCMJ**