

AVIAN FLU: PREPARING FOR A PANDEMIC

Introduction

Focus

It may not happen this year or next year or for an even longer period. But experts assure us that sometime in the near future we will almost certainly face an influenza pandemic that could be as severe as the 1918-19 Spanish Flu pandemic, which killed 50 000 Canadians and between 20 and 50 million people worldwide. In this *News in Review* story we examine the potential for a new pandemic and Canadian and international response to the threat. We also focus on the H5N1 virus that may be evolving into a major killer.

Definition

A *pandemic* is a disease that is widespread over an entire country or most of the world. An *epidemic* is also widespread, but limited to a specific community.



Sections marked with this symbol indicate content suitable for younger viewers.

“Scientists have long forecast the appearance of an influenza virus capable of infecting 40 per cent of the world’s human population and killing unimaginable numbers. Recently, a new strain, H5N1 avian influenza, has shown all the marks of becoming that disease. Until now, it has largely been confined to certain bird species, but that may be changing.” With these frightening words, Laurie Garrett, Senior Fellow for Global Health at the Council on Foreign Relations, begins her article in the July/August 2005 issue of *Foreign Affairs*.

Garrett goes on to quote the March 2005 National Academy of Science’s Institute of Medicine flu report: “[The] current ongoing epidemic of H5N1 avian influenza in Asia is unprecedented in its scale, in its spread, and in the economic losses it has caused.” As Garrett says, “In short, doom may loom.”

But the “may” in that final equation is extremely important. In order to be the killer virus that scientists have forecast, H5N1 will have to do three things. It will have to become capable of human-to-human transmission (something it is showing some signs of doing); it will have to become as contagious as most human influenzas (this certainly has yet to happen); and it will have to remain as deadly as it has so far proven to be (and viruses often mutate into much less lethal forms as they become human influenzas). It is entirely possible that H5N1 may never become the source of the next pandemic.

That there will be a next pandemic, however, is pretty much a given. Influenza pandemics happen on average

three or four times a century, and some of them have taken an enormous toll in human life. The Spanish Flu of 1918-1919 was especially deadly, killing between 20 and 50 million people around the world. Other 20th century influenza pandemics have been lethal, but much less so.

There are ways of preparing for an influenza pandemic. Antiviral drugs are available, and some countries—including Canada—have begun to stockpile reserves. Vaccines are being developed that can rapidly be modified to protect against any strain of H5N1 that develops human-to-human-transmission capabilities. Canada is also in the forefront of that research. But are we taking the threat seriously enough? The World Health Organization (WHO) has an answer to the question “Is the world adequately prepared?” in the FAQs on its Web site (www.who.int/csr/disease/avian_influenza/avian_faqs/en/#isit):

“No. Despite an advance warning that has lasted almost two years, the world is ill-prepared to defend itself during a pandemic. WHO has urged all countries to develop preparedness plans, but only around 40 have done so. WHO has further urged countries with adequate resources to stockpile antiviral drugs nationally for use at the start of a pandemic. Around 30 countries are purchasing large quantities of these drugs, but the manufacturer has no capacity to fill these orders immediately. On present trends, most developing countries will have no access to vaccines and antiviral drugs throughout the duration of a pandemic.”

As you watch the video portion of this *News in Review* story, ask yourself

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Video Review

Part I. Answer the questions in the spaces provided.

1. By the end of 2005, how many people were known to have been infected by H5N1? _____
How many had died? _____
2. What do scientists believe might happen to H5N1 that would cause a pandemic?

3. What previous flu does H5N1 closely resemble? _____
4. How does H5N1 kill people?

5. H5N1 has currently been found in birds on two continents. Which two?

6. Why do flu vaccines need to be updated every year?

7. What is the biggest problem preventing the production of sufficient flu vaccine against H5N1?

8. In a worst-case scenario, how many people out of every 100 would die?

9. How many birds were destroyed after the 2004 avian flu outbreak in British Columbia? _____
10. Why do Canadian officials believe it is highly unlikely that migratory birds will infect Canadian birds with the lethal H5N1 virus?

11. According to federal estimates, what percentage of Canadians will likely be infected during a flu pandemic? _____%. How many are likely to die? _____
12. How does Sherry Cooper of BMO Nesbitt Burns suggest corporations might use computers to maintain staff productivity in relative safety?

