

# Controlling droplet-transmitted respiratory infections

*Best practices and cost*

William Hogg, MD, CCFP, FCFP Patricia Huston, MD, MPH

## ABSTRACT

**OBJECTIVE** To promote incorporation of new guidelines on control of respiratory infections into family physicians' practices.

**SOURCES OF INFORMATION** The World Health Organization website on pandemic influenza, the Canadian Pandemic Influenza Plan, the Ontario guidelines on respiratory infection control, and research on implementing guidelines into family practice were reviewed. We also researched and calculated what the costs of implementing the guidelines would be.

**MAIN MESSAGE** Effective control of respiratory infections in physicians' offices can be achieved by displaying signs in the waiting room, having reception staff give masks to patients with cough and fever, instructing these patients to clean their hands with alcohol gel and to sit at least 1 m from others, inquiring about patients' or their close contacts' recent travel, using disinfectant wipes to clean possibly contaminated surfaces in waiting rooms and examining areas, and having staff and care providers wear masks and wash hands or use alcohol gel. The approximate annual cost of incorporating the guidelines is about \$800 per physician.

**CONCLUSION** Because the outbreak of an influenza pandemic is likely imminent, implementing standard guidelines for control of respiratory infections in primary care offices seems wise. Following these guidelines would help prevent patients and staff from contracting serious respiratory illnesses.

## RÉSUMÉ

**OBJECTIF** Promouvoir l'adoption par les établissements de médecine familiale des nouvelles directives concernant le contrôle des infections respiratoires.

**SOURCES DE L'INFORMATION** On a consulté le site web de l'Organisation Mondiale de la Santé, le Plan canadien de lutte contre la pandémie d'influenza, les directives ontariennes sur le contrôle des infections respiratoires et les recherches sur la façon d'incorporer les directives à l'exercice de la médecine familiale. Nous avons également étudié et calculé ce qu'il en coûterait pour adopter ces directives.

**PRINCIPAL MESSAGE** On peut obtenir un contrôle adéquat des infections respiratoires au bureau du médecin en disposant des affiches dans la salle d'attente, en demandant au personnel d'accueil de distribuer des masques aux patients avec toux et fièvre, en demandant à ces patients de se laver les mains avec un gel d'alcool et de s'asseoir à au moins 1 m des autres, en s'informant des récents voyages du patient ou de ses proches, en utilisant des désinfectants pour nettoyer les surfaces des salles d'attente et d'examen susceptibles de contamination, et en demandant au personnel de soutien et aux soignants de porter des masques, de se laver les mains ou d'utiliser le gel d'alcool. On estime qu'il en coûterait à chaque médecin environ 800\$ par année pour adopter de telles mesures.

**CONCLUSION** Parce que l'écllosion d'une pandémie de grippe semble imminente, il paraît raisonnable d'adopter des directives standards pour le contrôle des infections respiratoires dans les établissements de soins primaires. En se conformant à ces directives, on aiderait à empêcher les patients et le personnel de contracter des maladies respiratoires sévères.

This article has been peer reviewed.

Cet article a fait l'objet d'une révision par des pairs.

*Can Fam Physician* 2006;52:1229-1232.

The emergence of severe acute respiratory syndrome (SARS) in 2002-2003 took everyone by surprise. More than half the people infected with SARS were health care workers, mainly because hygiene precautions were inadequate.<sup>1-5</sup> The only doctor to die in the epidemic was a family physician who was exposed to SARS in his office. The explosive spread of SARS crystallized the need for aggressive measures to prevent and control respiratory infections and is often thought of as a dry run for a larger respiratory infection outbreak, such as pandemic influenza.

All signs indicate that a pandemic will occur. It is not a question of if, but when. Today, a highly pathogenic avian influenza virus (H5N1) is implicated as a global threat. The H5N1 virus is far more contagious than the SARS coronavirus.<sup>6</sup> Even though it has been shown that avian viruses generally replicate and transmit poorly in humans,<sup>7-9</sup> the virus has killed at least 54 people to date.<sup>10</sup> While the H5N1 virus has not yet achieved the adaptive changes necessary for effective human-to-human transmission, the emergence of a viral strain that can be readily transmitted between humans is probably imminent. Global health authorities fear that a new viral species transmissible in humans will emerge through adaptive mutation or genetic reassortment of human and avian influenza strains.

