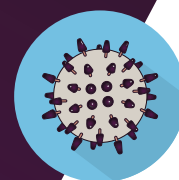


# The Underappreciated Burden of Influenza Amongst Canada's Older Population. And What We Need to Do About It.



February, 2018

**The Underappreciated Burden of  
Influenza Amongst Canada's Older  
Population. And What We Need to Do  
About It.**

Authors:

Dr. Samir Sinha, Julie Dunning,  
Ivy Wong, Michael Nicin and Stephanie  
Woodward. (e-book version)

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# National Institute on Ageing Immunization Series

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## **Mailing Address:**

National Institute on Ageing  
Ted Rogers School of Management  
350 Victoria St.  
Toronto, Ontario  
M5B 2K3  
Canada

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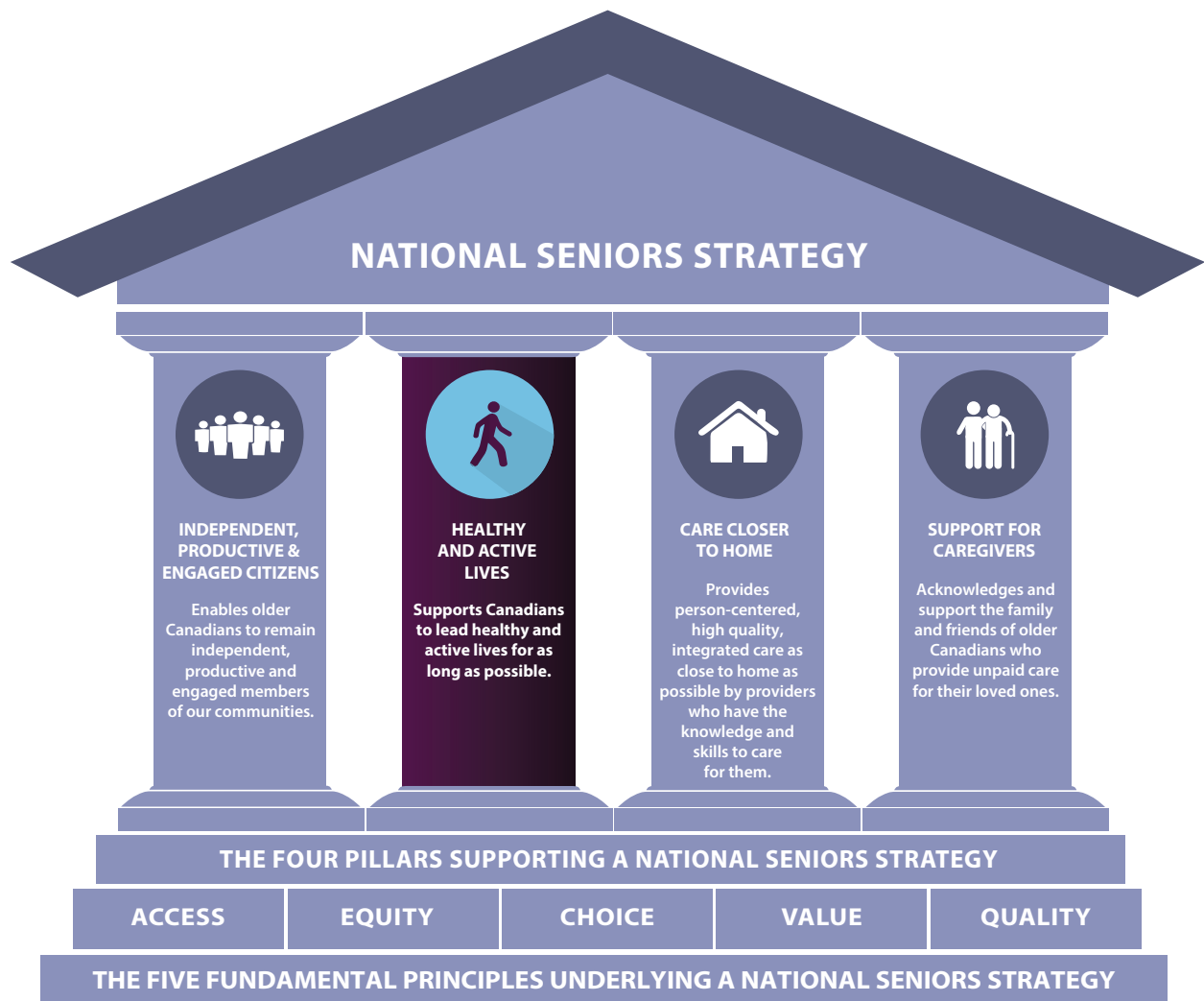
## About the National Institute on Ageing

The National Institute on Ageing (NIA) is a new policy and research centre based at Ryerson University in Toronto. The NIA is dedicated to enhancing successful ageing across the life course. It is unique in its mandate to consider ageing issues from a broad range of important perspectives, including those of financial, physical, psychological, and social wellness.

The NIA is also focused on leading cross-disciplinary research to better understand the issues that can lead to the development of evidence-informed actionable insights that can meaningfully contribute towards shaping the innovative policies, practices and products that will be needed to address the multiple challenges and opportunities presented by Canada's coming of age. The NIA is committed to providing national leadership in promoting a collaborative approach that also seeks to continually establish municipal, provincial, federal and global partnerships with other academic centres, and ageing-related organizations.

The NIA further serves as the academic home for the National Seniors Strategy (NSS), an evolving evidence-based policy document co-authored by a group of leading researchers, policy experts and stakeholder organizations from across Canada and first published in October 2015. The NSS outlines four pillars that guide the NIA's work to advance knowledge and inform policies through evidence-based research around ageing in Canada that include Independent, Productive and Engaged Citizens; Healthy and Active Lives; Care Closer to Home; and Support for Caregivers.

Over the coming year, the NIA will be looking at adult immunizations as a part of its 'Healthy and Active Lives' pillar of work, encouraging education and support so that Canadians and its policy and decision-makers can better understand and promote policies and activities that better support wellness, prevention, and overall healthy ageing.



## Authors and Reviewers

The background research for this report was undertaken by **Julie Dunning** (NIA Policy Analyst). It was written by **Dr. Samir Sinha** (Director of Geriatrics, Sinai Health System and University Health Network; Associate Professor of Medicine, Family and Community Medicine, Health Policy, Management and Evaluation, University Toronto; Co-chair, NIA), **Julie Dunning**, **Ivy Wong** (NIA Senior Policy Advisor), **Stephanie Woodward** (Former NIA Executive Director) and **Michael Nicin** (NIA Executive Director). This report was edited by **Allan McKee** (NIA Communications Officer).

### Expert Reviewers

We would like to sincerely thank our expert reviewers for their thoughtful feedback and guidance on the content and final recommendations of this report. Any opinions or errors reflected in this report are of the NIA alone.

**Dr. Michael Gardam** – Medical Director, Infection Prevention and Control, Women's College Hospital and Associate Professor of Medicine, University of Toronto.

**Dr. Allison McGeer** – Medical Director, Infection Prevention and Control, Sinai Health System and Professor of Laboratory Medicine and Pathobiology and at the Dalla Lana School of Public Health, University of Toronto.

**Colin Busby** – Associate Director, Research, C.D. Howe Institute.

**Dr. Janet McElhaney** – HSN Volunteer Association Chair in Healthy Aging; VP Research and Scientific Director; Health Sciences North Research Institute; Professor, Northern Ontario School of Medicine.

**Dr. Jacob Udell** – Cardiovascular Division, Women's College Hospital & Peter Munk Cardiac Centre, Toronto General Hospital; Assistant Professor of Medicine, University of Toronto.

**Dr. Jeff Kwong** – Senior Core Scientist, Institute for Clinical Evaluative Sciences (ICES); Scientist, Public Health Ontario; Family Physician, Toronto Western Family Health Team; Associate Professor of Family and Community Medicine and at the Dalla Lana School of Public Health, University of Toronto.

**Disclaimer:** The NIA has developed this document to provide a summary of general information about the burden of influenza and the benefit of the influenza vaccine, as well as provide evidence-informed recommendations to support uptake of the influenza vaccine. The NIA's work is guided by the current evidence. This document can be reproduced without permission for non-commercial purposes, provided that the NIA is acknowledged.



## Executive Summary

While Canada recommends an influenza vaccination target of 80%<sup>1</sup> only approximately 60% of older Canadians (and 29% of Canadians in general) receive the influenza vaccine each year<sup>2</sup>, which is lower than other developed countries such as New Zealand, the United States, and the United Kingdom.<sup>3</sup> What makes matters worse is that vaccination rates amongst older Canadians have also been declining over the past decade.<sup>4</sup>

Over the next two decades, Canada's population over the age of 65 is expected to double.<sup>5</sup> Influenza rates could also climb during this period because those over 65, as well as those living with chronic health conditions, are disproportionately affected by influenza. As a result, we expect that serious influenza outcomes will become more prevalent. Nevertheless, we still do not fully understand the burden of influenza among those infected with the virus, even though influenza and its related complications have a significant impact on the Canadian health care system and society in general.

In Canada influenza contributes to an average of 12,200 hospitalizations and an average of 3,500 deaths each year.<sup>6</sup> Influenza and pneumonia are the 7th leading cause of death in Canada<sup>7</sup> and the

leading cause of death amongst vaccine preventable diseases.<sup>8</sup>

The negative consequences of influenza are likely underestimated, as it is difficult to accurately determine the extent and degree to which influenza affects other health complications including overall mortality. For example, when the cause of death is due to a complication, or to an underlying condition which was worsened by influenza, it is not necessarily understood that this is a direct consequence of influenza. Despite its severity, popular misconceptions regarding the seriousness of influenza persist, with many people often dismissing its symptoms as being 'just a cold'.

Vaccination is overall the best way to prevent influenza. However, older adults and people living with chronic conditions respond less robustly to vaccination. One of the most important ways to reduce rates of influenza among this population is through widespread influenza vaccination or herd immunity, which is when enough of the population is vaccinated, the chance of becoming infected lowers for everyone.

Compounding the problem is that Canadian health care institutions and providers have inconsistent and inadequate vaccination policies and outcomes that contribute to low provider uptake of the vaccination as well. During the 2016-17 'flu' season, only

53% of health care providers in hospitals were vaccinated against influenza.<sup>9</sup>

Influenza vaccine therefore faces a policy and practice mismatch. Both the variable effectiveness of the vaccine from year to year and the requirement for an annual vaccination raises unique policy and communications challenges for influenza compared to other vaccinations.

This white paper will provide a concise summary of the current scientific evidence to inform future policy solutions. Showcasing these findings will create a stronger appreciation for the benefit of influenza vaccination and other measures in preventing influenza, as well as its often related but unattributed complications including functional loss and all-cause mortality.

