

IPAC Case Study Program

www.ipac.ca/CaseStudyProgram

Responding to the Crisis: Canada and H1N1

Paul Bretscher, Patrick Falastein, Alicia Miller, Verena Osieck

IPAC Case Study Program

Editor: Andrew Graham – andrew.graham@queensu.ca

This case study has been developed as part of an “organizational learning” case study series through the IPAC Case Study program. The cases from this series are prepared in conjunction with partners across a variety of governments, with a strong focus on the many activities of the federal government. We thank all those departments and ministries that have agreed to share their insights and experiences for the benefit of others. Each case will consist of the case itself and a short teaching note with ideas for uses and themes that the case suggests. Within the body of the case will be a series of lessons learned, based on the observations of those interviewed, written material and the insights of the case author and editor.

All cases are prepared by a researcher/writer and then edited. The research is based on published material and interviews with those who had been involved with the case. All interviews are treated as confidential and all quotations arising from them are not attributed to an identified individual.

Website for all IPAC cases: www.ipac.ca/CaseStudyProgram and www.ipac.ca/knowledge/CaseStudies

Responding to the Crisis: Canada and H1N1

Authors, Paul Bretscher, Patrick Falastein, Alicia Miller, Verena Osieck

Abstract

On June 11, 2009 the World Health Organization (WHO) declared the first global influenza pandemic since the 1968 Hong Kong Flu. The declaration by the WHO set off global alarm bells, evoking images of widespread death and disease amongst the general public. The virus, a previously unknown H1N1 strain of swine origin, also contained genes from avian and human influenza viruses. This new virus was viewed as particularly virulent, and the general public had little natural immunity. Across the globe, fear set in. There was widespread speculation that the new virus would cripple global trade, and result in death on a biblical scale. To put it bluntly, it was feared that the H1N1 pandemic of 2009 was the next Spanish Flu.

Date of Publication: 2011

Cover photo: Bernie Kasper, Madison Indiana Photography - <http://sindianavisions.wordpress.com/>

Responding to the Crisis: Canada and H1N1

By Paul Bretscher, Patrick Falastein, Alicia Miller, Verena Osieck

Outline/Content

Section 1 – INTRODUCTION

- H1N1 – A Global Threat
- Defining an Influenza Pandemic

Section 2 – H1N1 IN CONTEXT

- Pandemics in a Global Context: The Spanish Flu
- Pandemics in the Canadian Context: SARS
- Canadian Lessons from SARS

Section 3 – THE ARRIVAL OF H1N1

- Identifying H1N1 and the Pandemic
- Tracking the Pandemic
- Interventions During a Pandemic
- H1N1, Treatment and Risk

Section 4 – CANADA AND H1N1

- The Canadian Pandemic Influenza Plan
- Pandemic Emergency Preparedness in Canada
- Triggering the Emergency Plan
- Pandemic Planning and Vaccination

Section 5 – CRITICAL DECISIONS

- The Decision Makers
- Vaccination: Voluntary, Mandatory, or Compulsory
- Vaccination and Prioritization
- Emergency Powers in Canada

Section 6 – DECISION MAKING AND THE PUBLIC GOOD

Section 7 – CASE STUDY QUESTIONS

Important Acronyms

- World Health Organization (WHO)
- Severe Acute Respiratory Syndrome (SARS)
- Centers for Disease Control and Prevention (CDCP)
- Public Health Agency of Canada (PHAC)
- National Emergency Stockpile System (NESS)
- International Health Regulations (IHR)

SECTION 1 – INTRODUCTION

H1N1 – A Global Threat

Defining an influenza pandemic

A disease epidemic occurs when there are more cases of that disease than normal. A pandemic is a worldwide epidemic of a disease. Pandemics can be either mild or severe in the illness and death they cause. Moreover, the severity of a pandemic can change over time, as virus mutate and interact with new populations. The increase in global transport, combined with increasing urbanization, where much of the global population lives in overcrowded conditions, has dramatically increased the likelihood of epidemics morphing into global pandemics.