13. The World Health Organization wants all countries to develop contingency plans for a pandemic. How many have done so? _____

Part II. A Matter for Discussion

One of the most difficult decisions for Canadians will be how to conduct their day-to-day lives in case of a pandemic. Here is a quotation from one of the experts in the video.

“There’s not a lot that you can do once it happens. There’s no question, though, that the old adage about washing your hands, using cough etiquette, staying home if you’re sick, staying away from people who are sick will decrease the likelihood for transmission. This is not an airborne disease, at least not principally an airborne disease, so there are ways that you can protect yourself, but it’s not going to work if you think I’ll just head for the hills, I’ll go to the cottage. We can’t all go to the cottage for eight weeks. This is going to be something that is in our community for several months possibly, and . . . we can’t stop living.” —Donald Low, microbiologist, Mount Sinai Hospital

Should an influenza pandemic strike Canada, how do you think it would affect each of the following? Working with a partner, complete the chart below and be prepared to share your findings.

Institutions	Likely Impact of Influenza
City services (e.g., garbage collection, community centres, libraries)	
Hospitals	
Retail business (e.g., grocery stores)	
Entertainment (movies, concerts, clubs)	
Police	
Religious institutions	
Your school	
Your family	

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A Profile of H5N1

Did you know . . .

The viruses that have caused past pandemics have all been of the H1, H2, and H3 subtypes. According to the World Health Organization: "No virus of the H5 subtype has probably ever circulated among humans, and certainly not within the lifetime of today's world population." — *Foreign Affairs*, July/August 2005

The H5N1 virus—the “bird flu” with which scientists are most concerned at present—is only one of the many varieties of influenza that currently exist on the planet. Like all influenzas, it had its source in wild waterfowl. For several different reasons, however, scientists worry that it may be the source of the next pandemic.

Its Structure

An influenza virus is made up of eight genes composed of RNA (ribonucleic acid) packed in protective proteins. Two of these proteins are used by scientists to describe the many types of influenza viruses that exist. Different combinations of the proteins trigger different human immune responses.

The most important of these is haemagglutinin, the “H” in H5N1. This is the protein that binds the virus to any cell it will infect. Haemagglutinin locks on to a carbohydrate molecule on the surface of the cell. The kind of haemagglutinin determines how strong the bond will be to different types of cells.

The viruses that have the greatest success in infecting their subjects have haemagglutinin that can bind to many different types of cells. The haemagglutinin also determines which species can be infected. Because birds have very different cells from humans, it is hard for H5N1 to bond to human cells. It is even harder for one human to pass it on to another.

The “N” stands for neuraminidase, the protein that eases the release of new viruses from the host cells, helping them to infect other cells. It thus has a role in how virulent (severe) an influenza infection will be.

Its Virulence

The virulence of the H5N1 virus is, in a word, extreme. As an avian influenza it is truly destructive. For example, it kills 100 per cent of the domestic chickens it infects—within 48 hours of the infection. Since its first appearance in Hong Kong in 1997 it has become both stronger and deadlier, killing a wider range of species.

H5N1 is not only deadly, but also incredibly difficult to contain. It can survive both in chicken feces and in the meat of dead animals. Unlike most avian influenzas, it can even kill migrating birds, which are usually immune to the effects of these infections.

The current (2005) strain of H5N1 is known as z+, and it has proven to be especially deadly. Avian influenzas do not normally kill mammals, and especially not cats. However, when tigers in Thai zoos were fed infected chickens, 147 of them died. Influenzas are also rarely lethal to lab mice; z+ is 100 per cent lethal.

As of May 2005, 109 people—almost all of whom were known to live in close proximity to domestic fowl—were reported to have contracted H5N1. Of these, 54 per cent had died. As of this writing, in December 2005, H5N1 had not been proven to spread among human beings by human-to-human contact.

Its Transformations

As indicated above, the H5N1 z+ strain is different from the original Hong Kong variety that surfaced in 1997. In fact, the only gene segment in the virus that remains identical to the original version is the H5 gene itself. According

Did you know . . .
H5N1 has been found in wild birds in Canada. However, the strain is highly unlike that of the Asian variety and much less virulent.

to *New Scientist* (September 18, 2005), virologists “have learned that H5N1 has been under strong selective pressure for the last three or four years, producing a single dominant, ‘super fit’ strain, and at the same time steadily increasing virulence in mammals.”