The report makes the following 8 evidence-informed recommendations to support policy and practice approaches for health authorities and organizations towards supporting both influenza prevention and vaccination across Canada:

1. Improve Influenza Prevention Practices More Generally
2. Promote a Life-Course Vaccination Schedule that includes Older Adults

3. Continue Working Towards Developing Better Influenza Vaccines
4. Include Influenza Vaccination in Clinical Guidelines for Older Adults and for Treating Chronic Conditions
5. Provide Clinical Education and Support for Primary Care Providers and Pharmacists to Deliver Vaccinations
6. Universal Funding for Influenza Vaccinations Needs to Be in Place to Ensure it is Accessible to All Canadians
7. Highly Recommend the Influenza Vaccine for all Health Care Providers and Mandate it for Providers and Residents in Long-Term Care Homes
8. Develop Better and Mandatory Reporting of Influenza Vaccination Rates

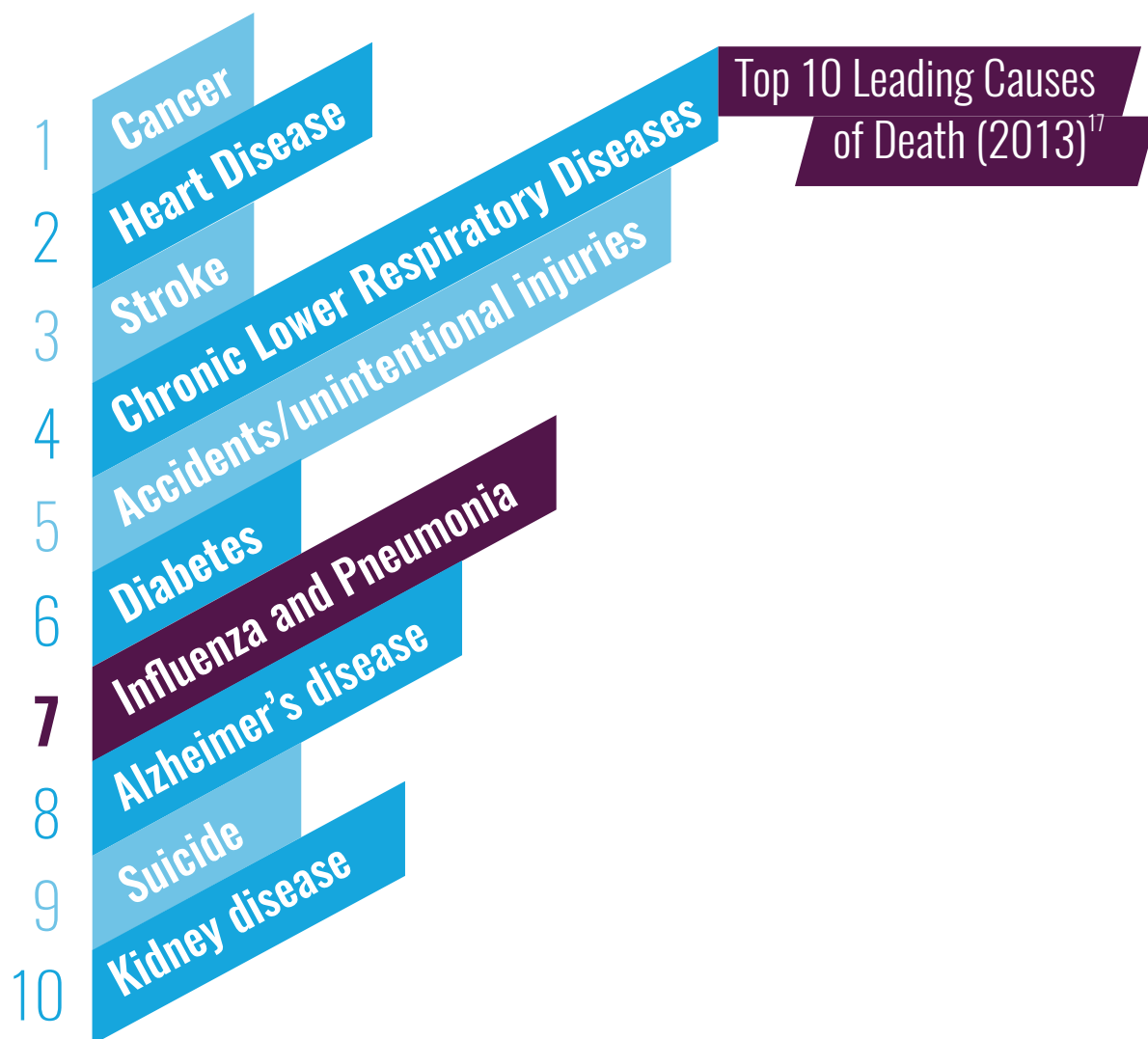
While Canada recommends that 80% of adults get vaccinated<sup>10</sup>, only **29% of Canadians aged 12 and over<sup>11</sup>, 62% of older adults<sup>12</sup>, and approximately 50% of health care workers are vaccinated against influenza.**<sup>13</sup>



## Background and Context

### Why is Influenza an Important Societal Issue?

Each year, influenza epidemics cause **1 billion cases of influenza**, 3-5 million cases of severe influenza-related illnesses, and lead to **250,000 to 500,000 deaths worldwide**.<sup>14</sup> Influenza, together with all causes of pneumonia, is the **7th leading cause of death in Canada**,<sup>15</sup> and is the **leading cause of death amongst vaccine-preventable diseases**.<sup>16</sup>



<sup>1</sup> As of 2013



## In Canada

Influenza cases peak during our November to March 'flu' season.<sup>18</sup>

Influenza has been reported to cause an average of 12,200 hospitalizations annually.<sup>19</sup>

Influenza has been reported to cause an average of 3,500 influenza-related deaths annually.<sup>20</sup>

Although most Canadians do not perceive influenza as a serious threat, (perhaps because most 'flu' cases experienced are mild<sup>21</sup>), it can lead to severe illness resulting in hospitalization or death and can be particularly hazardous to young children and adults over 65.<sup>22</sup> This is because these populations are at an increased risk of secondary complications such as pneumonia.<sup>23</sup> Older adults, in particular, are at increased risk due to the potential worsening of their underlying chronic medical conditions.<sup>24</sup>

The burden of influenza is also a challenge to assess because its related complications and exacerbating effects are often not linked to the original influenza or influenza-like illness.<sup>25</sup> Furthermore, it is difficult to determine whether mortality is related to influenza because people are not

always tested for influenza when seeking medical attention. In addition, people who do seek medical attention may do so specifically for a secondary complication or an exacerbation of a pre-existing condition, and these visits may never be attributed to influenza, despite its role in the complication.<sup>26</sup> Influenza also has a serious economic impact on work productivity,<sup>27</sup> leading to an estimated 1.5 million lost work days each year.<sup>28</sup>

Influenza also has a serious economic impact on work productivity,<sup>27</sup> leading to an estimated 1.5 million lost work days each year.<sup>28</sup>

Respiratory infections (including influenza, colds, and other respiratory infections) have the second-highest indirect costs in Canada totalling \$2.8 billion in 2008 alone.<sup>29</sup>

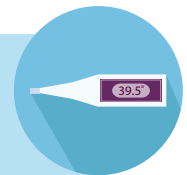
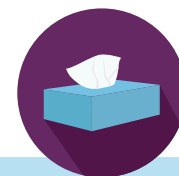
Respiratory infections (including influenza, colds, and other respiratory infections) have the second-highest indirect costs in Canada totalling \$2.8 billion in 2008 alone.<sup>29</sup>

### What is Influenza? How Does it Work?

Influenza, or the 'flu', is caused by two types of **constantly mutating** viruses – influenza A and influenza B,<sup>30</sup> and typically infects the nose, throat, and lungs.<sup>31</sup> It is most contagious when you have symptoms such as sneezing, coughing, or anything that may send the virus into the air. It is thought that the 'flu' can also be spread if people touch doorknobs, phones, remotes, or someone else's hands who has influenza.<sup>32</sup>

The influenza virus is able to mutate, or change, very quickly – which is why there are constantly new strains that emerge throughout the influenza season.<sup>33</sup>

Some of the symptoms of influenza include a fever of over 38°C, achy muscles, chills and/or sweats, headache, dry and persistent cough, fatigue/weakness, nasal congestion, and a sore throat.<sup>34</sup>



## Populations at Higher-Risk for Influenza

Canada's National Advisory Committee on Immunization (NACI) and Public Health Ontario (PHO) consider those living with chronic conditions to be at increased risk of influenza-related complications including hospitalizations and death.

Those living with the following chronic conditions are considered at increased risk

- Heart or lung conditions (including asthma and chronic obstructive pulmonary disorder)
- Diabetes
- Conditions that compromise the immune system, especially cancer
- Kidney disease
- Dementia
- History of stroke
- Blood disorders
- Neurologic and neurodevelopmental conditions
- Morbid obesity (Body Mass Index (BMI)>40).<sup>35, 36</sup>

Other groups at increased risk for complications of influenza<sup>37</sup>

- People over 65
- Children under 5
- Pregnant women
- Indigenous individuals
- Long-term care residents

In Ontario, over 65% of those who had a reported direct influenza complication had one or more underlying medical risk factors.<sup>38</sup>

In Ontario, over 65% of those who had a reported direct influenza complication had one or more underlying medical risk factors.<sup>38</sup> Research has found that patients living with cardiovascular disease have an increased risk of adverse events from influenza infection including pneumonia, heart attacks, hospitalizations, and death.<sup>39,40,41</sup> It is further thought that some of the costs associated with treating heart disease in general may be due to the increased hospitalizations due to cardiovascular complications that occur during the influenza season.<sup>42</sup>

Obesity, defined as having a Body Mass Index (BMI) over 30, has been found to be associated with an increased risk of complications due to influenza including respiratory-related hospitalizations.<sup>43</sup> The association was most strongly related to respiratory conditions including pneumonia and influenza, other acute respiratory diseases, and chronic lung diseases.<sup>44</sup>

People living with diabetes are also considered to be at increased risk for influenza-related complications.<sup>45</sup> People living with diabetes have been found to be more likely to be hospitalized and die.<sup>46</sup> Diabetes may weaken the immune system and make it harder to fight off infections, while it may also make it harder to control blood sugar.<sup>47</sup>

Chronic lung diseases, neuromuscular diseases, neurological diseases, cancer and chronic kidney diseases are also associated with an increased risk of death from influenza.<sup>48</sup> Those with chronic lung diseases and chronic obstructive pulmonary disease, who also have influenza, experience increased risk of death, hospital admission and admission to an intensive care unit, respectively.<sup>49</sup>

### **A Disproportionate Influenza Burden for those Over 65**

In Canada, the prevalence of high-risk medical conditions for influenza complications (i.e. heart disease, lung diseases, diabetes, cancer, or kidney diseases)<sup>ii</sup>, increases dramatically with age. For those aged 20-64, approximately 30% have one of these medical conditions, this rises to approximately 53% of those over age 50, and to over 70% amongst those over 65.<sup>50</sup>

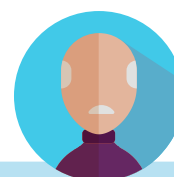
The presence of chronic conditions increases the likelihood of complications from influenza, including increased hospitalizations and higher mortality rates.<sup>56</sup> For those who were hospitalized with influenza, over 65% had an underlying condition; while approximately 85% of those who died from complications, had underlying risk factors.<sup>57</sup>

For those who were hospitalized with influenza, over 65% had an underlying condition; while approximately 85% of those who died from complications, had underlying risk factors.<sup>57</sup>