For any variant of the influenza virus to spark a pandemic, several factors must converge. These factors include:

- The emergence of a new strain of influenza virus, generally arising from a major genetic change, such as an antigenic shift
- Efficient transmission of the virus from person to person
- A susceptible population with little or no immunity

SECTION 2 – H1N1 IN CONTEXT

Pandemics in a Global Context: The Spanish Flu

The 1918 flu pandemic, caused by the H1N1 subtype of influenza A and commonly referred to as the Spanish Flu, is widely regarded as the reference point for global pandemics. The Spanish Flu, which lasted from March 1918 to June 1920, officially killed some 48 million people. However, new estimates place the total number of deaths anywhere from 50 to 100 million people. Moreover, it is estimated that 500 million, or one third, of the world's population became infected. As a result of the pandemic, there was widespread change in human behavior – in many respects, society closed down. For public health professionals, the Spanish Flu is an example of what can happen without effective pandemic planning: high rates of transmission, coupled with high rates of mortality.

Pandemics in the Canadian Context: SARS

Severe Acute Respiratory Syndrome (SARS) began in China in November 22, 2002 and rapidly swept the globe to appear on five continents. From February to July 2003, it affected over 8,000 people worldwide, leaving 774 dead (including 349 in China, 299 in Hong Kong, and 44 in Canada). In North America, the SARS crisis had one geographic locale, the City of Toronto.

At the advent of SARS, Toronto had not confronted a pandemic disease for nearly half a century; there were few plans in place, and little institutional capacity to respond to the crisis.

On March 26, Ontario declared a province wide State of Emergency in response to the rapid spread of SARS across Toronto. In the following days, York Central, North York General, and St. John's Convalescent, three major Toronto area hospitals were closed following acute outbreaks of the virus. Hospitals were unprepared for SARS, or a similar viral outbreak, and lacked appropriate basic equipment like gowns and masks. A lack of emergency preparedness and insufficient data about the disease led the province, on March 30, to declare a Code Orange alert province wide – on the nationally recognized

system for various events, Code Orange signifies “mass casualty”. Every hospital in the province was quarantined, and the Government considered closing down the schools and airports. Later, the World Health Organization (WHO) would issue travel advisory, recommending to the world that all non-essential travel to Toronto be postponed. Quite simply, the province was in chaos.

Ultimately, only 44 Torontonians died during the SARS outbreak. However, the policy response to the crisis was ad hoc. As James Young, provincial Coroner and Commissioner for Public Safety (Ontario), noted, “[the response to SARS was the] rigorous implementation of old methods: strong infection control, coupled with isolation and quarantine of large numbers of people. Without understanding the characteristics of the disease, we stopped it... perhaps it was not neat and clean... but it worked.”

In addition to the lack of capacity and planning in the health system to deal with SARS, Ontario faced serious jurisdictional issues. Who was responsible for Governments’ response to the crisis? The Ministry of Health and Long Term Care and the Commission for Public Health are legally responsible for health emergencies, while the Ministry of Public Security and Safety and the Commissioner for Public Safety are legally responsible for emergencies affecting the entire province. In the *ex post* analysis of the SARS crisis, jurisdictional conflicts made it evident that the government needed clear lines of authority for decision making.

Responding to a Pandemic in Canada: Lessons from SARS

Ultimately, the SARS crisis would become the reference point for dealing with a pandemic in Canada. A number of critical lessons were learnt from Toronto’s experience with the crisis.

First and foremost, the public health system was woefully unprepared to deal with a pandemic. The SARS crisis demonstrated that all orders of government needed to develop an integrated and effective pandemic plan, while putting the appropriate institutions in place to deal with a future crisis.

Second, effective communication with the public is critically important to managing an outbreak. The governments’ response to an emergency must appear to be effective and orderly. For government, maintaining the trust of the media and general public is decisively important to ensure compliance with public health measures.

Finally, while SARS led to only 44 deaths in Toronto, the economic impact was significant. The direct health costs to the province of Ontario were approximately \$945 million. The long-term impact on tourism in Toronto cost the industry over \$700 million. Most importantly, despite being geographically concentrated in Toronto, a J.P. Morgan analysis suggests that SARS resulted in a 1% – 1.5% decline in the third quarter GDP (2003) growth. For governments, the message was clear: emergency planning and effectively dealing with a pandemic crisis is critically important to protect not only human lives, but the economy as a whole.