Viruses change because their reproduction is extremely sloppy. They can easily lose one gene during reproduction and pick up a gene from another source. The danger comes when genes combine to form a variety of influenza that can infect humans.

This can happen in two ways. An influenza virus in nature can mutate and recombine into a new virus capable of human infection (recombination). New viruses can also result from reassortment. In this situation, a virus that infects another species encounters one that infects humans. They exchange some of their genetic material, and a new virus is born—one that easily infects humans and to which they have no resistance.

To Do

All avian influenzas have the ability to reassort or recombine into a form that might infect humans, but H5N1 is the strain currently of greatest concern to medical experts. Make a list of the major reasons why H5N1 is especially dangerous.

For most experts, reassortment is the greater concern. The scenario: a person who has already caught whichever human flu virus is making the rounds this winter simultaneously picks up H5N1. The two viruses exchange genetic material, and the result is a new virus that passes readily from human to human. Because the new virus has never infected humans before, we have no antibodies to resist it, and vulnerability is universal. A pandemic results. This is now considered the likeliest cause of the 1918-1919 Spanish Flu pandemic.

A second scenario sees reassortment taking place in pigs, which have a respiratory system very similar to that of humans. The avian virus would thus become mammalian, and human infections would follow. The 1957-1958 Asian Flu and 1968-1969 Hong Kong Flu pandemics are believed to have begun in this way.

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Timeline of a Killer

Further Research

For information on the history of influenzas, especially in the 20th century, see "Influenza: Battling the Last Great Virus" in the CBC archives at archives.radio-canada.ca/IDD-1-75-1965/science_technology/influenza/.

Did you know . . .

In Canada, the year 2003 is a significant one. This was the year of SARS (Severe Acute Respiratory Syndrome), whose outbreak served as a dress rehearsal for possible pandemics to come. The lessons learned in our sometimes inadequate attempts to deal with this coronavirus have now made Canada a world leader in planning for pandemics. To learn more about SARS, see the *News In Review* story "Confronting the SARS Outbreak," May 2003.

The H5N1 avian influenza has been around for at least 100 years, but it is only recently that it has turned into a major killer. Other human influenza outbreaks, however, had a major worldwide impact in the previous century:

1917-1918 – H1N1, the Spanish Flu, sweeps the world at the end of First World War, killing anywhere from 20 to 50 million people. Recent research seems to confirm that H1N1, like H5N1, was a direct transmission from birds to humans (see "'Bird Flu' Similar to Deadly 1918 Flu, Gene Study Finds" at news.nationalgeographic.com/news/2005/10/1005_051005_bird_flu.html).

1956-1967 – Asian Flu kills about two million people worldwide.

1968-1969 – Hong Kong Flu is the century's third pandemic, killing at least one million people.

1976 – This is the year of the pandemic that never happened. An anticipated outbreak of "Swine Flu" led to urgent preparations and mass vaccinations for a virus that never arrived.

Should the H5N1 virus become the human killer that many experts fear, its path to pandemic will have been the most carefully studied in history. Here is its story to date:

1997-1998 – A new strain of avian influenza infects the chickens of Hong Kong. The government decides to kill every chicken within the city to prevent its spread. This results in the slaughter of about 1.4 million birds. Fewer than

two per cent of people known to have been exposed to the virus catch the disease. Eighteen people are infected, and six of them die. Human-to-human transmission seems unlikely. Scientists identify the virus as H5N1.

Late 2002 – A strain of H5N1 is found to have become highly pathogenic in waterfowl.

January 2003 – H5N1 reappears, probably first in South Korea, as a new "z" strain. The new strain is resistant to one of the two available types of anti-flu drugs. It spreads rapidly to China, Vietnam, and Thailand.

January 2004 – H5N1 is now the "z+" strain, supervirulent and capable of infecting a broad range of species. In the first three weeks of January, 11 million chickens are killed in Vietnam and Thailand. In China, the disease is confirmed in domestic ducks as well as chickens.

February 2004 – 10 Asian countries are now affected. A human-to-human transmission is suspected in Vietnam, but unconfirmed.

April 2004 – By now, 120 million chickens have been killed in order to keep the disease from spreading.

July 2004 – Researchers at the Veterinary Research Institute in Harbin, China, report their suspicion that H5N1 is mutating in ways that make it dangerous to mammals. They say it is jumping back and forth between ducks and pigs.

October 2004 – Eagles discovered being smuggled into Belgium are found to be infected with H5N1.