Current efforts to prevent a pandemic have comprised culling infected birds and attempting to develop a vaccine for humans. It is too late, however, for efficient culling, as the H5N1 virus is now endemic in poultry in some rural areas in Asia<sup>11</sup> and has expanded to the wild-bird population. An ominous recent report of the death in China of more than 1000 migratory birds from the H5N1 strain could indicate that the virus has genetically mutated or reassorted.<sup>12</sup> As the virus is now mutating in tens of millions of wild birds, a human-to-human transmissible virus seems virtually inevitable. Even if an effective and safe vaccine is available in time, it is likely that supply will not meet demand, and an influenza pandemic will spread rapidly.

It is clear that we are vulnerable to the threat of a pandemic, but also that we are still poorly prepared. Experts seem sure that an influenza pandemic will be transmitted by droplet infection. During coughing or sneezing, respiratory viruses in droplets can be propelled

about 1 m through the air and settle on nearby surfaces where they can survive long enough to be picked up by other people. An important place to stop the spread of respiratory infections is in the waiting rooms and offices of family practices where patients with infectious diseases collect.

### Threat of infection

A patient visibly ill with a cough comes to your office and sits in a busy waiting room. A few days later, several patients who were in that waiting room report being ill and ask whether they became sick as a result of sitting next to your sick patient. Growing public anxiety about the risk of an influenza pandemic make these complaints difficult to ignore. Guidelines have come out recently that recommend screening for cough and fever, and when it is found, using masks, alcohol-based hand sanitizers, and spaced seating. You ask yourself if it is time to incorporate these guidelines and change your office practice, and you wonder how you are going to do this and how much it will cost.

### Why protection is important

As critical front-line workers, physicians have compelling reasons to implement and follow stringent respiratory infection-control measures in their offices. Many respiratory infections are serious, and some are lethal. When a pandemic happens, family physicians will be needed to care for sick people, and they have a moral obligation to prevent these people from infecting each other while they are under a physician's care. Physicians also have the incentive of protecting their families and friends by not bringing infection home. Another concern is keeping staff healthy, and simply put, it makes good business sense not to have employees off sick. Finally, patients might question the lack of proper precautions, precautions that are gradually being implemented in other care settings. The recent release by the College of Physicians and Surgeons of Ontario<sup>13</sup> of guidelines to prevent the spread of infections in the office might increase the risk of lawsuits if proper precautions are not taken.

### Sources of information

We consulted the World Health Organization plan and the *Canadian Pandemic Influenza Plan*. It is possible, based on a United States Centers for Disease Control model<sup>14</sup> and calculations set out in the *Canadian Pandemic Influenza Plan*,<sup>15</sup> to predict the effect of a pandemic on any Canadian city or region. Using Ottawa with its population of 850 000 as an example, experts predict the effect of a pandemic to be about 21 000 new cases of influenza each week for 9 weeks, assuming an average attack rate and duration of outbreak. The capacity of health services will be strained by a sudden sharp increase in the need for

---

**Dr Hogg** is a Professor and Director of Research in the Department of Family Medicine at the University of Ottawa, Director of the C.T. Lamont Primary Health Care Research Centre at the Élisabeth Bruyère Research Institute, and Principal Scientist at the Institute of Population Health at the University of Ottawa in Ontario. At the time of this study, **Dr Huston** was Associate Medical Officer of Health and Manager of Surveillance of Emerging Issues in the Education and Research Division of the City of Ottawa's Public Health Branch.

medical care. Despite canceling all elective surgery, hospitals will be overwhelmed (eg, 175% of current intensive care beds will be needed just for the influenza outbreak) and be more aggressive than usual in sending people home early. This will greatly increase the responsibility and workload of family physicians. While not every person with influenza will seek medical help, most of the 9700 people who are predicted to seek medical help will likely go to family physicians, many of them 2 or 3 times during the course of the illness.

