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Influenza vaccination: protecting our communities

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Learning Objectives

Upon successful completion of this continuing education lesson you will be able to do the following:

1. Discuss the impact of influenza virus on the patient and on the Canadian population
2. Discuss the key differences between the common cold and the flu
3. Determine the differences among the currently available influenza vaccines
4. Discuss the different dosages, adverse effects, and necessary precautions with currently available influenza vaccines

Introduction

During the winter and spring months it is very common to see a person come into the pharmacy looking for the best over-the-counter (OTC) treatment for a cold or the flu. For most people these conditions are self-limiting and will just get better with time.

Like all vaccinations, the influenza vaccine ("flu shot") offers protection from the flu for both the patient and the entire community. The influenza vaccine is a key strategy to lower the number of influenza-related complications and deaths. With an increasing number of provinces across the country authorizing certified pharmacists to administer vaccinations, it is important that technicians increase their awareness of the different influenza vaccine products available as well as common misconceptions.

Each year the National Advisory Committee on Immunization (NACI) produces a statement on the seasonal influenza vaccine. This statement gives all Canadians some guidance on the impact of influenza in Canada and the role of the different vaccines to help to lower the number of deaths and complications from influenza. This continuing education lesson will review the key points of this statement so that technicians can help educate patients.

The influenza virus

There are three types of influenza virus that are linked to outbreaks of the flu, which are classified as influenza A, influenza B, and influenza C. Influenza C causes mild disease in humans, does not occur seasonally, and is not as common as influenza A and B.[2]

Influenza type A is classified based on proteins that are on the surface of the virus.[1] These two proteins are haemagglutinin (H) and neuraminidase (N). There are three main subtypes of haemagglutinin (H1, H2, H3) and two subtypes of neuraminidase (N1 and N2) that have commonly caused widespread human disease.[1] Humans develop antibodies to the H and N proteins of the different influenza A subtypes and help to protect the person against repeat infection from the same strain of the influenza virus.

Influenza type B comes from two lines of viruses known as the B/Yamagata and B/Victoria lines.[1] These two lines cause influenza each year.[1]

Antigenic shift and drift

Influenza viruses are constantly evolving; these changes are known as antigenic drift or antigenic

TABLE 1 - Symptoms of the common cold and the flu[5]

Symptom	Common cold	Influenza
Fever	Rare	Usual, high (39°C to 40°C) Sudden onset Lasts 3-4 days
Headache	Rare	Can be severe
General aches and pains	Sometimes, mild	Usual, often severe
Fatigue and weakness	Sometimes, mild	Usual, severe May last for 2–3 weeks
Extreme fatigue	Unusual	Usual, early onset Can be severe
Runny and stuffy nose	Common	Common
Sneezing	Common	Sometimes
Sore throat	Common	Common
Chest discomfort, coughing	Sometimes mild to moderate	Usual, can be severe
Complications	Sinus congestion Earache	Pneumonia Respiratory failure Worsened chronic conditions (eg, heart conditions) Life threatening

shift. Antigenic drift refers to small changes in the influenza type A virus through small mutations,[3] which can accumulate over time and eventually reach the point at which a person who was protected against a certain strain of the flu is no longer protected.

Antigenic shift is a major change in the influenza type A virus and results in a new virus subtype that was not previously infecting people.[3] This type of change occurs through direct animal-to-human transmission of an animal influenza virus or through the mixing of human and animal influenza type A virus.[3] These types of shifts are the most common cause of global influenza pandemics, as the virus spreads to human populations around the world.[3]

FLU TIP: The influenza A virus is constantly changing. This is one of the main reasons that the flu vaccine has to be constantly updated to help protect Canadians from new strains of flu.

The impact of the flu

Although some patients may view the flu as a minor illness, it is responsible for serious health concerns in many patients. Between 5%–10% of Canadians become infected with the flu each year, leading to approximately 20,000 hospital admissions annually.[1] Approximately 4,000 to 8,000 Canadians die each year from the flu, mostly seniors who expire from pneumonia or other complications.[1]

FLU TIP: Many people confuse influenza and the "stomach flu." Influenza attacks the respiratory tract and causes symptoms such as severe coughing and wheezing. The "stomach flu" is usually caused by other viruses and is clinically known as gastroenteritis.

Transmission

The influenza virus is shed (released) in secretions from the nose. The virus can enter the body in one of the following ways:

- Direct contact with infected droplets containing the virus that land on surfaces such as the mouth, eye, or nose.[4]
- Coming in contact with a person or object that is contaminated with the virus then touching the eyes, nose, or the mouth.[4]

The time from infection to the start of symptoms will normally range from 1–4 days, with an average of two days.[4] Infected people are contagious the day before symptoms begin; adults will normally shed the virus for 5–7 days, infecting others.[4] Children can shed the virus for a longer period.[4]

Influenza versus a cold

Many patients confuse a cold with the flu. As previously stated, influenza is caused by the influenza virus, whereas a cold is caused by other types of viruses. Both of these conditions cause respiratory symptoms and it is often very hard to tell them apart. For the most part, the flu is linked to more severe symptoms and tends to cause fatigue, achiness, and many days of missed work compared with the common cold. The Canadian Coalition for Immunization Awareness and Promotion has developed a chart comparing the different symptoms of a cold and the flu. Table 1 shows these different symptoms.