December 2004 – A first vaccine has been designed by scientists at St. Jude Children’s Research Hospital in Tennessee. The vaccine proves its effectiveness on animals. The U.S. government orders enough vaccine from manufacturers to perform human clinical trials.

A first suspected case of human-to-human transmission of the z+ strain is reported in Thailand.

January 2005 – Viral experts are on alert because of the rising number of human deaths from H5N1. Vietnam and Thailand saw three deaths in 2003, but 32 in 2004.

April 2005 – H5N1 is confirmed in pigs in Indonesia, and suspected in China and Vietnam.

August 2005 – The National Institute of Allergy and Infectious Diseases in Bethesda, Maryland, announces that it will be providing funding for an experimental vaccine against H5N1 that it has tested and found effective.

October 2005 – The Canadian Department of Foreign Affairs reports that outbreaks of H5N1 continue to persist in Thailand, Vietnam, Indonesia,

China, Russia, Mongolia, and Kazakhstan. H5N1 avian influenza is reported in Romania, Turkey, and Greece. Roche Canada, maker of the antiviral drug Tamiflu, halts its sale in Canada to ensure that a sufficient supply will be available to regular seasonal flu sufferers during the 2005-2006 winter flu season. Scientists succeed in recreating the deadly 1918-1919 H1N1 flu virus in the lab and determine that it was genetically very similar to H5N1.

November 2005 — China confirms what many have suspected: It too has had human deaths caused by H5N1. British Columbia authorities order the killing of 67 000 domestic ducks and geese exposed to a mild version of an H5 avian influenza virus. The U.S. briefly bans the import of Canadian ducks and geese.

December 2005 – Known cases of avian flu have doubled over the previous year: 139 people were infected, and half of them died. All of these cases were in Asia.

A Hong Kong virologist accuses China of hiding many cases of bird flu in provinces throughout the country.

Activity

From the list of events in the timeline, circle five that you feel were most critical in the development of H5N1 as the likely source of the next influenza pandemic. Be prepared to justify your choices in a class discussion.

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Pandemic Influenza: FAQs

Here are answers to some of the most frequently asked questions about a potential avian influenza pandemic in Canada.

What is an influenza pandemic?

An influenza pandemic occurs when a new strain of human influenza suddenly emerges. Because few or no people have a natural immunity to this new strain, it spreads rapidly around the world.

How often do influenza pandemics occur?

Influenza pandemics occur three or four times a century; on average, every 40 or so years. There were three pandemics in the last century: Spanish Flu in 1918-1919; Asian Flu in 1957-58; and Hong Kong Flu in 1968-1969.

How long do pandemics last?

It is impossible to predict with certainty how long a pandemic might last. Experts expect, based on previous pandemics, that a new influenza would take no more than three months to reach Canada once it had emerged in another part of the world. Once it reaches Canada, it is likely to spread in two or more waves. Each wave lasts from six to eight weeks. A second wave would likely occur anywhere from three to nine months after the first outbreak.

Is the H5N1 influenza virus the only avian influenza virus that scientists are watching as a possible source of a pandemic?

Experts believe that H5N1 currently poses the greatest pandemic threat to humans. However, there are other avian influenza strains that have caused

serious infections since the first outbreak of H5N1 in 1997. These include an outbreak of H9N2 in Hong Kong in 1999 and H7N7 infections in the Netherlands in 2003. In both of these, a few humans developed the infection. H7N3 infections in Canada in 2004 were responsible for the culling of 17 million birds in British Columbia, but no people were infected. Any of these viruses has the potential to cause a pandemic. There are also other avian viruses that, by reassortment, could become a source of human infection.

Who is at risk during a pandemic?

Pretty much “everyone” is the answer to this question, because no one has immunity to the new virus. H5N1 is especially dangerous. Unlike typical influenzas, which prey mostly on the very old and the very young, H5N1 is especially adept at killing healthy people of all ages.

How is influenza likely to come to Canada?

Influenza will likely arrive in Canada the same way SARS did. A traveller who has contracted the disease in another part of the world will only develop symptoms after he or she arrives in Canada.

What are the symptoms of avian influenza?

The symptoms are similar to those of any other influenza, and include: fever, chest discomfort, aches and pains (often severe), headache, extreme exhaustion, and a weakness that may last as long as two or three weeks. Coughing and sneezing are also common.

Quiz

Do you know the difference between cold symptoms and flu symptoms?