Media coverage of the pandemic will result in family physicians' seeing many people with fever and minor unrelated illnesses who do not usually come to see them. Each of the 486 full-time-equivalent family physicians in Ottawa would need to see an additional 12 patients each day for 9 weeks, assuming all these physicians remain healthy and are able to work a regular schedule. Expert opinion has it, however, that at any given time, 25% of health care workers will be off sick. The epidemic is expected to strike quickly, giving little time to prepare. Family physicians should adopt precautions now and maintain them as standard practice on a permanent basis.

Ontario was not the only province affected by SARS,<sup>16,17</sup> but it was the one hit hardest, so it is not surprising that in its aftermath Ontario developed new respiratory infection-control guidelines. The Ministry of Health and Long-Term Care released guidelines on respiratory infection control in the community in 2004.<sup>18</sup> The College of Physicians and Surgeons of Ontario released guidelines on infection control in physicians' offices in 2005.<sup>13</sup>

These guidelines need not be limited to Ontario alone, as they are based on evidence that applies to primary care in general. In a recent study,<sup>19</sup> an expert advisory committee developed respiratory infection-control guidelines for primary care. The committee, comprised of an infection-control specialist, an Associate Medical Officer of Health, 2 family physicians, and a librarian, selected and reviewed the most current, most reliable, and best-quality evidence found through a search of the Cochrane Library database, medical literature databases, and Canadian and international government-sponsored public health websites. Based on this review, the committee reached similar conclusions to the above-mentioned guidelines. These conclusions are consistent with the main messages below.<sup>13,18,20</sup>

## Main messages

**Masks, alcohol gel, seating, "kleening," and signage (MASKS).** Stopping the spread of respiratory infections in the office should begin with placing signs in or near the waiting room, having reception staff give masks to patients with cough and fever, and instructing patients with cough and fever to clean their hands with alcohol gel and to sit at least 1 m from others. Other activities

are important as well. Chairs and tables patients might have contaminated in waiting rooms and examining rooms should be cleaned with disinfectant wipes. Care providers and staff should protect themselves by wearing masks and washing their hands or cleaning them with alcohol gel. Physicians seeing patients with respiratory infections should inquire about recent travel that they or any of their close contacts might have done.

The acronym MASKS was developed to help people remember the precautions:

- M**—masks for patients with cough and fever,
- A**—alcohol hand gel for sanitation,
- S**—seating of potentially infectious patients apart from others,
- K**—"kleening" (disinfecting) hard surfaces, and
- S**—signs to guide patients and staff.

Signs outlining precautions should be posted in waiting areas, and reception staff should be trained to screen patients for cough or fever, provide masks and alcohol gel, and direct potentially infected patients to segregated seating. Regular surgical masks afford sufficient protection. Alcohol gel should be available to patients as they enter the waiting room and again at the reception desk, and should be available in every examining room and throughout the office. Alcohol gel works on contact and is superior to soap and water against droplet infection. Using an amount the size of a quarter and rubbing hands together until the alcohol has evaporated is enough to kill viruses. Disinfectant wipes should be used to clean hard surfaces in waiting rooms and offices.

### **Calculating the costs of implementing guidelines.**

In community family practice, about 3.2% of patients present with cough and 1.4% present with fever.<sup>21</sup> If half these patients have both cough and fever, alcohol gel and masks will need to be used by patients at 2.3% of office visits. We assumed physicians would also use masks when seeing patients with cough and fever and would use alcohol gel before or after seeing each patient. We also assumed that reception staff would use the gel 4 times a day and that offices did not have nurses. In 2005 in Ottawa, a 1-L alcohol gel dispenser cost \$6.53 and would provide 250 uses at 3¢ per use. A container of 160 disinfectant wipes cost \$11.08 (7¢ per use). A box of 50 masks cost \$33.51 (67¢ each).