SECTION 3 – THE ARRIVAL OF H1N1

Identifying H1N1 and the Pandemic

In early 2009, the critical factors indicating an impending pandemic were identified with a new strain of H1N1. On March 28th and 30th 2009, two children in different areas of California became ill and sought medical attention. Lab results confirmed a novel, swine origin influenza A (H1N1) virus, with unique genetic sequence that had not been previously identified. The virus was again identified in April 2009, this time in Mexico. The virus spread quickly, and ultimately evolved into a global pandemic. By early August 2009, over 160 countries had reported over 170 000 cases, causing more than 1,000 deaths worldwide.

Tracking the Pandemic

As required by the International Health Regulations, H1N1 cases were reported to the WHO. In the United States, the Centers for Disease Control and Prevention (CDC) in Atlanta put state and local public health officials on high alert, and implemented enhanced surveillance measures. Locally, the Public Health Agency of Canada (PHAC) took the lead in monitoring the outbreak. On April 26th, PHAC announced the first confirmed cases of H1N1 in Canada: two in British Columbia and four in Nova Scotia. By late May, the number of cases had risen to 1,336 worldwide, with two confirmed deaths. In mid June, foreseeing an impending crisis, the WHO declared a Phase 6 pandemic – the highest possible alert, indicating widespread human infection on a global scale. By late June, the WHO had identified 78,893 cases of H1N1, resulting in 311 deaths. In Canada, the PHAC identified 7,983 cases of the virus, resulting in 25 deaths.

On July 8, 2009, the WHO made an announcement that shocked public health officials: several H1N1 viruses had emerged in Hong Kong, Denmark and Japan that were resistant to the oseltamivir drug (Tamiflu). Tamiflu, the ‘silver bullet’ antiviral drug, was considered the last line of defense when someone becomes infected. Just a few days later, the WHO announced that although the pandemic was considered only moderately severe, the H1N1 virus appeared “unstoppable” and vaccination would be required for every man, woman and child worldwide.

Early models developed by the PHAC before H1N1 predicted that a moderately severe pandemic with no vaccination could kill between 11,000 and 58,000 Canadians – a rate 3 to 7 times greater than normally accrues as a result of seasonal influenza. In early August, the PHAC predicted that H1N1, now a global pandemic, would cause illness in 15-35% of Canadians, requiring between 34,000 – 138,000 hospitalizations. All evidence suggested that Canada was facing a public health emergency of the highest order.

Interventions During a Pandemic

In the event of a pandemic, certain interventions can help reduce the spread or severity of the outbreak. The most important intervention is isolation. This measure was used with some success during the outbreak of SARS in 2003. An efficient surveillance and reporting system permits effective identification of infected individuals, who can then be quarantined to prevent further spread. Effective surveillance, reporting and quarantine are critical steps in limiting the spread of any communicable disease.

Available medical interventions include vaccination and antiviral drugs. A vaccine for the flu was first tested in the 1930s and has been recommended for general use since the 1960s. According to the

CDCP, vaccination is the primary method for limiting the spread of influenza and preventing severe medical complications in individual patients.

Creating an effective vaccine to combat the influenza virus is inherently challenging. Because the influenza virus evolves so quickly, a new vaccine must be designed each year, a process that takes upwards of three months. Therefore, during a pandemic outbreak, vaccines are initially of limited use. As was the case with H1N1, a new and virulent strain can emerge and spread rapidly before a vaccine is made available.

H1N1, Treatment and Risk

In early July, attempts to define the most at risk populations to the new H1N1 virus proved difficult. It quickly became apparent that individuals over 60 years of age were not the most vulnerable - it was believed that those individuals had latent immunity to other H1N1 strains, which circulated decades ago. Early updates from public health officials suggested that those with underlying health conditions were most at risk. Although the virus normally causes only mild to moderate disease, officials urged caution and vigilance given the persistence of the virus. There was also deep concern that the virus could mutate and become more severe. It ultimately became clear that an H1N1 vaccine would become available by October 2009. However, for public health officials, operating under uncertainty and with insufficient information, it was unclear who should be treated first.