## Why Are Older Adults Particularly Vulnerable to Influenza? Introducing the Concept of Immunosenescence.

Older adults naturally have diminished immune system functioning as they age, and are more likely to contract influenza and less likely to respond well to the vaccine.<sup>51</sup>

Immunosenescence refers to changes that occur in the immune system as people age, which results in an increased risk of infectious disease and decreased protection from vaccination.<sup>52</sup> There have been attempts to better address the lack of effectiveness in adults over 65 including using new vaccines that have been developed to address the changes in immune function.<sup>53</sup> Another way to increase protection for individuals over 65, is indirectly through herd immunity (i.e. vaccinating those around them).<sup>54</sup>



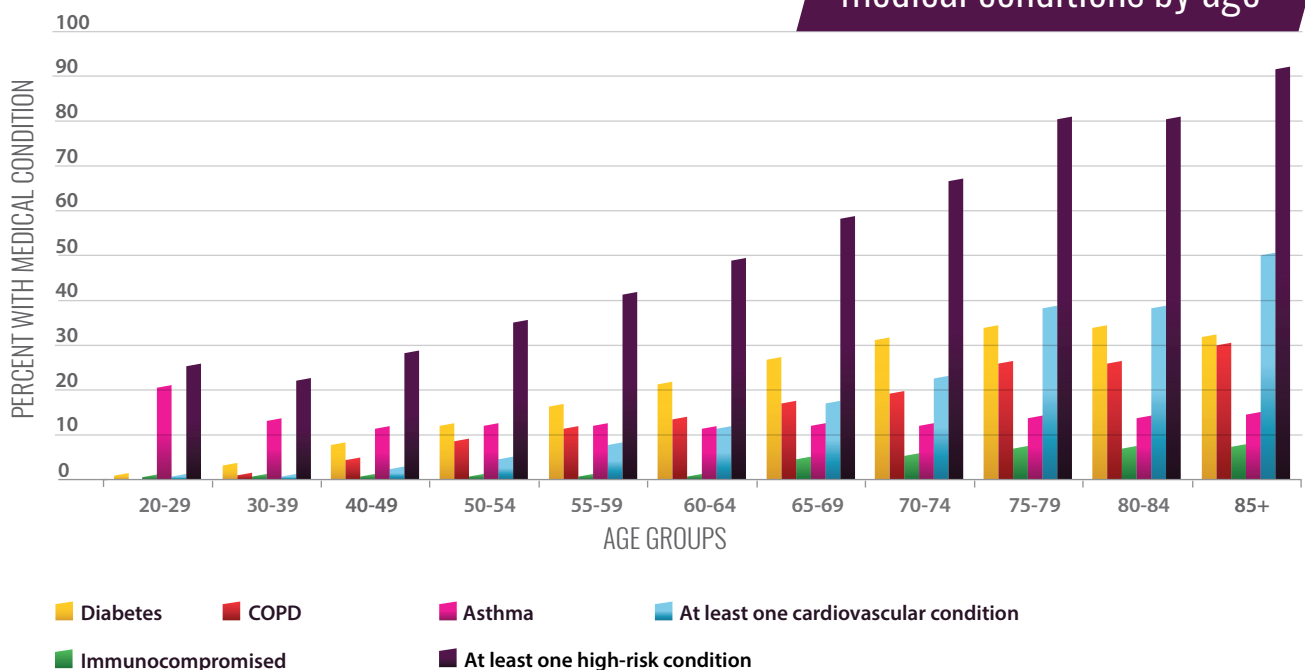


The highest rates of complications have been reported in those over 70 with an underlying condition.<sup>58</sup>

Influenza increases the risk of hospitalization amongst older adults, which can be devastating for their health. Any hospitalization (due to ‘flu’ or in general) can severely affect an older adult’s ability to live independently because functional decline can occur very quickly during a hospital stay.<sup>59</sup> Studies have found that as many as one-third of older adults leave hospitals with a reduced ability to carry out their activities of daily living.<sup>60</sup>

Indeed, it has been shown that prolonged stays in hospitals can lead to a ‘cascade of dependency’ where immobility leads to poor outcomes including significant functional loss that in some cases requires older patients to have additional rehabilitative care or to move to a long-term care home.<sup>61</sup> The decline of independence and functional ability among older patients while in hospital can be exacerbated by influenza. It has been found that influenza can impact a person’s ability to perform their activities of daily living, as well as cause weight loss, pressure ulcers, and infections.<sup>62</sup>

Figure 1: Prevalence of selected medical conditions by age



## Vaccination – A Public Health Success Story

Some of the challenges of improving influenza vaccination rates may ironically be due to the public health success of vaccinations in general. Vaccines have been estimated to prevent 2-3 million deaths annually worldwide.<sup>63</sup>

Vaccines have been estimated to prevent 2-3 million deaths annually worldwide.<sup>63</sup>

It is because of how well vaccines work that people have forgotten how severe many once common diseases were. This is especially true for diseases that have been entirely or almost completely eradicated. However, more frequent travel of people around the world means that some of these diseases that were once eradicated may make their way back into Canada as they are just a 'plane ride away' (e.g. polio).<sup>64</sup>

### Eradicating Smallpox through Vaccination

Smallpox was an infectious disease that caused painful, red blisters, with epidemics killing millions of people worldwide, including over 3,000 Canadians annually.<sup>65</sup> The smallpox vaccine was the first that was widely used and smallpox became the first human infectious disease to be eradicated, back in 1979.<sup>66</sup> Smallpox was easier to target because it had very distinct clinical features that were well recognized and feared.<sup>67</sup> Smallpox remains the only human infection to ever be eradicated.<sup>68</sup>

## How do Vaccines Work?

In general, vaccines use a tiny amount of dead or weakened virus/bacteria or toxin. This helps the body to build 'antibodies' which are like memories in the immune system.<sup>69,70</sup> Vaccines do not cause the disease itself, because the virus they use is too weak to cause harm, but strong enough that the immune system's reaction to it will help it protect against infection later.<sup>71</sup> Humans naturally form immunity when infected with influenza, but because the virus changes rapidly, previous infection is usually not effective in preventing or lessening the severity of influenza in the future.<sup>72</sup> There are some vaccines that protect against one disease with a single injection (i.e. influenza vaccine) and there are some vaccines that cover multiple diseases with a single injection (i.e. measles, mumps, and rubella).<sup>73</sup>

## Herd Immunity

Vaccines are not only a protection mechanism for an individual, but they can also help an entire population through 'herd immunity' or 'community immunity'.

This occurs when there are enough people in the community immunized against a disease that there is an overall decrease in the risk of the disease for everyone.<sup>74</sup> Vaccination protects you from getting sick if you are exposed to the influenza virus, which then protects others because you are less likely to spread the virus.<sup>75</sup>

Herd immunity is particularly important as it protects vulnerable groups who cannot yet be immunized, such as infants (who cannot be immunized before 6 months of age), cancer patients undergoing chemotherapy, the older adults who are more likely to experience immunosenescence, and other people who cannot be immunized for medical reasons.<sup>76</sup>

## The Influenza Vaccination – Still Our Best Defence Against Influenza

Vaccination is the best defence against influenza.<sup>83</sup>

Vaccination is the best defence against influenza.<sup>83</sup> Public health agencies all over the world recommend influenza vaccination as a key defence against the 'flu'. The World Health Organization (WHO) recommends that pregnant women, children aged 6-23 months old, older adults and people living with chronic conditions should be priority groups for vaccination.<sup>84</sup>

### How does the Influenza Vaccine get to the Providers in Canada?



First, the World Health Organization (WHO) determines which virus is most likely to cause infection in the upcoming season.<sup>77</sup> Then the WHO distributes the strains and reagents to the influenza vaccine manufacturers and continuously monitors the quality of the vaccine that is produced for distribution.<sup>78</sup>

Influenza vaccine manufacturers across North America and Europe participate in safety checks and processes before their vaccines are distributed.<sup>79</sup> The Government of Canada purchases influenza vaccines for the provinces and territories through Public Works and Government Service Canada.<sup>80</sup> The Public Health Agency of Canada (PHAC) helps coordinate the distribution of the vaccines and works with a Federal/Provincial/Territorial (FPT) committee to address vaccine supply issues.<sup>81</sup> PHAC carries out surveillance for any adverse effects from the vaccine.<sup>82</sup>

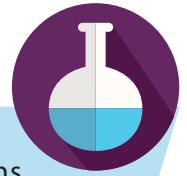
It also recommends that health care providers (HCPs) be vaccinated as they are potential sources of influenza infection<sup>85</sup> and are more likely to be in contact with individuals at higher risk, such as infants, older people and people living with chronic conditions. HCPs and people who live with children also have an increased risk of contracting influenza.<sup>86</sup> HCPs may develop asymptomatic or very mildly symptomatic infections, which is particularly problematic because they may not appear sick, but are still able to pass it to the vulnerable people (i.e. frail elderly) they care for.<sup>87</sup>

### **Why Do We Need to Get a 'Flu Shot' Every Year?**

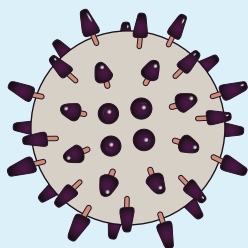
The influenza vaccine differs from other vaccinations because the circulating viruses mutate each season (and throughout the season). This means that every year a new vaccine is created for the upcoming influenza season.<sup>88</sup> The effectiveness of the influenza vaccine depends on how well the World Health Organization selecting the vaccine strains predicts what viruses will be present that season, and how much the influenza viruses mutate in the six months it takes to make influenza vaccines. Overall, influenza vaccine effectiveness is about 60% in healthy adults.<sup>89</sup> However, it varies substantially from year to year, and differs for different strains. For example, it has been found that vaccine effectiveness varied from 10% to 60% between 2004-2005 and 2016-2017.<sup>90</sup>

In addition, the effectiveness of the vaccine wanes over time. It has been found that as the time since the influenza vaccine was administered increases, the effectiveness of the vaccine decreases.<sup>91</sup>

## How the Influenza Vaccine Works



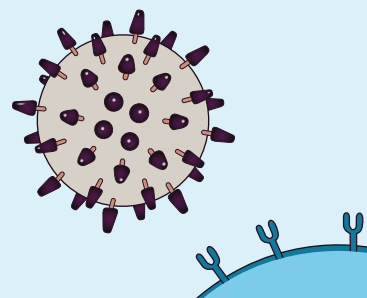
Influenza viruses are covered by proteins called 'hemagglutinins', which have a head and a stalk portion. If the head of the hemagglutinin locks onto a human cell, it can enable the influenza virus to spread by replicating itself. The influenza vaccine uses a dead or weakened version of the flu virus to get the immune system to produce antibodies, which are Y-shaped molecules.<sup>92</sup> Antibodies bind to the head of the hemagglutinin, which then stops it from being able to infect our cells.<sup>93</sup> It is the head of the hemagglutinin that changes every year and this is what we have to vaccinate against.<sup>94</sup> This means that the antibodies that our body made last year after receiving the influenza vaccine (or being infected by influenza) may no longer be effective, and this can cause us to still be susceptible to getting sick from this year's upcoming strains of influenza.<sup>95</sup>



The flu virus is a sphere covered by numerous proteins known as **hemagglutinin**, which resembles a lollipop.

