



Dr Montizambert and the 1918–1919 Spanish influenza pandemic in Canada

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We have experienced the first 2 waves of the 2009 H1N1 influenza pandemic. The current virus, like the 1918 virus, was passed directly from a pig to a human. The subsequent human-to-human spread in the current pandemic has had a fatal effect on patients with concurrent illnesses, on the young and healthy who have little or no immunity, and on those who succumb to an overwhelming immune response, the so-called cytokine storm. How does the pandemic of today differ from its infamous predecessor? And what has happened in the interim?

Influenza

The term *influenza* comes from the Italian word for *influence*—in the Middle Ages the illness was thought to be under the influence of the stars. As time passed it was recognized that the disease existed in a milder, local (ie, endemic) form, often referred to as *la grippe*, and a more serious, widespread (ie, epidemic) form, which could devastate a city, region, or country. Two or 3 times each century a fatal form of influenza would sweep across a continent or continents, becoming a pandemic. In the television series *The Tudors* there was an episode in which the “sweating sickness”¹ arrived from the continent and swept through England with an alarming fatality rate. Both Cardinal Wolsey and Anne Boleyn had the illness but lived to die more violent deaths, while lusty King Henry isolated himself and came through the pandemic unscathed.

Much later, in the 20th century, these forms of influenza would be explained by the “shift” and “drift” phenomena. Drift occurs when there is a slight change in the protein coat of the influenza virus. One of the surface proteins is hemagglutinin (used by the virus to penetrate cells and use the cell DNA to replicate) and the other is neuraminidase (used by the newly constituted viruses to break out of the cell to infect more cells and continue their deadly proliferation). People who have been exposed to previous influenza strains have partial immunity; when exposed to the variant virus, they develop a mild form of the disease or resist it completely. Populations not previously exposed to the virus get the full-blown disease, but people who have immunity check its spread. Shift occurs when the protein material on the surface of the virus is completely new and there is no immunity from previous exposure. This happens when the influenza virus goes directly from another species (pig or bird) to humans; with no immunity, pandemics occur.

Viruses and their composition were unknown in 1918, but medical science had made considerable advances in the field of bacteriology. An organism called Pfeiffer bacillus was isolated from the throats of patients with influenza symptoms. However, the finding was not reproducible and the causative agent of influenza had to await the discovery of viruses in the early 1930s. As the appalling death rate from influenza in 1918 began to take its toll on both the Allied and Axis forces, the censors on both sides concealed the problem. Only in neutral Spain did the press report the alarming mortality rate; this disease, therefore, became known as the Spanish influenza. Soldiers were particularly vulnerable. They were young with no previous exposure to the virus, they were often in crowded and confined areas, and they were under considerable stress. Public health measures were minimal to nonexistent, and there were no antibiotics (to treat secondary bacterial pneumonia) or antiviral drugs. Many soldiers died from an outpouring of fluid in their lungs within hours of developing the illness. They drowned from within. Ventilators were nonexistent then, and even today artificial ventilation is impossible when lung tissue becomes so congested that gas exchange cannot occur.

After the war, infected troops from around the world returned home. What measures were taken in Canada to protect an unsuspecting populace?

Dr Montizambert and Canadian public health

Dr Frederick Montizambert was Director General of Public Health for Canada in 1918. He graduated from Edinburgh University in the United Kingdom in 1864 and entered public service in 1866 as an Assistant Quarantine Officer at Grosse Île, Que.* He was exposed to typhus while inspecting immigrants arriving to Grosse Île and contracted the illness in 1868.³ Upon his recovery, rather than opting for a safer line of work, he devoted the rest of his career to quarantine and public health. In succession he became the Medical Superintendent at Grosse Île, then the General Superintendent of the St Lawrence Service. This was followed by his appointment as Director General of Public Health and Sanitary Adviser to the Government of Canada in 1899. In the same year he successfully supervised the smallpox

*The first big quarantine station was established in 1832 by Lower Canada to check the spread of cholera from immigrants.²

quarantine of 2000 Doukhobours on Lawlor Island in Halifax Harbour, NS.⁴ He was appointed a federal deputy minister by statute in 1905 and in effect became the first Canadian Deputy Minister of Health.