Check

www.flustar.com/symptoms.asp for the answer, provided by Roche Laboratories, makers of Tamiflu, a leading antiviral drug that would likely prove very important in dealing with any influenza pandemic.

How is the flu virus spread?

Flu is spread from human to human in respiratory droplets, mostly from coughing and sneezing.

What are the recommended methods for fighting the spread of influenza?

The most effective methods are traditional ones: Wash your hands frequently, cover your mouth when you cough or sneeze, and stay home if you are sick. It is also highly recommended that all Canadians have an annual seasonal flu shot. It will not protect them from a new virus; but it will mean that there is no second virus with which the new one can interact.

In the event of a flu pandemic how many Canadians are expected to become ill?

Experts believe that at least 30 to 40 per cent of the population will become ill.

How many Canadians will die?

The Canadian Pandemic Influenza Plan estimates a death toll anywhere between 11 000 to 58 000 Canadians. Some experts believe this estimate to be a low one; the Conference Board of Canada has declared that as many as 1.6 million Canadians might be killed. Dr. David Butler-Jones, Canada's chief public health officer, considers that estimate way out of line.

Discussion

As noted in the last FAQ, the government has prioritized the order in which vaccine will be made available to Canadians. Why do you think it has chosen this particular order? Do you agree with this order? Explain.

Are there drugs to treat the flu?

There are. Canada is stockpiling one called Oseltamivir, better known under its trade name Tamiflu. Taken once a day, Tamiflu helps prevent people from being infected. Taken twice a day once individuals are ill, it is usually effective in fighting the disease. To be effective, however, Tamiflu needs to be taken within the first two days of illness.

What about a vaccine?

It will take anywhere from four to six months to develop and produce a vaccine once the strain of influenza virus has been isolated. Initially, there will not be enough for everyone, although Canada's vaccine manufacturer can produce about six million doses per month. Because this will be a new strain of virus, each individual will require two doses. The government has established a priority for the order in which the vaccine will be made available. First it will go to health-care workers, then to essential services workers. These will be followed by those at high risk of serious illness, then by healthy adults, and finally by healthy children.

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Is Canada Ready?

Further Research

The Public Health Agency of Canada's "Canadian Pandemic Influenza Plan" is available online at www.phac-aspc.gc.ca/cpip-pclcpi/index.html.

Follow-up Research

Has your province or territory and/or your community developed or is it developing a pandemic influenza plan? If so, it is likely available online at the provincial/territorial or community Web site.

"We have a plan and we have the infrastructure and a lot of countries are looking at following our framework." So said Dr. Arlene King of Health Canada's immunization and respiratory diseases division in an article in *The Globe and Mail*, January 28, 2004.

The plan to which King was referring was the Canadian Pandemic Influenza Plan, which has become a model for many other countries preparing for a possible avian flu pandemic. The infrastructure to which she referred was Canada's vaccine production capability. King assured Canadians that a vaccine against a flu strain could be developed within 48 days of its isolation in a lab, and that six million doses per month could then be produced.

Many Canadian medical authorities point to the country's experience with SARS (Severe Acute Respiratory Syndrome) as a major reason for our new preparedness for potential pandemics. Failures at that time have been taken into account so that the new plan will not repeat those mistakes.

The Toronto Example

But are we really ready for a pandemic? If any part of the country should be ready it would be Toronto, which bore the brunt of the SARS outbreak in Canada. On November 24, 2005, the city released its Toronto Pandemic Influenza Plan (available online at www.toronto.ca/health/pandemicflu/). The headline in the *Toronto Star* on the next day was "'Major gaps' in Toronto's bird flu strategy."

The problems still to be resolved in Toronto likely exist across the country.

Some are quite gruesome, but all need to be addressed. They include:

- The need to free up 40 to 50 per cent of hospital beds for influenza patients (up to 14 000 people in Toronto alone would need to be hospitalized in the first wave of the pandemic)
- The need to stockpile inexpensive coffins by funeral homes (up to 4 300 people are expected to die in Toronto); how will this be funded?
- The need for plans to deal with mass absenteeism, not only in hospitals but in the city's own departments (including fire, police, ambulance, and transit)
- Should anyone in the community be required to wear masks, and when?
- Once vaccines are available, how will they be stored, transported, distributed, and administered?