96

The flu shot prompts our bodies to make **antibodies**, which block the hemagglutinin head from locking into our cells, preventing illness.



## What are the Different Types of Influenza Vaccines

### The Influenza Vaccine - How is it Made?

Each year, extensive research is conducted by scientists to determine which influenza strains are most likely to occur in the upcoming influenza season and then the vaccine is formulated to protect against those strains.<sup>97</sup>

Most influenza vaccinations are made to protect against three viruses: an influenza A (H1N1) virus, an influenza A (H3N2) virus, and an influenza B virus.<sup>98</sup> These are called 'trivalent' vaccinations. There are also 'quadrivalent' influenza vaccinations which are designed to protect against four different influenza viruses.<sup>99</sup>

### Inactivated Influenza Vaccines (IIV)

In this vaccine, the influenza virus has been killed; there are both trivalent (protects against three strains of influenza) and quadrivalent (protects against four strains of influenza) versions.<sup>100</sup>

### Adjuvanted, Inactivated Influenza Vaccines

These vaccines include an adjuvant, which is a substance that aims to elicit a stronger immune response in the recipient.<sup>101</sup> This type of vaccine is targeted to those 65 and over.<sup>102</sup>

### High-dose Inactivated Influenza Vaccine

The high-dose influenza vaccine contains the three influenza strains that are predicted for the upcoming influenza season.<sup>103</sup> The high-dose vaccine contains four times the amount of dose of the standard-dose influenza vaccine. This vaccine is being targeted to those over age 65.<sup>104</sup>

### Live Attenuated Influenza Vaccine

This vaccine is made from weakened influenza viruses and is given through a nasal spray and is approved for those aged 2-59.<sup>105</sup>



## New and Emerging Findings



The high-dose influenza vaccine aims to encourage the body to create a stronger response, which is why it is being made available for people over 65 who tend to respond less strongly to the flu vaccine.<sup>106</sup> Although there are still ongoing investigations into the efficacy of this influenza vaccine, a recent study from 2014 has found that the high-dose vaccine is 24.2% more effective than the standard-dose vaccine in individuals over 65.<sup>107a</sup> In a recent US study, it was found that the high-dose vaccine reduced respiratory hospital admissions for those over age 65.<sup>107b</sup>

Manitoba is funding the vaccination for those over 65 living in long-term care homes.<sup>109</sup> Ontario has recently announced that beginning in the 2018-19 influenza season they will be funding the high-dose influenza vaccine for all Ontarians over 65.<sup>108</sup>



## Spotlight on Current Research around the Influenza Vaccine in Canada

### **INVESTED – Influenza Vaccine to Effectively Stop cardio Thoracic Events and Decompensated heart failure Trial** <sup>110</sup>

Influenza can lead to many complications and/or death in those living with heart disease. It has been found that influenza-related death is more common in individuals living with heart disease than individuals living with any other chronic condition. People who have heart disease who then get influenza are more likely to have a heart attack. Those who have heart failure are more likely to be hospitalized. Vaccination has been shown to reduce the risk of major cardiac events.<sup>111</sup> Furthermore, there is already some evidence to suggest that the high-dose vaccine can decrease the likelihood of influenza infection for individuals living with heart disease.

The INVESTED trial taking place across the United States and Canada is looking to determine which of the two formulations of influenza vaccine, either

the standard quadrivalent influenza vaccine (QIV) or the high-dose trivalent influenza vaccine (TIV), is more effective at reducing death and heart/lung disease-related hospital admissions.

The INVESTED trial is enrolling individuals over 18 with at least one heart disease risk factor and a history of a heart attack (within the past year) or prior hospitalization for heart failure (within the past 2 years). The trial will randomly assign participants to either receive the standard QIV vaccine (or receive the high-dose TIV form of the vaccine or receive the high-dose form of the vaccine.<sup>iii</sup> This is a high-dose trivalent vaccine that is currently available for those over 65 but is considered investigational for anyone younger than 65.

For more details about the INVESTED Trial please visit <http://www.investedtrial.org/>.

## Influenza Vaccination Internationally

# Canada's influenza vaccination rate<sup>iv</sup> for older adults over 65 is lower than other developed countries

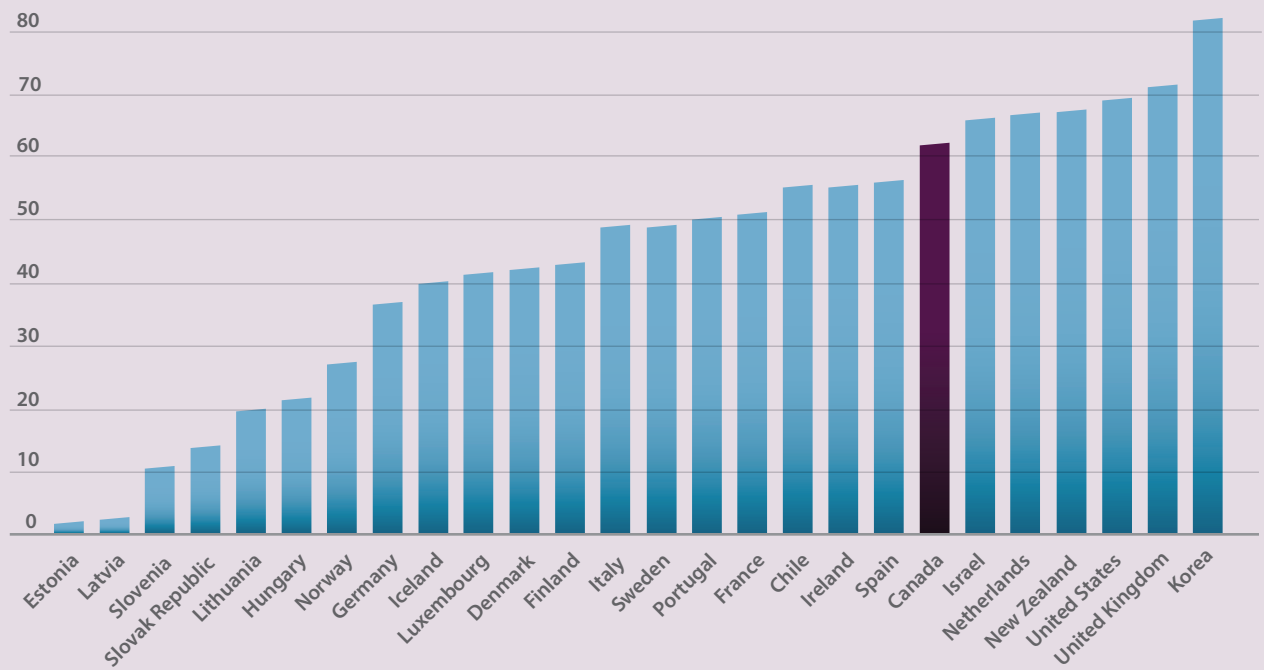
Canada's influenza vaccination rate<sup>iv</sup> for older adults over 65 is lower than other developed countries such as New Zealand, the United States, and the United Kingdom, and is almost 20% below that of South Korea, which has the highest achieved vaccination rates.<sup>112</sup> It is important to note that no country, other than South Korea, has achieved the World Health Organization (WHO) recommended target influenza vaccination rate of 75% for older adults.<sup>113</sup> Although Canada is among the top 10 OECD nations, its rate has been significantly falling compared to other OECD countries.<sup>114</sup>

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<sup>iv</sup>The OECD Indicator for influenza refers to vaccination rates amongst the elderly, defined as the number of people over age 65 who are vaccinated against influenza in a given country

Only 59% of WHO member countries reported having a national influenza immunization policy (as of 2014).<sup>116</sup> Among those countries that did have a national policy in place, their programs targeted specific risk groups (as defined by the WHO) including pregnant women, young children, those living with chronic conditions, older adults, and health care workers.<sup>117</sup> High or upper middle income countries were more likely to have a national policy.<sup>118</sup> In addition, these countries were more likely to have introduced national policies around other vaccines.<sup>119</sup>

Figure 2: % of the population over 65 who have received a vaccination for OECD countries<sup>115</sup>



## Other Means of Prevention

### Immunization alone is not enough.

Immunization alone is not enough. In addition to influenza vaccination, there are other important steps that may prevent influenza from spreading. These include:

- Regular and thorough hand-washing
- Coughing into sleeves
- Avoiding touching one's face with their hands
- Disinfecting commonly touched surfaces (i.e. doorknobs)
- Strengthening one's immune system (i.e. through healthy eating and physical activity)
- Avoiding interactions with others who are feeling ill<sup>120</sup>

All of these measures will help prevent the spread of not only influenza, but other infections and illnesses as well.

Antiviral medications can also be used to control cases of influenza. The Association of Medical Microbiology and Infectious Disease Canada (AMMI Canada) recommends that treatment with antivirals begin as soon as possible after symptoms occur, with better effects if started within 12 hours (versus 48 hours).<sup>121</sup>

AMMI also supports the selective use of antivirals for prophylaxis, for example using them to protect high-risk groups who cannot be vaccinated.<sup>122</sup> The Ministry of Health and Long-Term Care in Ontario recommends that residents of long-term care homes, their families, formal caregivers, and visitors be educated on vaccination policies and recommendations, including education in proper hygiene.<sup>123</sup> There are policies that recommend wearing masks to control the spread of influenza – especially for those who may be infected asymptomatically and for the protection of those who are unvaccinated.<sup>124</sup>

## Vaccination Policies and Outcomes in Canada

### The State of Influenza Vaccination Policies and Outcomes in Canada

Influenza vaccination is recommended for all Canadians over 6 months of age – with particular recommendations for groups that are at higher risk of influenza complications or hospitalizations (i.e. those over 65, pregnant women, and those living with chronic conditions).<sup>125</sup>

In Canada, 7 provinces and all territories now provide universal funding for influenza vaccination coverage. The provinces that currently still do not provide universal funding are: British Columbia, Quebec, and New Brunswick.<sup>126</sup>

The provinces that currently still do not provide universal funding are: British Columbia, Quebec, and New Brunswick.<sup>126</sup>

In these provinces, the influenza vaccine is funded for people living with certain chronic conditions (i.e. cardiovascular disease, asthma, diabetes) and for all adults over 65.<sup>127</sup> Ontario was the first province to implement a large-scale Universal Influenza

Immunization Program (UIIP), which was found to be associated with decreased mortality, hospitalizations, emergency department use, and doctor's office visits when compared to other provinces in Canada.<sup>128</sup> The Ontario program was found to be cost-effective because it reduced reported influenza cases, and the use of health services such as physician visits, hospitalizations and mortality.<sup>129</sup>

Canada's provinces and territories also differ in how they deliver influenza vaccination. In general, vaccination is offered at doctor's offices, flu clinics, public health centres, workplaces, schools, hospitals, institutions, and pharmacies. Enabling pharmacists to offer influenza vaccinations is a relatively new initiative in Canada, which was designed to improve access and uptake. Alberta and British Columbia introduced this policy for pharmacists during the 2009-10 influenza season, New Brunswick in 2010-11, Ontario in 2012-13, and Nova Scotia in 2013-14.<sup>130</sup> Pharmacists can now also administer influenza vaccines in Manitoba, Prince Edward Island, Newfoundland and Labrador, and Saskatchewan.<sup>131</sup> Pharmacists can now offer the influenza vaccination in 9 of Canada's provinces.