A physician working 230 days yearly (46 weeks) and seeing 30 patients a day would have to spend an estimated \$782 a year to adopt the protocol. Distributors of alcohol gel, masks, and wipes can be found by searching the Internet or inquiring at local hospitals or long-term care facilities. Signs can be obtained through the Internet.<sup>22</sup> Signs can be printed in colour and laminated at local print shops. The cost for 2 "STOP" signs and 3 "Disinfecting with Alcohol Sanitizer" signs in both French and English would add a one-time cost of approximately \$32.00.

## Conclusion

We cannot change the source of an influenza pandemic nor predict the timing. What we can do is learn from the SARS dress rehearsal and prepare ourselves for an outbreak that is considered imminent. Implementing and following the MASKS protocol in primary care offices would go a long way toward preventing patients and practice staff from contracting serious respiratory illnesses. Family physicians have a vital role in caring for patients with droplet-transmitted viruses and need to adopt proper respiratory infection-control measures as standard practice. ❁

## Acknowledgment

We thank Dr Carmel Martin for her contribution to the research project from which this paper originates, Ms Eileen Vilis for creating the acronym to identify recommended infection control practices, and Mr Enrique Soto for modifications to drafts of this paper.

## Competing interests

None declared

Correspondence to: Dr William Hogg, Room 706B, 43 Bruyere St, Ottawa, ON K1N 5C8; telephone 613 761-4334; e-mail [whogg@uottawa.ca](mailto:whogg@uottawa.ca)

## References

- Booth CM, Matukas LM, Tomlinson GA, Rachlis AR, Rose B, Dwosh HA, et al. Clinical features and short-term outcomes of 144 patients with SARS in the greater Toronto area. *JAMA* 2003;289:2801-9.
- Donnelly CA, Ghani AC, Leung GM, Hedley AJ, Fraser C, Riley S, et al. Epidemiological determinants of spread of causal agent of severe acute respiratory syndrome in Hong Kong. *Lancet* 2003;361:1761-6.
- Dwosh HA, Hong HH, Austgarden D, Herman S, Schabas R. Identification and containment of an outbreak of SARS in a community hospital. *CMAJ* 2003;168:1415-20.
- Lee N, Hui D, Wu A, Chan P, Cameron P, Joynt GM, et al. A major outbreak of severe acute respiratory syndrome in Hong Kong. *N Engl J Med* 2003;348:1986-94.
- Svoboda T, Henry B, Shulman L, Kennedy E, Rea E, Ng W, et al. Public health measures to control the spread of the severe acute respiratory syndrome during the outbreak in Toronto. *N Engl J Med* 2004;350:2352-61.
- World Health Organization. *Avian influenza: assessing the pandemic threat*. Geneva, Switz: World Health Organization; 2005. Available from: <http://www.who.int/csr/disease/influenza/H5N1-9reduit.pdf>. Accessed 2006 August 10.
- Beare AS, Webster RG. Replication of avian influenza viruses in humans. *Arch Virol* 1991;119:37-42.
- Hinshaw VS, Webster RG, Easterday BC, Bean WJ Jr. Replication of avian influenza A viruses in mammals. *Infect Immun* 1981;34:354-61.
- Hinshaw VS, Webster RG, Naevs CW, Murphy BR. Altered tissue tropism of human-avian reassortant influenza viruses. *Virology* 1983;128:260-3.
- World Health Organization. *Cumulative number of confirmed human cases of avian influenza A(H5N1) reported to WHO*. Geneva, Switz: World Health Organization; 2005. Available from: [http://www.who.int/csr/disease/avian\\_influenza/country/cases\\_table\\_2005\\_06\\_28/en/index.html](http://www.who.int/csr/disease/avian_influenza/country/cases_table_2005_06_28/en/index.html). Accessed 2006 August 10.
- Li KS, Guan Y, Wang J, Smith GJ, Xu KM, Duan L, et al. Genesis of a highly pathogenic and potentially pandemic H5N1 influenza virus in eastern Asia. *Nature* 2004;430:209-13.
- Cyranoski D. Flu in wild birds sparks fears of mutating virus. *Nature* 2005;435:542-3.
- College of Physicians and Surgeons of Ontario. *Infection control in the physician's office*. Toronto, Ont: College of Physicians and Surgeons of Ontario; 2004. Available from: [www.cpso.on.ca/Publications/infectioncontrolv2.pdf](http://www.cpso.on.ca/Publications/infectioncontrolv2.pdf). Accessed 2006 August 10.
- Meltzer MI, Cox NJ, Fukuda K. The economic impact of pandemic influenza in the United States: priorities for intervention. *Emerg Infect Dis* 1999;5:659-71.