The WHO recommended immunizing health care workers first to protect basic health infrastructure. It was further recommended that priority be given to pregnant women; individuals above 6 months of age with one of several chronic medical conditions; healthy young adults of 15-49 years of age; healthy children; healthy adults of 50-64 years of age; and healthy adults of 65 years of age and above. However, many experts disagreed. Some argued that given the nature of the pandemic, health care workers, then first responders (police, firefighters and EMTs) and the Canadian Forces should be vaccinated, to ensure that the government had the capacity to maintain public order during a full blown emergency. Others argued that individuals who interacted with the public most frequently should be immunized first, to mitigate the likelihood of transmission. Clearly, different experts had different opinions regarding the prioritization of vaccination to reduce the overall risk to society from the H1N1 pandemic.

SECTION 4 – CANADA AND H1N1

The Canadian Pandemic Influenza Plan

Canada first developed a pandemic influenza Plan in 1988. The document is periodically updated in light of current research, and experience within Canada and abroad with disease outbreaks. The Plan is based on the basic principles of public health and emergency response. Its goals are to minimize illness and death, while minimizing social disruption. These aims can be realized only if the different levels of government are able to coordinate their activities.

In 2002 Canada's federal-provincial/territorial Pandemic Influenza Committee (PIC) was formed with the mandate to provide advice, expertise, recommendations, liaison and other activities associated with a flu pandemic. In December 2006, PIC issued a revised strategy entitled *Canadian Pandemic Influenza Plan for the Health Sector*. The Plan is meant as an outline for planning, preparedness and response to pandemic influenza by the three orders of government. The Plan is designed as an 'off-the-shelf'

document – once a pandemic is declared, the Plan is triggered, and everyone ostensibly knows what to do.

The revised Canadian Plan adopted the new “pandemic phases” definition of the WHO. Specifically, the Plan addresses the response and actions required of the three levels of government for each phase of the pandemic. Within each phase of a pandemic, the Plan describes the surveillance, vaccine programs, antiviral medications, health services, emergency services, public health measures and communications strategies (or actions) that are required from each every order of government.

Pandemic Emergency Preparedness in Canada

The PHAC’s Centre for Emergency Preparedness and Response funds and maintains a \$300-million national emergency stockpile system (NESS), which includes a central depot in Ottawa and eight additional warehouses located across Canada, to provide emergency medical supplies during a pandemic. A 24-hour response capability is maintained. The Agency manages the NESS by assessing and refurbishing stockpile units and distributing medical and pharmaceutical supplies at the request of provinces. The NESS contains hospital supplies ranging from beds and blankets to pharmaceuticals and antibiotics. It includes 165 field (or mobile) hospitals, each with a 200-bed capacity. The units can be deployed within 24 hours, and set up in existing buildings such as schools and community centers.

Antiviral stocks have received much attention in discussions of pandemic preparedness.

On 4 February 2005, the federal minister of health announced that the government would be establishing a National Antiviral Stockpile and securing sufficient oseltamivir (Tamiflu) to treat nearly 1 million Canadians. Since that time, the stockpile has been increased to 55 million doses, sufficient to treat approximately 5.5 million Canadians.

Given that an influenza vaccine can only be developed once a virus strain has emerged, Canada has taken two steps to improve our capacity to secure a vaccine supply in response to a pandemic. First, the federal government has secured a 10-year contract with a domestic manufacturing facility, currently owned by GlaxoSmithKline Inc. (GSK), to produce vaccine for all Canadians in the event of a pandemic. Second, the 2005 federal budget dedicated \$34 million, over five years, for the development of a prototype vaccine that would help accelerate vaccine production.

Triggering the Emergency Pandemic Plan in Canada

Canada is one of the 194 members of the WHO, meaning that the country is subject to the international health regulations (IHR). The purpose of the IHR is “to help the international community prevent and respond to acute public health risks that have the potential to cross borders and threaten people worldwide”. These regulations bind Canada to enact its core response plan in the case that the WHO declares an international health emergency. Hence, when the WHO declares a pandemic, the federal government should automatically activate the *Canadian Pandemic Influenza Plan*.