Toronto's medical officer of health, Dr. David McKeown, was quoted by the *Toronto Star* (November 25 2005): "I think we're much better prepared than we were before SARS (in 2003)." But "a fairly severe pandemic would be a real challenge to our health system as it is today." Unlike SARS, a flu pandemic will not be limited to one part of the country. If Toronto is unprepared, how likely are other parts of Canada to be ready to cope with the disease?

International Concerns

It is important to remember that Canada will not be facing an influenza pandemic on its own. Avian influenza is, and will always remain, an international concern. How Canada helps other nations fight this problem will be just as important as how it deals with bird flu within its own borders.

Quote

“There’s a lot of work going on, there’s still more we could do, no question. But we’re on the right road.”
— Dr. David Butler-Jones, Canada’s chief public health officer (*Toronto Star*, December 27, 2005)

During a pandemic, no country can be truly isolated. One of the likeliest effects of an influenza pandemic is the collapse of world trade. Almost all modern business and commerce—and this is especially true in Canada—relies on the timely and readily available international trade in goods and services. Consider, for example, what would happen to the availability of fresh food in Canada if the country’s borders were suddenly closed to foreign imports in the middle of winter. Consider the number of Canadian industries that depend on parts shipped from all over the world. It would seem to be very much in Canada’s self-interest to ensure that a developing pandemic is dealt with as soon as possible, before it hits home.

And there is also the moral issue.

Laurie Garrett, Senior Fellow for Global Health at the (U.S.) Council on Foreign Relations, recognizes the importance of Canada—and other developed nations—in the fight against the next pandemic. In a special issue of the prestigious periodical *Foreign Affairs* (July/August 2005), she wrote: “The international community would look to the United States, Canada, Japan, and Europe for answers, vaccines, cures, cash, and hope. How these wealthy governments responded, and how radically the death rates differed along worldwide fault lines of poverty, would resound for years thereafter.” Canada, like all nations who have the capacity to produce drugs and vaccines to fight disease, will be expected to do its part in some of the poorest and most vulnerable areas of the world.

Activity

In an FAQ on the Public Health Agency of Canada Web site (www.phac-aspc.gc.ca/influenza/avian_qa_e.html#6), the question is asked: “What is Canada doing to help these countries [Asian countries where H5N1 is prevalent] and to prevent the international spread of the virus?” The answer is somewhat unspecific: “The Public Health Agency of Canada has provided communications and public health support to the region. The Agency continues to work with the WHO [World Health Organization], other international organizations, and other countries to improve the prevention and control of avian influenza and pandemic influenza preparedness.”

In the space below list at least five specific ways in which Canada might become involved—along with other wealthy nations—in assisting those countries in the forefront of the fight against H5N1.

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Stockpile or Share?

Canadians are a fortunate people. As one of the world's wealthier nations, Canada is taking significant steps to prepare for the next influenza pandemic. One of the ways in which it is doing so is by stockpiling supplies of Oseltamivir, better known as Tamiflu—one of the few antivirals known to be effective in combating H5N1. As one of the few countries with vaccine production capabilities, it is also gearing up to develop and manufacture a vaccine against any new strain of influenza that threatens its population.

But what of other, poorer nations? They will also suffer, but probably a lot more than Canada. "In a world where most of the wealth is concentrated in less than a dozen nations representing a distinct minority of the total population, the capacity to respond to global threats is, to put it politely, severely imbalanced. The majority of the world's governments not only lack sufficient funds to respond to a superflu; they also have no health infrastructure to handle the burdens of disease, social disruption, and panic" (Laurie Garrett, *Foreign Affairs*, July/August 2005).

In small groups, try to answer the dilemma in the title of this section: stockpile or share?

- Should Canada stockpile medicines exclusively for Canadians before sharing with the rest of the world? Why? Why not?
- What criteria should determine whether and how much Canada shares with other countries?
- If it shares these supplies, what other countries/areas should have priority?
- What steps might Canada take to encourage other wealthy countries to participate in an international relief effort for poorer countries affected by a pandemic? Should it even do so?
- What would be the advantages to Canada of hoarding medical supplies for its own use? What would be the advantages of sharing such supplies?
- What might be the disadvantages to Canada if it fails to share its medical stockpiles? What disadvantages might result from sharing them?
- And a basic question: Do Canadians have an obligation, moral or otherwise, to assist other countries in major crises like pandemics? Why? Why not?

Each group should share the results of its discussion in a brief report to the rest of the class.