Pharmacists can now offer the influenza vaccination in 9 of Canada's provinces.

## Influenza Vaccination Policies by Province (2017-2018)

Influenza vaccines are provided at public health clinics, physician's offices, travel clinics, or pharmacies in certain provinces.<sup>120</sup>

Province/ Territory	Who can administer the influenza vaccination?	Universal Funding? <sup>133</sup>
Alberta	Alberta Health Services, family doctors & pharmacists <sup>134</sup>	<b>Yes</b>
British Columbia	Public health clinics, pharmacies, physician's offices, and travel clinics <sup>135</sup>	<b>No</b> But, funded for: <ul style="list-style-type: none"> <li>◦ Persons with morbid obesity</li> <li>◦ Indigenous people</li> <li>◦ Children under 5</li> <li>◦ Pregnant women</li> <li>◦ Persons 65 and older</li> <li>◦ Residents of nursing homes or chronic care homes</li> <li>◦ Health care workers</li> <li>◦ Household contacts of people at high-risk</li> <li>◦ Persons with weakened immune systems</li> <li>◦ Essential community services (i.e. first responders)</li> <li>◦ People living with chronic conditions such as: cardiac, pulmonary, diabetes, asthma, renal, liver, anaemia or hemoglobinopathy, HIV patients, immunosuppression and cancer, neurologic or neurodevelopmental conditions</li> </ul>
Manitoba	Public health offices, doctor's offices, pharmacies, immunization clinics <sup>136</sup>	<b>Yes</b> Starting in the 2017-18 influenza season, Manitoba is funding the high-dose influenza vaccine for people over 65 who are in long-term care homes. <sup>137</sup>

## Influenza Vaccination Policies by Province (2017-2018)

Influenza vaccines are provided at public health clinics, physician's offices, travel clinics, or pharmacies in certain provinces.<sup>120</sup>

Province/ Territory	Who can administer the influenza vaccination?	Universal Funding? <sup>133</sup>
New Brunswick	Primary care providers, Public health clinics (through nurses), and certified pharmacists <sup>138</sup>	<b>No</b> But, funded for: <ul style="list-style-type: none"> <li>◦ Persons with morbid obesity</li> <li>◦ Indigenous people</li> <li>◦ Children under 5</li> <li>◦ Pregnant women</li> <li>◦ Persons 65 and older</li> <li>◦ Residents of nursing homes or chronic care homes</li> <li>◦ Health care workers</li> <li>◦ Household contacts of people at high-risk</li> <li>◦ Persons with weakened immune systems</li> <li>◦ People living with chronic conditions such as: cardiac, pulmonary, diabetes, asthma, renal, liver, anaemia or hemoglobinopathy, HIV patients, immunosuppression and cancer, neurologic or neurodevelopmental conditions</li> </ul>
Newfoundland and Labrador	Public health, health care, occupational health services and physician's offices <sup>139</sup>	<b>Yes</b>
Northwest Territories	Nurses or doctors <sup>140</sup>	<b>Yes</b>
Nova Scotia	Pharmacies, doctor's offices, Public Health clinics, and in some workplaces <sup>141</sup>	<b>Yes</b>
Nunavut	Community Health Centres or Iqaluit Public Health <sup>142</sup>	<b>Yes</b>

## Influenza Vaccination Policies by Province (2017-2018)

Influenza vaccines are provided at public health clinics, physician's offices, travel clinics, or pharmacies in certain provinces.<sup>120</sup>

Province/ Territory	Who can administer the influenza vaccination?	Universal Funding? <sup>133</sup>
Ontario	Pharmacies, doctor's offices, public health units, workplaces, long-term care homes, hospitals, and community health centers <sup>143</sup>	<p><b>Yes</b></p> <p>Starting in the 2018-19 influenza season, Ontario will fund the high-dose influenza vaccine for adults over 65.<sup>144</sup></p>
Prince Edward Island	Flu vaccination clinics, pharmacists, family physicians, or nurse practitioners <sup>145</sup>	<p><b>Yes</b></p>
Quebec	Integrated health and social service centre update where vaccinations will be offered <sup>146</sup>	<p><b>No</b></p> <p>But, funded for:</p> <ul style="list-style-type: none"> <li>◦ Persons with morbid obesity</li> <li>◦ Indigenous people</li> <li>◦ Pregnant women</li> <li>◦ Children (6-23 months)</li> <li>◦ People over age 60</li> <li>◦ Residents of nursing homes or chronic care facilities</li> <li>◦ Health care workers</li> <li>◦ Household contacts of people at high-risk</li> <li>◦ Persons with weakened immune systems</li> <li>◦ Persons at risk travelling to destinations where influenza is likely circulating</li> <li>◦ People living with chronic conditions such as: cardiac, pulmonary, asthma, diabetes, renal, liver, anemia or hemoglobinopathy, HIV patients, and immunosuppression and cancer</li> </ul>



## Influenza Vaccination Policies by Province (2017-2018)

Influenza vaccines are provided at public health clinics, physician's offices, travel clinics, or pharmacies in certain provinces.<sup>120</sup>

Province/ Territory	Who can administer the influenza vaccination?	Universal Funding? <sup>133</sup>
Saskatchewan	Public health clinics, pharmacies, physician's and nurse practitioner's offices <sup>147</sup>	Yes
Yukon	Community health centres <sup>148</sup>	Yes



Research has found that in provinces where pharmacists are able to administer the influenza vaccine, more people are vaccinated.<sup>149</sup>

Research has found that in provinces where pharmacists are able to administer the influenza vaccine, more people are vaccinated.<sup>149</sup> Pharmacists have successfully increased access to the vaccine as they are conveniently located and accessible to many individuals, and are more likely to have longer hours, not require an appointment, and have shorter wait times.<sup>150,151,152</sup> The pharmacy option may be especially effective among those in some high-risk populations who may be averse to visiting doctor's offices and prefer to visit pharmacies, such as smokers.<sup>153</sup>

## **Influenza Vaccination Policies for Residents/Patients in Institutions**

Health Canada recommends that in acute and long-term care settings, influenza vaccination should be part of patient care plans.<sup>154</sup> Furthermore, when transferring patients, information about their vaccinations should also be provided to the institution they are being sent to.<sup>155</sup>

The Ministry of Health and Long-Term Care (MOHLTC) in Ontario supports the use of influenza vaccines as its main preventive measure against influenza in long-term care homes (LTCHs) and recommends that all LTCH residents should be vaccinated.<sup>156</sup> A study found an almost 20% reduction in outbreaks in LTCHs when over 90% of residents were vaccinated versus homes where fewer than 70% of residents were vaccinated.<sup>157</sup> The MOHLTC also recommends influenza vaccination for all visitors to LTCHs.<sup>158</sup>

In 2012, health authorities in British Columbia were the first to implement a “vaccine-or-mask” policy.<sup>159</sup> This policy requires all employees of the health authorities, students, physicians, residents, contractors, vendors, and volunteers to be immunized or to be masked during influenza season.<sup>160</sup> This policy has further been expanded to include all visitors in health care facilities.<sup>161</sup> All staff must report through an online reporting system whether they have been vaccinated.<sup>162</sup>

## Vaccination Rates in Canada

### Current Influenza Vaccination Rates in Canada – Not Up to Our Own Standards

Only 29% of Canadians aged 12<sup>v</sup> and over were vaccinated against influenza,<sup>163</sup> significantly lower than the Canadian government target of 80%.

Only 29% of Canadians aged 12<sup>v</sup> and over were vaccinated against influenza,<sup>163</sup> significantly lower than the Canadian government target of 80%. Vaccination rates in key at-risk groups such as older adults (62%) and people living with one or more chronic conditions (47%) are higher than the average among the general population.<sup>164</sup> However, declining vaccination rates among older adults in every province except Newfoundland and Labrador is a worrying trend.<sup>165</sup>

Among Canada's provinces and territories, Nova Scotia consistently achieves the highest overall vaccination coverage – with increases from 40% in 2006-07 to 45% in 2013-14.<sup>166</sup>

Among Canada's provinces and territories, Nova Scotia consistently achieves the highest overall vaccination coverage – with increases from 40% in 2006-07 to 45% in 2013-14.<sup>166</sup> Quebec has the lowest coverage<sup>v</sup> and Ontario's influenza vaccination rates decreased from 37% in 2006-07 to 33% in 2013-14.<sup>167</sup> Coverage was stable in all income groups (32%) except for the lowest quartile who experienced a drop in coverage to 27%.<sup>168</sup> Coverage was further found to be much higher in provinces that have universal funding provisions.<sup>169</sup>

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<sup>v</sup> Using data from 2007-14

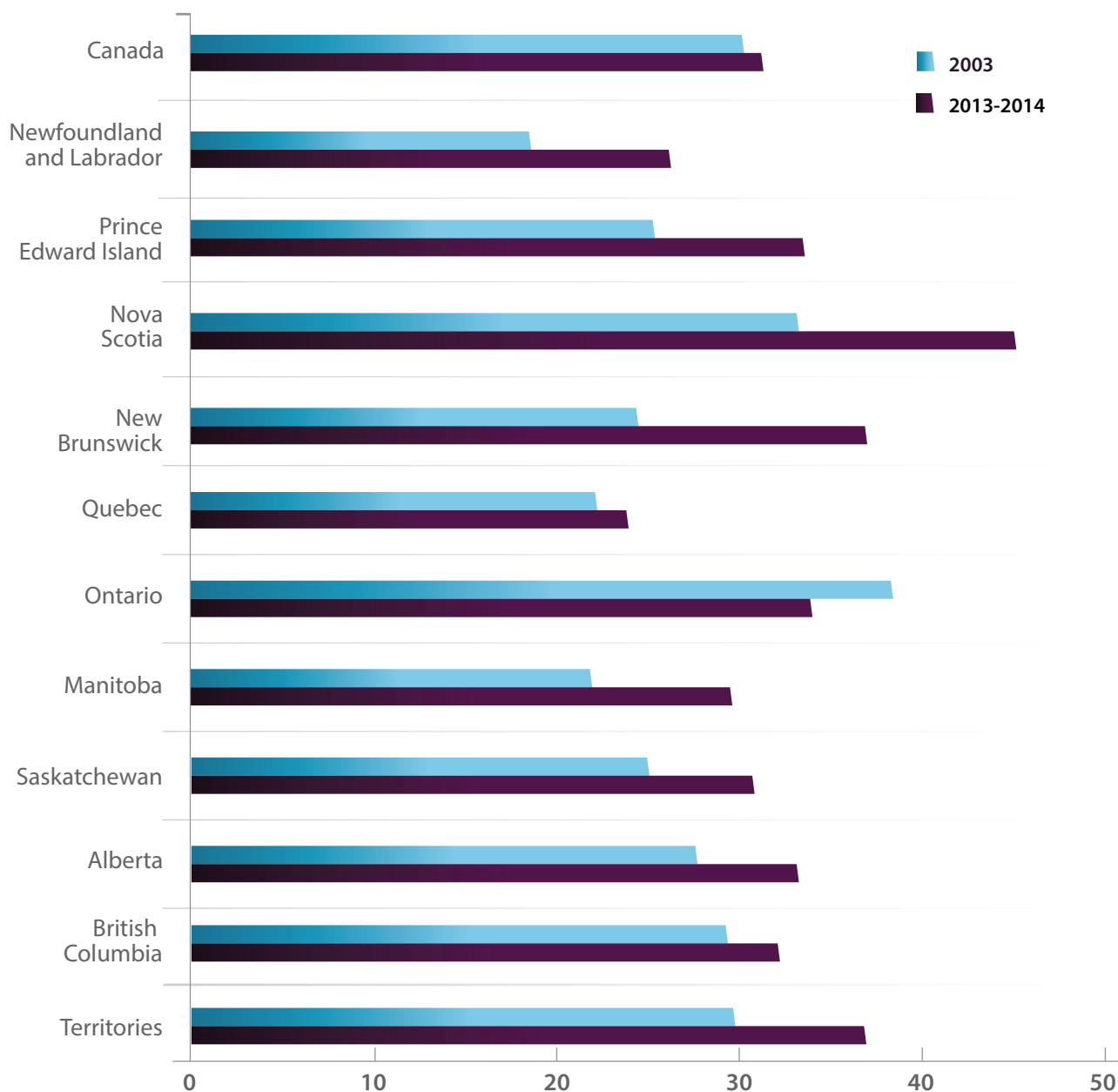
Older Canadians have higher coverage rates, with those over 85 and those living with a chronic condition having the highest coverage, at 74%.<sup>170</sup> Despite this success, vaccination rates are decreasing for those over 65 (between 2006-07 and 2013-14, it declined from 69% to 60%), and by 11% for those over 85.<sup>171</sup> Individuals living with at least one chronic condition are more likely to be vaccinated than those without chronic conditions.<sup>172</sup> In New Brunswick, older adults who were vaccinated increased from approximately 57% in 2003 to 63% in 2013-14.<sup>173</sup> However, these rates decreased in Ontario, Saskatchewan, and British Columbia over the same decade.<sup>174</sup> Specifically, for those over 65 with a chronic condition, the influenza vaccination rate increased in Atlantic and Prairie Provinces from 2003 to 2013-14, but decreased in Ontario.<sup>175</sup> Newfoundland and Labrador was the only province that did not see a decrease in flu vaccination coverage for those over 65.<sup>176</sup>