Pandemic Planning and Vaccination in Canada

Certain elements of the pandemic influenza Plan are discretionary; one such element is the vaccination procedure. Canada is obligated, under WHO commitments, to ensure that the entire population is vaccinated. However, the process of vaccination is largely discretionary and depends on the context and severity of the situation. In late July, the PHAC conducted a poll and concluded that only 60% of

Canadians would voluntarily choose to vaccinate themselves against H1N1. The Plan states: “universal vaccination has the advantage of creating a population that is highly resilient to the pandemic virus because of both individual protection and potential herd immunity.” Herd immunity is achieved when a large proportion of the population is vaccinated, and therefore provides coverage for those who are not vaccinated, by virtue of limiting the possibility of viral transmission. Experts believe that a 95% vaccination rate must be achieved to obtain herd immunity.

The objectives of the pandemic vaccine program within the plan are to: (1) provide a safe and effective vaccine program to all Canadians as quickly as possible; (2) allocate, distribute and administer vaccine as rapidly as possible to appropriate subgroups of people; and (3) monitor the safety and effectiveness of immunization programs. Public reaction to vaccination will be affected by the severity of the pandemic, the timing of vaccine availability, and the real or perceived safety of the vaccine. There are also “rate-limiting” steps to delivery of a population wide vaccine. It can be slowed on either the operational end (this refers to how quickly health care workers can administer the vaccine), or at the distributional end (meaning that the production, or supply, of vaccination may be insufficient to meet required demand).

The Plan states that public health officials should be prepared to vaccinate the Canadian population over a period of four months. As vaccine is produced, it will be distributed in batches. Therefore, choosing who gets vaccinated, and in what order, is critically important. While the Plan has divided the Canadian population into subgroups, it does not specify which groups get priority during a pandemic. The key groupings identified in the plan are health care workers, healthy adults, healthy children, high risk, key health decision makers, key societal actors, public health responders, and pandemic social responders.

SECTION 5 – CRITICAL DECISIONS

The Decision Makers

In August 2009, the Government of Canada was faced with some particularly difficult decisions. When the WHO declared H1N1 a pandemic, the Government (via cabinet) responded and implemented the *Canadian Pandemic Influenza Plan*. As with all public health emergencies that are national in scope, the Government of Canada was in charge. While activating the Plan was an easy and almost automatic decision for the federal cabinet, the tough calls laid ahead. Who should be vaccinated first? And why? Should vaccination be voluntary or mandatory (perhaps even compulsory)? Should public spaces like schools, libraries and airports be closed? Would there be public panic? If so, should the cabinet declare a state of emergency, dramatically increasing the coercive powers of government, to ensure public order? These are questions that we will revisit at the end of the case study, but deserve mention now as we move ahead.

Vaccination: Voluntary, Mandatory or Compulsory

In normal circumstances, vaccination cannot be made compulsory in Canada because of the provisions set out in the *Charter of Rights and Freedoms*, which specifies the fundamental freedoms of conscience and religion. The Charter must also be included in any consideration of mandatory vaccination. For example, three provinces have legislation under their health-protection acts to enact mandatory immunization in schools. Ontario and New Brunswick require proof for diphtheria, tetanus, polio, measles, mumps and rubella immunization for school entrance and Manitoba requires measles vaccination for school entrance. However, exemptions must always be permitted for religious or conscientious reasons. This is the distinction between mandatory and compulsory vaccination. The

Constitution permits establishment of mandatory vaccination in Canada, which specifies that individuals must be vaccinated unless they formally object for religious or conscientious reasons. Compulsory vaccination, which forces all individuals to be vaccinated regardless of choice, cannot be implemented under normal circumstances. The definition of voluntary vaccination is self-evident: individuals have the freedom to choose whether or not they get vaccinated, based on their own beliefs.