During his tenure the major quarantine diseases (ie, smallpox, cholera, typhus, yellow fever, and bubonic plague) were brought under control, despite being serious threats from immigrants or shipping personnel entering Canada. He did this by developing and maintaining strict quarantine measures at the 4 key maritime quarantine stations in Canada: Lawlor Island in Halifax Harbour, Partridge Island in Saint John Harbour, NB, Grosse Île in the St Lawrence River, and William Head on the southern end of Vancouver Island in British Columbia. The substantial advances in medical knowledge in the late 19th century guided his policies. In particular, the identification of biologic vectors that carry disease was of enormous value in preventive care.[†] Shipping regulations mandating improved sanitation, adequate ventilation, and decreased crowding virtually eliminated cholera on immigrant ships. Public confidence in vaccination programs for smallpox greatly decreased the morbidity and mortality from that lethal disease. Further, all of these advances were enhanced by international cooperation in information sharing, the development of collective policies, and regular communication between ports and countries identifying diseases on the quarantine list.

Influenza, however, was not on that list in 1918. When the troop ships started returning to Canada with sick personnel on board, they did not stop at the quarantine stations. In Halifax, ill servicemen were taken directly to the Cogswell Street Military Hospital in the centre of the city. No precautions were taken and those who were incubating the disease were discharged to their homes across the province and the country.^{*} Only when the death toll began to mount and municipal authorities began to complain did the quarantine stations begin to admit influenza patients. It was too late. Once the nonimmune public had been exposed to the virus, the grim mathematical progression began.

Outcomes, then and now

There were an estimated 50 million deaths worldwide⁵ and 50 000 in Canada during the 1918-1919 pandemic.⁶ This breach of Canada's public health system marked the end of Dr Montizambert's era. Canadian health measures, which to that point had mostly concentrated on containing the serious quarantinable diseases, now seemed inadequate.

Dr Montizambert was retired. His bureaucratic system, which reported to the Minister of Agriculture, was moved to a newly created federal Department of Health in 1919 and was given a much broader range of responsibilities.[§]

[†]Vectors included lice (typhus), mosquitoes (yellow fever), and rats (bubonic plague).

^{*}The incubation period for influenza is 2 to 7 days.

The old maritime quarantine stations continued to operate, but they had completed their primary task and could not adequately deal with the complexities of modern transportation. They were closed in 1936.

The notion of quarantine is still relevant. It was used successfully to contain the SARS epidemic in 2003; and in the H1N1 outbreak this past year, families with mild to moderate influenza symptoms were encouraged to self-isolate.

The key to controlling influenza began in the 1940s with the successful development of influenza vaccines. These vaccines have been modified and improved in the intervening years. It is estimated that in the recent pandemic, 40% of the Canadian population was vaccinated against the H1N1 strain of the influenza virus.⁷ As of January 2010 there have been an estimated 12 799 deaths globally,⁸ including 426 deaths in Canada, attributed to the virus.⁹

The third wave of the Spanish influenza pandemic in 1919 produced fatalities but it had a diminished effect. A substantial portion of the population had developed natural immunity. A third wave of the most recent pandemic might not even develop in Canada^{||}—that, along with the marked reduction in the mortality rate, would be a testimony to the success of the immunization program.

The cost of the Spanish influenza pandemic was in human lives. Lives have been lost in the recent influenza pandemic; fortunately, the primary cost today is in dollars—the cost of progress.

Dr Cameron is a rural family physician in Sherbrooke, NS.

Competing interests

None declared

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[§]The new federal Department of Health had an expanded mandate to include not only quarantine services and leper hospitals, but also immigration medical services, marine hospital services, venereal disease control, sanitation, opium and narcotic drug dispensaries, proprietary and patent medicines, child welfare services, food and drug laboratories, the Public Works Health Act, and pollution of boundary waters.

^{||}Globally, Canada has one of the best immunization rates for the H1N1 influenza virus.¹⁰