In one Canadian study, all ethnic groups (except Black Canadians) were more likely to have received influenza vaccination than Caucasian Canadians.<sup>177 178</sup> This may be due to certain groups or populations having a higher likelihood of being exposed to specific anti-vaccination messages and media.<sup>179</sup>

In another study, older adults receiving social assistance and benefits were more likely to be vaccinated than people who were employed.<sup>180</sup> A possible explanation for this is that these groups may have been specifically targeted to receive influenza vaccination.<sup>181</sup> Another reason could be that high-risk groups are more likely to be given free influenza vaccination regardless of whether there is universal funding in that province, and individuals on social assistance are more likely to be living with comorbidities.<sup>182</sup>

### Flu Vaccination Rates in Canada 2003 and 2013-14.<sup>183</sup>

Chart: Age-standardized<sup>1</sup> flu vaccination<sup>2</sup> rates, population aged 12 & over, Canada, provinces & territories<sup>3</sup>, 2003 & 2013-2014



1. The data was age-standardized to the age structure of the Canadian respondents of the 2013-2014 Canadian Community Health Survey.

2. Refers to the Canadians who received a flu vaccination within 12 months prior to responding to the survey.

3. The three territories were combined to produce a large enough sample size to compare 2003 and 2013-14 data.

Notes: The differences are statistically significant between the 2003 and 2013-14 estimates for each province and the territories (p<0.05). Sources: Statistics Canada, 2003 and 2013-14, Canadian Community Health Surveys

## Health Care Provider Influenza Vaccination Policies in Canada

The Government of Canada requires that health care workers have their vaccination status assessed, as well as receive recommended vaccines, and booster doses as needed.<sup>184</sup> All health care workers in Canada are recommended to receive vaccinations against tetanus/diphtheria, pertussis, hepatitis B, measles, mumps, rubella, and varicella.<sup>185</sup>

Influenza vaccination policies for health care providers vary widely across Canada and have often been met with controversy. The first policies requiring influenza vaccination as a 'condition of service' in long-term care homes were introduced in Ontario in 1998, and extended to acute care hospitals across Ontario in 2000.<sup>186</sup> These policies require employees who are not vaccinated to take antiviral prophylaxis or not work during institutional outbreaks.<sup>187</sup>

More recently, health care institutions have started to consider and implement policies that increase health care worker influenza vaccination. Many hospitals in the

United States now require influenza vaccination as a condition of employment, and other institutions have implemented 'vaccinate-or-mask' policies, which require that health care workers who are not vaccinated wear a mask in clinical care areas of the hospital during periods of epidemic influenza activity.<sup>188</sup> As of 2014 in Canada, at least one long-term care home mandates annual influenza vaccinations for all of its health care workers.<sup>189</sup> All health authorities in British Columbia, one of two health authorities in New Brunswick, and some hospitals in Ontario have implemented vaccinate-or-mask policies.<sup>190</sup>

Studies have shown that based on current data, mandated influenza vaccination policies for health care workers are not yet warranted.<sup>191</sup> However, these researchers do agree with approaches to support voluntary vaccination or other practices such as staying home or wearing masks if symptomatic.

## Current Health Care Provider Influenza Vaccination Policies across Canada's Provinces and Territories

British Columbia	In 2012, British Columbia health authorities implemented a policy that required all health care workers in the province to either receive the influenza vaccine or wear a mask in patient areas for the entire influenza season. <sup>192</sup> A grievance was brought by the British Columbia Nurses Union; the arbitrator found the policy to be a reasonable exercise of management right. <sup>193</sup>
Alberta	Currently not required – but it is made accessible and convenient for staff. <sup>194</sup>
Saskatchewan	Currently not required. In 2014, the provincial government mandated a 'vaccinate or mask' policy – however, in 2015 the decision was made by The Medical Health Officers' Council of Saskatchewan to stop this policy. <sup>195</sup>
Manitoba	Currently not required – but influenza vaccination is strongly recommended for all health care workers. <sup>196</sup>
Ontario	Mandatory influenza vaccination policies would violate agreements between hospitals and the Ontario Nurses Association. No province-wide policy in regard to vaccination. Some hospitals have introduced 'vaccinate or mask' policies, including many of the Toronto Academic Health Science Network (TAHSN) hospitals. <sup>197</sup> An initial grievance by the Ontario Nurses Association against one hospital policy found in favour of the union <sup>198</sup> ; a second grievance is currently being heard <sup>199</sup> ; most hospitals have continued their policies pending the outcome of this hearing.
Quebec	Currently not required – and a refusal to be vaccinated cannot be considered negligence. <sup>200</sup>
Nova Scotia	Currently not required – but recommended and encouraged for health care workers. <sup>201</sup>
New Brunswick	One of the two regional health authorities has implemented a 'vaccinate or mask' policy. This policy was supported by the New Brunswick Nurses Union. They introduced a 'vaccinate or mask' policy in one of the regional health networks. <sup>202</sup> However, their provincial news release for the 2017 influenza season now states that the Department of Health encourages health care workers to receive the influenza vaccine. <sup>203</sup>
Newfoundland and Labrador	Currently not required – but recommended. <sup>204</sup>
Prince Edward Island	Currently not required – but recommended and made available to health care workers. <sup>205</sup>
Northwest Territories	Currently not required – but universally available to residents. <sup>206</sup>
Yukon	Currently not required – but it is highly recommended for health care professionals. <sup>207</sup>
Nunavut	Currently not required – but universally available to residents. <sup>208</sup>

## Vaccination Rates for Health Care Providers/Healthcare Facilities

### Health Care Provider Influenza Vaccination Rates in Canada

Vaccination rates for health care providers across Canada is 50%, well below the Canadian target level of 80%,<sup>209</sup> and vaccination rates vary widely between occupations.<sup>210</sup>

Vaccination rates for health care providers across Canada is 50%, well below the Canadian target level of 80%,<sup>209</sup> and vaccination rates vary widely between occupations.<sup>210</sup> Family physicians and general practitioners are more likely to be vaccinated, whereas chiropractors, midwives, and practitioners of natural healing are least likely to be vaccinated.<sup>211</sup> Midwives in particular have been found to have very low vaccination rates.<sup>212</sup>



As many organizations and facilities are still below targets for influenza vaccination rates, there has been mounting pressure to publicly disclose vaccination rates.<sup>213</sup> Health care facilities in Ontario, for example, are required to report their rates of influenza vaccination amongst their staff, and large variations between facilities can be found.<sup>vi</sup> During the 2016-17 flu season, approximately 53% of health care providers in hospitals were vaccinated, while 72.4% of health care providers in long-term care homes were vaccinated.<sup>214</sup>

During the 2016-17 flu season, approximately 53% of health care providers in hospitals were vaccinated, while 72.4% of health care providers in long-term care homes were vaccinated.<sup>214</sup>



<sup>vi</sup> under 'The Influenza Prevention and Surveillance Protocol for Long-Term Care Homes



## Influenza immunization rates among health care personnel, by occupation

Occupation	Flu shot in last 12 months, % (95% CI)
Specialist physician	59 (51-67)
Family physician or general practitioner	72 (65-79)
Dentist	44 (31-57)
Optometrist	32 (17-47)†
Chiropractor, midwife or practitioner of natural healing	4 (1-7)†
Pharmacist	50 (43-58)
Dietitian or nutritionist	61 (50-72)
Physiotherapist	44 (36-51)
Occupational therapist	51 (39-62)
Nurse	57 (55-60)
◦ Head nurse or supervisor	53 (45-62)
◦ Registered nurse	58 (55-60)
◦ Licensed practical nurse	59 (54-64)

**Note:**

CI = confidence interval.

\* As per Statistics Canada confidentiality rules, unweighted n values have been rounded to the nearest 5.

† Use with caution (coefficient of variation (16.6%–33.3%))

*Table adapted from:* Buchan, S.A. & Kwong, J.C. (2016). Influenza immunization among Canadian health care personnel: a cross-sectional study. *Canadian Medical Association Journal*, 4(3), E479- E488. Doi: 10.9778/cmajo.20160018

Long-term care homes in Ontario are also required to provide staff with annual information regarding vaccination rates, and to promote and implement accessible vaccination clinics for staff.<sup>215</sup> They must also keep records of influenza vaccination status, advise agencies providing staff to the care home on their vaccination policies and develop staffing plans based on vaccination rates.<sup>216</sup> The care home must also ensure that consenting residents receive their influenza vaccines.<sup>217</sup> The Occupational Health Service in hospitals in Ontario similarly must make the influenza vaccine accessible to health care workers through on-site vaccination clinics, mobile programs, and by ensuring all shifts/sites have access, among other methods.<sup>218</sup> They must then report the rate of vaccination among health care workers to the hospital Infection Prevention and Control Committee and Joint Health and Safety Committee, and the Medical Officer of Health every December.<sup>219</sup> They must also ensure all staff know the policies regarding antiviral use and that they may face work restrictions if there is an outbreak.<sup>220</sup> They are also required to keep documentation of the status of employees and any refusals must be documented.<sup>221</sup>

Other provinces have similar policies around reporting vaccination uptake among health care workers. Nova Scotia reports vaccination rates for health care workers in acute care hospitals.<sup>222</sup> Alberta provides rates for health care workers in acute care, long-term care, home care, and public health.<sup>223</sup> In British Columbia, all health care workers must report their influenza vaccination status and must report if a vaccination is declined.<sup>224</sup> Being vaccinated against influenza does not necessarily mean that the person will not contract influenza and potentially spread it to others. One study systematically reviewed studies of health care workers who cared for people over 65 and whether or not they received an influenza vaccine and found that providing the vaccine to health care workers who provided care for those over 65 may not necessarily decrease the number of individuals diagnosed with influenza.<sup>225</sup> This study reinforces that although important, vaccination cannot be solely relied upon to prevent influenza.<sup>226</sup> Other policies such as handwashing, asking workers to stay home if ill, or use of antivirals are still important.<sup>227</sup>

## A City Snapshot - How Toronto Health Care Facilities are Doing

Toronto requires reporting of influenza vaccination rates in its health care facilities.