Vaccination and Prioritization

There are different factors to consider when deciding which group of individuals should be prioritized for immunization. The first consideration is the impact on pandemic goals: if you want to minimize serious illness and the number of overall deaths, vaccinating high risk groups and health care workers is a first priority. However, if you want to minimize social disruption in the case of an extremely deadly pandemic, you may favor the prioritization of critical infrastructure occupational groups and healthy adults.

There are also operational considerations. If there is plenty of vaccine available, no prioritization may be required. If supplies of the vaccine are scarce, it may be easiest to prioritize smaller groups that can be easily located and identified. Finally, public opinion and risk perception must also be taken into consideration. For example, if the pandemic is particularly deadly, there may be public pressure to vaccinate children first, whether or not it is good public policy. On the other hand, if the pandemic is perceived as relatively mild, the public may want to delay vaccination until more information is available on reactivity of the vaccine.

Ultimately, in the case of a severe pandemic like H1N1, questions regarding vaccinations and prioritization are political decisions. Political decision makers must weigh the costs and benefits of death to various groups, while assuring that government and critical infrastructure continues to function, all in the context of maximizing social welfare in the public interest.

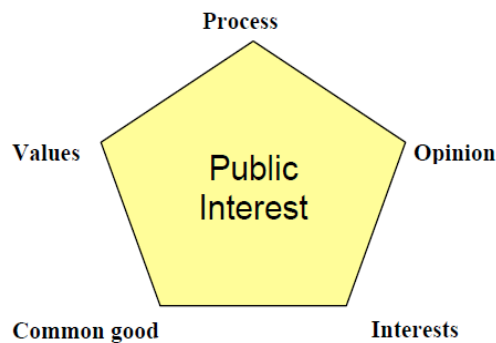
Emergency Powers in Canada

The *Emergencies Act*, and its companion legislation, the *Emergency Preparedness Act*, outlines the procedure and legislative context by which public welfare emergencies are proclaimed, continued and revoked. When invoked, the *Act* confers substantial additional powers on the government to control public welfare emergencies. These powers include the regulation of travel to the affected regions, evacuation of geographic areas, the re-possession of property, and ability to direct all services to provide emergency care. Invocation of the *Act* is akin to implementing a state of martial law, a decision made by cabinet.

In a situation where the Government of Canada declares a state of national emergency and invokes the *Act*, the *Charter of Rights and Freedoms* remains in full force and effect. In the context of compulsory vaccination, invocation of the *Act* presents a dilemma. On the one hand, citizens are protected by the *Charter*, which allows them to refuse vaccination on the grounds of freedom of conscience and religion. On the other hand, the *Charter* is subject to reasonable limits, and it could be argued that these limits are expanded during a state of emergency to include compulsory vaccination if required. Canada has no experience testing the limits of the executive power during an emergency, as a state of national emergency has not been declared since the adoption of the *Charter of Rights and Freedoms* in 1982.

SECTION 6 – DECISION-MAKING AND THE PUBLIC GOOD

It is often difficult for decision makers to determine what is in the public good. When deciding how to deal with the H1N1 pandemic in Canada, it was no doubt challenging for the federal cabinet to determine what to do, and in whose interest. There are many approaches that decision makers can invoke to determine public interest and maximize total welfare. The five major approaches include process, majority opinion, utilitarian, common interest, and shared values. The process approach specifies that an outcome be in the public interest if it is arrived at using appropriate procedures. This includes legal and constitutional processes, as well as standards such as transparency, fairness, adequate distribution to the public, etc. Majority opinion embodies the basic approach that what is in the public interest must be some reflection of what the public wants. Here, public opinion rules the day.



The utilitarian approach is about balancing different interests to produce the maximum satisfaction among the most people. It is argued that this approach is very relevant to policy-making because one must often balance competing definitions of the public good. The common interest approach states that the public interest is something that everyone shares. For example, everyone has an interest in a stable economy, basic rights and freedoms, social stability, a clean environment. The defining characteristic of this approach is that it allows room to override minority views by justifying the decision with the pursuit of the “true” public interest. Finally, the shared value approach is similar to the common interest approach. It states that there are some values that are shared among all people that underlie our interests. Examples of shared values include those encompassed in the *Charter of Rights and Freedoms*, including equality and dignity. Some argue that this approach is not applicable in a diverse society and that it can be dangerous as the basis for policy development, as this would allow the disregard of any other concerns.