## EDITOR'S KEY POINTS

- Experts seem sure that an influenza pandemic will be brought about by droplet-transmitted infection. It is not a question of if, but when.
- Family physicians should adopt precautions now and maintain them permanently as standard practice.
- Stopping the spread of respiratory infections in the office should begin with having signs in or around the waiting room, having reception staff give masks to patients with cough and fever, instructing patients with cough and fever to clean their hands with alcohol gel, and having patients with cough and fever sit at least 1 m from others.
- The authors estimate it would cost each physician \$782 a year to adopt this protocol.

## POINTS DE REPÈRE DU RÉDACTEUR

- D'après les experts, il est presque sûr qu'il y aura une pandémie de grippe transmise par les gouttelettes de salive. La question n'est pas de savoir si elle aura lieu, mais quand.
- Il importe que les médecins de famille adoptent maintenant dès certaines précautions et qu'ils en fassent des habitudes permanentes.
- Les moyens d'enrayer la propagation des infections respiratoires au bureau consistent d'abord à installer des affiches près ou dans la salle d'attente, faire distribuer des masques aux patients souffrant de toux ou de fièvre, et demander à ces derniers de se laver les mains avec un gel d'alcool et de s'asseoir à au moins 1 m des autres patients.
- Les auteurs estiment qu'il en coûterait 782\$ à chaque médecin annuellement pour adopter un tel protocole.

- Public Health Agency of Canada. *Canadian Pandemic Influenza Plan*. Ottawa, Ont: Public Health Agency of Canada; 2004. Available from: <http://www.phac-aspc.gc.ca/cpip-pclpci/>. Accessed 2006 August 10.
- Yassi A, Moore D, Fitzgerald JM, Bigelow P, Hon CY, Bryce E, et al. Research gaps in protecting healthcare workers from SARS and other respiratory pathogens: an interdisciplinary, multi-stakeholder, evidence-based approach. *J Occup Environ Med* 2005;47:41-50.
- Zapp R, Krajden M, Lynch T. SARS: a quality management test of our public health safety net. *Qual Manag Health Care* 2004;13:120-9.
- Ontario Ministry of Health and Long-Term Care. *Preventing respiratory illness in community settings: guidelines for infection control and surveillance for febrile respiratory illness in community settings (FRI) in non-outbreak conditions*. Toronto, Ont: Ontario Ministry of Health and Long-Term Care; 2005. Available from: [www.health.gov.on.ca/english/providers/program/pubhealth/sars/docs/docs3/present\\_community\\_settings\\_guidelines\\_031104.pdf](http://www.health.gov.on.ca/english/providers/program/pubhealth/sars/docs/docs3/present_community_settings_guidelines_031104.pdf). Accessed 2006 August 10.
- Hogg W, Huston P, Martin C, Saginur R, Newbury A, Vilis E, et al. Promoting respiratory infection control practices in primary care: primary care/public health collaboration. *Can J Public Health*. In press 2006.
- Academy of Pediatrics and American Occupational Safety and Health Administration. Infection control in physicians' offices. *Pediatrics* 2000;105:1361-9.
- Woodwell DA, Cherry DK. National Ambulatory Medical Care Survey: 2002 summary. *Adv Data* 2004;346:1-44.
- Ottawa Public Health. *Resources for physicians*. Ottawa, Ont: Ottawa Public Health; 2005. Available from: [http://ottawa.ca/residents/health/support/professionals/pandemic/resources/index\\_en.html](http://ottawa.ca/residents/health/support/professionals/pandemic/resources/index_en.html). Accessed 2006 August 10.