Of the 18 acute care facilities in Toronto, none achieved the 80% target rate in 2016, with the closest facility reaching 68%.<sup>228</sup> Among 15 complex continuing care/rehabilitation facilities, 2 were able to reach the 80% target rate in 2016 (McCall Centre for Continuing Care and Runnymede Healthcare Centre).<sup>229</sup>

Toronto's long-term care homes have much greater variation, but many homes reached the target. Of 86 long-term care homes, 45 (52%) were able to reach 80%+ influenza vaccination coverage rates, with 17 (20%) able to reach 90% or above.<sup>230</sup>

Three homes in particular were able to reach 99% vaccination rates (Yee Hong Centre for Geriatric Care, Rose of Sharon Korean Long-Term Care and the Mon Sheong Home for the Aged).<sup>231</sup> In two of these homes, only one employee was not vaccinated!<sup>232</sup> The overall results appear to indicate that certain culturally specific long-term care homes in Toronto may be more successful in achieving robust influenza provider vaccination rates.

However, differences in reported rates have also been found to be based on inconsistent definitions, making comparisons across organizations challenging.<sup>233</sup> Also, documentation is not always required – sometimes verbal confirmation is used, which can also affect the accuracy of what is being reported.<sup>234</sup>

## Innovating to Improve Provider Vaccination Rates



In Toronto, Mount Sinai Hospital

conducted a study during the 2011-12 and 2012-13 influenza seasons in which nurses provided vaccines from a mobile influenza vaccine cart that was available during the day, evenings, and weekends.<sup>235</sup> Staff who were not vaccinated were offered either an intramuscular or an intradermal vaccine (smaller needle with less volume).<sup>236</sup> Staff liked the intradermal vaccine, and many reported wanting this kind of vaccine in the future.<sup>237</sup> Additionally, the use of the mobile cart was shown to improve accessibility and contributed to improved vaccination rates in the hospital.<sup>238</sup>

## Vaccine Hesitancy

### Understanding Vaccine Hesitancy through the WHO 3C Framework: Complacency, Confidence and Convenience

The effectiveness of the influenza vaccine is well-established, so why aren't rates of vaccination higher? It's not because of lack of knowledge. Studies show that the public and their health care providers generally accept the concept of vaccination and understand that prevention is a better option than treatment.<sup>239</sup> The public also understands that vaccinations are helpful and consider the side effects less severe than the condition the vaccine is preventing.<sup>240</sup>

Although there is widespread agreement that vaccination is a key preventive measure against infectious diseases and influenza, uptake of influenza vaccination still remains well below target levels. A possible explanation for this is 'vaccine hesitancy'. This is the 'delay in acceptance or refusal of vaccines despite availability of vaccination services',<sup>241</sup> which the WHO addresses through its 3C framework: Complacency, Convenience, and Confidence.<sup>242</sup> Complacency occurs when the risks of illness seem low and vaccination is therefore not prioritized. Confidence addresses trust in the vaccine, the health system, and the policy-makers.<sup>243</sup>

Convenience refers to accessibility and affordability.<sup>244</sup>

The WHO recommends many possible ways to address the 3Cs, including engaging religious or influential leaders to promote vaccination, social mobilization, using mass media, improving convenience and access, mandating vaccinations or sanctioning non-vaccination, using reminders and follow-up processes, non-financial incentives to motivate vaccination, and training for health care workers on communicating messages.<sup>245</sup>

*Unpacking Complacency – Many Canadians Don't Think Influenza is Serious Enough to Warrant Action*

In one Canadian study, the most frequently reported reason for not receiving a vaccination was that it was perceived to be unnecessary.<sup>246</sup>

In one Canadian study, the most frequently reported reason for not receiving a vaccination was that it was perceived to be unnecessary.<sup>246</sup> This reason was less reported among those living with chronic conditions.<sup>247</sup> Employed people are less likely to be vaccinated, perhaps because they believe they are healthier and do not need to engage in preventive measures.<sup>248</sup> In another study, many people who did not receive a vaccination noted it was because they did not think they were at increased risk of contracting influenza.<sup>249</sup> Another study from Quebec found that people felt they needed to get a vaccine in order to protect vulnerable family members (children and grandparents) but not that they had a responsibility to protect the public at large.<sup>250</sup> Participants also felt strongly that they did not want to be told what to do and wanted the option to choose.<sup>251</sup>

*Unpacking Convenience – Barriers Still Exist in Some Parts of Canada to Access the Vaccine*

Jurisdictions across Canada have made strides in reducing barriers to accessing the influenza vaccine, but they could still do more to increase access. Vaccines are not universally funded in all provinces across Canada, including in British Columbia, New Brunswick, and Quebec.<sup>25</sup>

Also, although allowing pharmacists to administer influenza vaccines has been shown to increase the likelihood of vaccination, Quebec, Nunavut, the Northwest Territories, and the Yukon still do not allow pharmacists to administer them.<sup>253</sup>

Also, although allowing pharmacists to administer influenza vaccines has been shown to increase the likelihood of vaccination, Quebec, Nunavut, the Northwest Territories, and the Yukon still do not allow pharmacists to administer them.<sup>253</sup>

*Unpacking Confidence – Low Trust Around the Influenza Vaccine May Be An Issue*

When patients do not trust the influenza vaccine, either because of misinformation or negative past experiences, they may be less likely to receive the influenza vaccine.

## When patients do not trust the influenza vaccine, either because of misinformation or negative past experiences, they may be less likely to receive the influenza vaccine.

One study found that people were highly influenced by their primary care providers or spouses regarding the influenza vaccine.<sup>254</sup> Primary care providers are particularly influential for older adults – in improving knowledge about influenza, the vaccine, and its potential side effects.<sup>255</sup> However, hearing about perceived side effects can sow doubt among patients.

In one study, half of the participants who did not receive the vaccine reported that it was because of perceived side effects or hearing about others having perceived side effects that kept them from getting vaccinated again.<sup>256</sup> On the other hand, a positive experience can help build confidence in the influenza vaccine.

Those who did receive the vaccine said that they have had past positive experiences getting the vaccination and that encouraged them to keep getting vaccinated.<sup>257</sup> Health care providers can also have low levels of confidence in the influenza vaccine as well. One qualitative study of nurses found that some feared the safety of the vaccination because of the requirement that it be created annually, with short timeframes for testing.<sup>258</sup>

Many also did not trust the effectiveness of the vaccine, again due to the annual nature of the vaccine and because the viruses that the vaccine were created for could mutate and render the vaccine ineffective.<sup>259</sup> Similarly, other studies have noted that HCPs may be vaccine hesitant due to worries about the safety of influenza vaccines.<sup>260</sup> Where the information about the influenza vaccine comes from can also have a significant impact on vaccination uptake among HCPs. Providers trust those who recommend vaccines i.e. Chief Medical Officers of Health, public health practitioners, and medical journals, but are less trusting of recommendations from pharmaceutical companies and some government agencies.<sup>261</sup>

## Developments and New Research – Developing a Universal Influenza Vaccine

Researchers around the world have been working on developing a universal 'flu' vaccine that targets the part of the influenza virus that does not change from year to year.<sup>262</sup> This would create a lasting target that would eliminate the need to come up with a different vaccine each year. Dr. Matthew Miller, an Assistant Professor of Biochemistry and Biomedical Sciences at McMaster University in Hamilton, Ontario, is one of the researchers involved in developing a universal influenza vaccine.<sup>263</sup> His team has found a way for the immune system to react to the 'stalk' or never-changing part of the influenza virus.<sup>264,265</sup> Dr. Miller believes that if they can target the "stalk" instead of the "head" that people will no longer need annual vaccinations.<sup>266</sup>

In the United Kingdom (UK), University of Oxford researchers began trialling a universal vaccine for people over 65 starting in 2017.<sup>267</sup> Depending on the results of this study, the vaccine could potentially be used across the National Health Service in the UK and ultimately worldwide.



## Evidence-Informed Recommendations

Through examination of current evidence and the state of vaccination rates and policies in Canada and beyond, there is clearly more work to be done to improve influenza prevention in Canada. The following eight recommendations provide evidence-informed policy and practice approaches for health authorities and organizations towards supporting both influenza prevention and vaccination across Canada.

### 1. Improve Influenza Prevention Practices More Generally

Influenza prevention should include, but not be limited to, influenza vaccination. Other key preventive health measures that should be promoted include hand washing as much as possible; avoiding coughing directly into one's hands; avoiding touching one's face or those of others with hands that have not been washed; cleaning and disinfecting objects that many people touch, like remote control devices, phones, and door handles; maintaining a healthy diet and staying physically active to improve one's overall immunity; and, being well-rested.<sup>268</sup> Additional measures should include policies to quickly identify patients who are sick and respond accordingly, implementing restrictions on work and

visiting for people who are sick, and using anti-viral medications appropriately.<sup>269</sup>

These policies will also help to prevent against other respiratory viruses.

The Public Health Agency of Canada encourages acute and long-term care facilities to practice respiratory hygiene, such as coughing into sleeves or using tissues and masking when appropriate, for patients or any other individuals who appear to have 'flu' or a 'flu'-like illnesses.<sup>270</sup> Patients should be screened to ensure it is not another respiratory infection (i.e. tuberculosis).<sup>271</sup> The Agency encourages hand hygiene – preferably using an alcohol-based rub, unless hands are soiled which then requires soap and water.<sup>272</sup> It also encourages separating patients who may have influenza from other patients.<sup>273</sup>

Policies should be strengthened to include guidelines that promote hand hygiene and proactive visiting policies for institutions. These could be as simple as ensuring that sinks and alcohol hand-rub are available at entrances, or that receptionists ask whether visitors have 'flu'-like symptoms. In addition, consent policies for patients should be streamlined to include influenza vaccination and anti-virals where medically necessary for patients; such consents should further be obtained for the duration of residence in the facility, rather than each year.

## 2. Promote a Life-Course Vaccination Schedule that includes Older Adults

Universal vaccination schedules for children are commonly accepted as part of routine care, however, routine vaccinations are also important for adults.<sup>274</sup> Establishing a vaccination schedule for older adults could be a simple way to streamline messaging and practice for providers and the public, and thereby support increased vaccination rates.