SECTION 7 – CASE STUDY QUESTIONS

In this case study, we have presented you with general information on pandemics, the incidence of H1N1, and Canada’s capacity to respond to the crisis. You are now the key decision maker in Canada’s response to the H1N1 pandemic. Assume that the Government of Canada has already activated the *Canadian Pandemic Influenza Plan*. Acting as the Minister of Health, please answer to the following questions – your response to these questions should be viewed as recommendations to the Prime Minister and Cabinet on how the Government of Canada should proceed during the crisis. It is early September 2009.

Question 1: Should the Government of Canada move to implement a system of mandatory or voluntary vaccination? Should the Government go a step further, and invoke the *Emergencies Act*, and require compulsory vaccination?

Question 2: Given the adoption of either mandatory or compulsory vaccination for the general public, who should receive priority? Why?

Question 3: Given the incidence of H1N1 in Canada, and the declarations made by the WHO, would you implement regulations to limit travel? Would you limit access to public spaces? Shut down public facilities like schools, libraries, and government offices? Limit the ability of private enterprise to conduct their own affairs, by shutting down major businesses?

Question 4: Is it ethically justifiable, during a pandemic, to declare a state of emergency and dramatically limit civil liberties? How would you balance the public good, against the rights of individuals?

BIBLIOGRAPHY

Bridges, Carolyn B. M.D. et al. "Prevention and Control of influenza: Recommendations of the Advisory Committee on Immunization Practices (ACIP)." *Center for Disease Control - MMWR*. 50, (April 12, 2002): 1-31.

Brown, IH, Ludwig, et al. "Antigenic and genetic analyses of H1N1 influenza A viruses from European pigs." *Journal of General Virology*, 1997, 78: 553-562.

CBC.ca. Indept: "SARS: The Economic Impact". <http://www.cbc.ca/news/background/sars/economicimpact.html> (Retrieved on Wed. March 31, 2010).

Centers for Disease Control and Prevention. Jeffery K. Taubenberger and David M. Morens. 1918 Influenza: the Mother of All Pandemics, January, 2006. Retrieved on March 31, 2010.

CTV news. "WHO 'recommends' global mandatory vaccination, Canada prepares". (Aug 2009). <http://columbiavalleynews.com/2009/08/14/who-recommends-global-mandatory-vaccination-canada-prepares/> (Retrieved on March 31, 2010).

Duffin, Jacalyn. "Introduction: Lessons and Disappointments." in eds., Jacalyn Duffin and Arthur Sweetman. *SARS in Context: Memory, History and Policy*. Montreal: McGill-Queen's University Press, 2006.

Grasby, Elizabeth. "Influenza Pandemic Planning at LHSC." *Ivey*. University of Western Ontario: Richard Ivey School of Business, 2008.

Johnson, Niall P. A. S., and Mueller, Juergen. "Updating the Accounts: Global Mortality of the 1918-1920 "Spanish" Influenza Pandemic." *Bulletin of the History of Medicine*, 2002, 76:1.

Law Reform Commission of Saskatchewan. "Consultation Paper: Vaccination and the Law." *Government of Saskatchewan – Publications Centre*, (2007).

Lendman, Stephen. "Mandatory Swine Flu Vaccination Alert." (July 2009).
<http://www.infowars.com/mandatory-swine-flu-vaccination-alert/> (Retrieved on: March 31, 2010).

Niemczak, Peter and Philip Rosen. "Emergencies Act." (October 2001). <http://dsp-psd.pwgsc.gc.ca/Collection-R/LoPBdP/BP/prb0114-e.htm> (Retrieved on: March 31, 2010).

Pal, Leslie and Judith Maxwell. "Assessing the Public Interest in the 21st Century." *Canadian Policy Research Networks*, (2004):50.

Public Health Agency of Canada. "Canada National Report on Immunization." (1996). <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/97vol23/23s4/index.html> (Retrieved on: March 31, 2010).

"Report World Health Organization Regional Office for Africa Brazzaville • 2009." Presented at the Regional Conference on Pandemic Influenza A (H1N1) 2009, Johannesburg, South Africa, August 11–13 2009 .

Spika, John S. and David Butler-Jones, (2009). "Pandemic Influenza (H1N1): Our Canadian Response." *Canadian Journal of Public Health*; 100(5):337-39.

Sweetman, Arthur. "Introduction to Economic Issues in Epidemiology and Public Policy." in eds., Jacalyn Duffin and Arthur Sweetman. *SARS in Context: Memory, History and Policy*. Montreal: McGill-Queen's University Press, 2006.

The Healing Journal. "To be or not to be vaccinated... in Canada." (July 2009).
<http://thehealingjournal.com/node/863> (Retrieved on: March 31, 2010).

World Health Organization (WHO). "Pandemic Preparedness."
<http://www.who.int/csr/disease/influenza/pandemic/en/> (Retrieved on: March 31, 2010).

World Health Organization. "What are the International Health Regulations?" (April 2008).
<http://www.who.int/features/qa/39/en/index.html> (Retrieved on: March 31, 2010).

World Health Organization. "WHO global influenza preparedness plan: The role of WHO and recommendations for national measures before and during pandemics."
http://www.who.int/csr/resources/publications/influenza/WHO_CDS_CSR_GIP_2005_5.pdf (Retrieved on: March 30, 2010).

World Health Organization. "WHO recommendations on pandemic (H1N1) 2009 vaccines." *Pandemic (H1N1) 2009 briefing note 2*. (July 2009).
http://www.who.int/csr/disease/swineflu/notes/h1n1_vaccine_20090713/en/index.html (Retrieved on: March 31, 2010).

World Health Organization. "Virus resistant to oseltamivir (Tamiflu) identified." *Pandemic (H1N1) 2009 briefing note 1*. (July 2009).
http://www.who.int/csr/disease/swineflu/notes/h1n1_antiviral_resistance_20090708/en/index.html (Retrieved on: March 31, 2010).

Young, James G. "My experience with SARS." in eds., Jacalyn Duffin and Arthur Sweetment. *SARS in Context: Memory, History and Policy*. Montreal: McGill-Queen's University Press, 2006.

Zoutman, Dick. "Remembering SARS and the Ontario SARS Scientific Advisory Committee." in eds., Jacalyn Duffin and Arthur Sweetment. *SARS in Context: Memory, History and Policy*. Montreal: McGill-Queen's University Press, 2006.

Comments

We are always extremely interested in how Cases and Simulations are employed and the experiences of instructors. Please send us your feedback so that we can improve future editions. ntl@ipac

IPAC Case Study Program

www.ipac.ca/CaseStudyProgram

IPAC serves as the hub for public administration case expertise in Canada. The website www.ipac.ca/CaseStudyProgram, offers an array of services to academics, practitioners and public sector organizations:

- IPAC's own case study inventory,
- Linkages to public administration case studies around the world,
- Updates and linkages on new cases as they become available,
- Information and advice on the presentation and teaching of case studies, and
- Expertise in the research, editing and writing of case studies.

IPAC invites faculty using their own case studies in their classes to submit them to become part of this public administration resource. After an editorial review process, these cases become part of the IPAC inventory, available to members of IPAC for free and for sale for large group use.

IPAC invites government organizations and agencies to develop case studies for their internal learning and for sharing experience and practice. IPAC has a strong record of partnering with governments, based on its available research and editing expertise, to develop cases for internal use or for broad distribution within the IPAC inventory.

For more information on the Case Study Program:

Wendy Feldman
Director of Research, IPAC
1075 Bay Street, Suite 401
Toronto, ON M5R 2B1
(416) 924-8787
wfeldman@ipac.ca

Professor Andrew Graham
Case Study Program Editor
Queen's University
andrew.graham@queensu.ca

© Institute of Public Administration of Canada
1075 Bay Street, Suite 401
Toronto, ON M5R 2B1
ISBN: 155061-113-5
Published in 2012