Although public health agencies and governments communicate the importance of adult immunizations, there is not consistent messaging around which vaccinations should be given, or when. Governments should include influenza as an essential vaccination, as part of a life-course vaccination schedule that includes older adults.

### Opportunities for Streamlining Messaging Around Adult Immunizations

As the example below from Ontario on the Ministry of Health and Long-Term Care's social media account demonstrates, there are many opportunities available to streamline messaging about vaccinations for individuals over 65, and influenza could easily have been included in the messaging below.

**Adult vaccines. What to get, when.**

18-64 Years	65 Years & Older
<ul style="list-style-type: none"> <li>• Tetanus, Diphtheria &amp; Pertussis (once at 24-26 Years)</li> <li>• Tetanus &amp; Diphtheria (every 10 years after dose above)</li> </ul>	<ul style="list-style-type: none"> <li>• Pneumococcal (once at 65 years)</li> <li>• Shingles (once at 65-70 years)</li> <li>• Tetanus &amp; Diphtheria (every 10 years)</li> </ul>

ontario.ca/vaccines

### 3. Continue Working Towards Developing Better Influenza Vaccines

Researchers around the world are working diligently on testing and developing a universal influenza vaccine and this work should be encouraged.

Future research should also focus on supporting high-risk groups, including older adults.<sup>275</sup> Our current vaccines are not ideal for those over 65, due to immunosenescence, and there is a need for more effective vaccines for this population.<sup>276</sup> Studies are underway to test a higher-dose vaccine in older patients and there is some evidence that it could be more effective than the standard dose in people over 65.<sup>277</sup> To this end, Ontario has recently introduced the high-dose vaccine for those over 65 from 2018-19 while Manitoba will be providing it to residents of personal care homes. More research should be conducted to guide the future of available influenza vaccinations and to optimize the use of vaccines for those over 65 in Canada.

### 4. Include Influenza Vaccination in Clinical Guidelines for Older Adults and for Treating Chronic Conditions

There is growing evidence of the interaction between influenza, complications of chronic conditions and the increasing burden of these associations. Influenza vaccination, as a result, should be included in clinical guidelines for the management of older adults and people living with chronic conditions.

Influenza vaccination should also be part of clinical guidelines for individuals over the age of 65. Influenza vaccination has been shown to reduce hospitalizations due to influenza.<sup>278</sup>

Influenza vaccination should be included in diabetes clinical guidelines. Vaccination was found to reduce hospital admissions for cardiovascular complications and pneumonia or influenza among people with diabetes.<sup>279</sup> Vaccination in people with obesity and also those with type 2 diabetes is an important part of secondary prevention efforts.<sup>280,281</sup> Vaccination should also be an important part of cardiovascular disease clinical guidelines.

It is recommended that individuals with cardiovascular disease be vaccinated to prevent flu-related hospitalizations, reduce major adverse cardiovascular events, acute heart failure, and decrease mortality.<sup>282</sup>

Due to the relationship between influenza and respiratory conditions, it should also be an important part of respiratory disease clinical guidelines including asthma, COPD, and other lung-related conditions.<sup>283</sup>

## 5. Provide Clinician Education and Support for Primary Care Providers and Pharmacists to Deliver Vaccinations

Annual influenza vaccination should be a standard of care for older adults and should be prioritized as such for older adults in primary care<sup>284</sup> and pharmacy settings. It is especially important for both the public and health care providers to realize how important vaccinations are in preventing morbidity and mortality due to complications associated with infections such as influenza.<sup>285</sup> More should be done to assist primary care providers and pharmacists to ensure their patients can be vaccinated, including addressing barriers related to knowledge, skill, attitudes, policy, procedures and funding that may exist in primary care and pharmacy settings.

## 6. Universal Funding for Influenza Vaccinations Needs to Be In Place to Ensure it is Accessible to All Canadians

Provinces that have universal funding for influenza vaccines have achieved higher coverage rates.<sup>286,287</sup> In addition, studies comparing income and immunization have found that those on lower-incomes actually have higher rates of vaccination, implying that targeting specific populations with free vaccinations is a more effective strategy.<sup>288</sup> The remaining provinces (British Columbia, New Brunswick, and Quebec) should consider extending their policies to include universal funding for influenza vaccination.

## 7. Highly Recommend the Influenza Vaccine for all Health Care Providers and Mandate it for Providers and Residents in Long-Term Care Homes

Whereas several other vaccinations are requirements for employment depending on the hospital/jurisdiction (i.e. measles, mumps, rubella; varicella<sup>289</sup>), the influenza vaccine has remained optional.

Although different sectors and jurisdictions have considered mandating it, there remains considerable resistance from health care providers towards mandatory influenza vaccination and no province has yet required this.<sup>290,291</sup>

The arguments against mandatory vaccinations policies in Canada have rested on employment law, the human rights code, and the Canadian Charter of Rights and Freedoms.<sup>292</sup> Those in favour of mandatory vaccination, for example Ontario's Provincial Infectious Disease Advisory Committee,<sup>293</sup> are challenged by the fact that the influenza vaccine varies in its effectiveness, making it difficult to mandate in comparison with other vaccines with consistently high effectiveness. From a human rights perspective, opponents have argued that mandatory influenza vaccinations do not meet human rights conditions by allowing individuals to be exempt for medical or religious beliefs.<sup>294</sup> In terms of the Canadian Charter of Rights and Freedoms, there have been arguments that these types of policies violate the right to liberty and security of the person, and the right to freedom of expression.<sup>295</sup>

However, when the influenza prevention policy in British Columbia was brought to court, the arbitrator concluded that it was a reasonable expression of the employer's rights and did not violate the Canadian Charter of Rights and Freedoms.<sup>296</sup>

In addition to being contested on grounds of individual freedom, mandatory vaccination policies have also been an issue in collective agreements between employers and labour unions.<sup>297</sup> Most of the cases that have fought these policies involve unionized employees filing grievances saying that they violate integrity, autonomy, and privacy.<sup>298</sup>

In long-term care settings, mandating influenza vaccination for providers and residents should be considered. The National Advisory Committee on Immunization (NACI) recommends that residents of long-term care homes and other longer-term care facilities receive the annual influenza vaccine.<sup>316</sup> Studies have found that as vaccination rates (of both staff and residents) increase in long-term care homes, the risk of influenza outbreaks decrease.<sup>317</sup> Residents in many long-term care homes are often vaccinated annually against influenza in order to control the risk for outbreaks and illness among residents, however, there may be sufficient evidence to support the mandatory influenza vaccination of HCPs in long-term care homes.

## **Mandatory Influenza Vaccination for Health Care workers – examples from the United States**

The United States has had various jurisdictions attempt to make influenza vaccination a condition of employment for health care workers. Studies suggest that although these policies lead to increases in vaccination rates, there is much less evidence about the influence these policies have on the clinical outcomes and influenza infection rates among both health care workers and patients.<sup>299</sup>

Virginia Mason Hospital, an acute care hospital in Seattle, Washington, became the first in the state to make influenza vaccination mandatory in 2004.<sup>300</sup> Before the requirement, only 54% of workers were vaccinated, and after implementation of this policy it increased to 98.9%.<sup>301</sup> The Washington State Nurses Association filed a grievance stressing that vaccination should be a choice, not mandated.<sup>302</sup> The court ruled in favour of the nurses.<sup>303</sup>

In 2009, New York State required that all health care professionals receive an influenza vaccination.<sup>304</sup> However, this was recently overridden to become a 'vaccinate-or-mask' policy.<sup>305</sup>

BJC HealthCare, a Midwestern health care organization based in St. Louis, Missouri, with approximately 26,000 employees decided in 2008 to mandate influenza vaccination as a condition of employment with exemptions on medical or religious grounds.<sup>306</sup> With this policy, they reached

a 98.4% vaccination rate (1.24% were medically exempted and 0.35% were religiously exempted from receiving the vaccine).<sup>307</sup>

The Hospital Corporation of America (HCA), based in Tennessee, adopted a mandatory vaccination policy for the 2009-10 influenza season.<sup>308</sup> This was implemented across 163 hospitals, 112 outpatient clinics, and 368 medical practices, across 20 states.<sup>309</sup> This policy required any employee who would not be vaccinated to either be reassigned to roles without patient contact or to wear surgical masks.<sup>310</sup> Along with this policy they implemented non-vaccine strategies such as cough etiquette, hand hygiene, and stressing the importance of staying home if ill.<sup>311</sup> Prior to implementing this policy, the coverage rates varied from 20% to a high of 74% (with the average being 58%).<sup>312</sup> After implementing the policy, 96% of staff was vaccinated.<sup>313</sup>

In the United States, the Centers for Disease Control and Prevention (CDC), the Advisory Committee on Immunization Practices (ACIP), and the Healthcare Infection Control Practices Advisory Committee, all recommend that workers be vaccinated against influenza annually.<sup>314</sup> A survey by the CDC found that higher vaccination rates among health care providers was linked to employer requirements, vaccination promotion, and access to vaccination at work, at no cost.<sup>315</sup>

## 8. Develop Better and Mandatory Reporting of Influenza Vaccination Rates

There is no central agency or report that documents influenza vaccination rates in Canada and there is no standard definition for how to report these rates. Therefore, reporting should be mandatory and should be clearly defined so that rates can be reported, monitored and improved upon across Canada. Public health bodies can take the lead in defining how vaccination rates should be measured and reported.<sup>318</sup> They should also assist in developing guidelines for how to put in place monitoring systems and repositories to track progress.

The WHO European Region similarly recommended that national influenza vaccination policies and programs work to improve monitoring of vaccination rates in target groups including older adults, persons living with chronic conditions, pregnant women, and health care providers.<sup>319</sup> They suggest collecting uptake on an annual basis at the end of each flu season. This would allow for better monitoring of interventions and determining the effectiveness of seasonal influenza programs.

Currently, Canada's national surveillance system, FluWatch, monitors influenza and influenza-like illnesses across Canada but does not report on influenza vaccination rates.<sup>320</sup> They post reports every week with information about the viruses that are currently making their way across the country.<sup>321</sup> This information is helpful as it can detect outbreaks, provide up-to-date information about influenza across the country, monitor current strains and provide information to the WHO to support future vaccine production and development.<sup>322</sup> However, the reports are released weekly and each report does not necessarily have data from every province and territory and the data collected and reported differs in different jurisdictions. For example, all provinces and territories except Nunavut report flu outbreaks in long-term care facilities and all except Nunavut and Quebec report hospital outbreaks.<sup>323</sup> However, the definition and reporting of outbreaks in different facilities is different between jurisdictions.<sup>324</sup> Also, certain regions (British Columbia, Nunavut, and Quebec) do not report hospitalizations, and only those requiring intensive care are reported by Saskatchewan.<sup>325</sup>

Since 2001, the Public Health Agency of Canada has monitored vaccination rates using the adult National Immunization Coverage Survey (aNICS). It has been conducted 6 times between 2001 and 2016.<sup>326,327</sup> This survey is conducted via telephone interviews with a small sample (3,005 individuals) and they categorize the individuals based on their age and chronic conditions.<sup>328</sup>



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