FLU TIP: The biggest difference between flu and cold symptoms is severity. People with the flu will normally

TABLE 2 - Overview of each of the approved influenza vaccine products in Canada

Product	Influvac®	Fluviral®	Agriflu®	Fluad®	Vaxigrip®	FluZone®	Intanza®	FluMist®
Vaccine type	Inactivated	Inactivated	Inactivated	Inactivated	Inactivated	Inactivated	Inactivated	Live attenuated
Route of administration	IM	IM	IM	IM	IM	IM	Intradermal	Intranasal spray
Authorized ages	≥ 18 years	≥ 6 months	≥ 6 months	≥ 65 years	≥ 6 months	≥ 6 months	≥ 18 years	2-59 years
Adjuvant	No	No	No	Yes—MF59	No	No	No	No
Format	Single	Multi	Single	Single	Single/multi	Single/multi	Single	Single
Thimerosal	No	Yes	No	No	Yes—multi	Yes—multi	No	No
Antibiotics (traces)	Gentamicin	None	Kanamycin Neomycin	Kanamycin Neomycin	Neomycin	Neomycin	Neomycin	Gentamicin

IM—intramuscular, multi—5 mL multidose vial, single—single use syringe for injection or single use nasal spray (FluMist®).

have more severe symptoms that usually last 7–10 days, but can last for up to six weeks.[1]

Preventing the flu—hygiene

The two prevention strategies for influenza involve hygiene and the influenza vaccine. The Public Health Agency of Canada (PHAC) recommends that all patients regularly wash their hands with soap and warm water for at least 20 seconds; if this is not possible, use an alcohol based hand-sanitizer.[2] Keep common surfaces (e.g., doorknobs, light switches) clean and disinfected.[2] Other recommendations include isolating infected individuals to reduce the risk of transmitting the virus to other people in the family or the community.[2]

FLU TIP: Everyone should be encouraged to sneeze or cough into their arms rather than their hands.[2] This helps to lower the spread of cold or influenza virus.

Preventing the flu—vaccine

The influenza vaccine is one of the most effective strategies to lower the risk of getting the flu.[1] There are currently eight different vaccines authorized for use in Canada; seven are inactivated (dead virus) and one is a live attenuated (weakened) vaccine.[1]

Trivalent inactivated influenza vaccine (TIV)

The trivalent inactivated influenza virus is the most commonly used influenza vaccine. This vaccine is given by intramuscular injection.[1] There are six different influenza vaccines that each contain 15 µg of the influenza protein haemagglutinin for three strains of influenza that experts believe will be prevalent in Canada (two type A and one type B).[1] One of these vaccines includes an oil-in-water adjuvant called MF59,[1] which has been shown to boost the immune response. This adjuvant product is designed for patients ≥ 65 years of age to help increase the amount of antibodies created by the injection.[1]

Another TIV product available is administered by an intradermal injection.[1] This product comes with a specialized needle that delivers the flu vaccine just below the surface of the skin.[1] There are two formulations for this vaccine[1]:

- Patients 18–59 years of age should receive a dose of 9 µg (for each of the three strains) per 0.1 mL
- Patients 60 years or older should receive a dose of 15 µg per 0.1 mL

TABLE 3 – NACI-recommended recipients of influenza vaccine[1]

People at high risk of influenza-related complications or hospitalization

- Adults (including pregnant women) and children with the following chronic health conditions:
  - cardiac or pulmonary disorders (including bronchopulmonary dysplasia, cystic fibrosis and asthma), diabetes mellitus, and other metabolic diseases
  - cancer, immune compromising conditions (due to underlying disease and/or therapy)
  - renal disease
  - anemia or hemoglobinopathy
  - conditions that compromise the management of respiratory secretions and are associated with an increased risk of aspiration
  - morbid obesity (BMI ≥ 40)
  - children and adolescents with conditions treated for long periods with acetylsalicylic acid
- People of any age who are residents of nursing homes and other chronic care facilities.
- People ≥ 65 years of age
- Healthy children 6 to 23 months of age
- Healthy pregnant women (the risk of influenza-related hospitalization increases with length of gestation, eg, it is higher in the third than in the second trimester)
- Aboriginal peoples

People capable of transmitting influenza to those at high risk

- Health care and other care providers in facilities and community settings who, through their activities, are capable of transmitting influenza to those at high risk of influenza complications
- Household contacts (adults and children) of individuals at high risk of influenza-related complications (whether or not the individual at high risk has been immunized):
  - household contacts of individuals at high risk, as listed in the section above
  - household contacts of infants < 6 months of age as these infants are at high risk of complications from influenza but cannot receive influenza vaccine
  - members of a household expecting a newborn during the influenza season
- Those providing regular child care to children < 24 months of age, whether in or out of the home
- Those who provide services within closed or relatively closed settings to persons at high risk (eg, crew on a ship)

Others

- People who provide essential community services
- People in direct contact during culling operations with poultry infected with avian influenza

Live attenuated influenza vaccine (LAIV)

A live attenuated influenza vaccine (LAIV) was recently introduced to the Canadian market. An attenuated virus is a weakened live virus that will grow in the nasal passages when it enters the body.[1] Although this is a live virus, it is unlikely to cause any influenza type symptoms in patients who don't have conditions or medications that cause immunosuppression (ie, people with weakened immune systems). Currently the manufacturer of this product recommends clinicians weigh the risks and benefits of using this vaccine in immunocompromised patients such as[6]

- bone marrow transplant patients;
- patients immunosuppressed due to cancer therapy or anti-rejection therapy;
- patients with immunosuppression due to HIV.

This product is indicated for persons 2–59 years of age and is administered as a nasal spray, with 0.1 mL being delivered into each nostril.[1]

Efficacy of vaccine

Studies have shown the influenza vaccine is efficacious.[1] If the influenza experts have properly matched the strains in the vaccine to the circulating virus, there is approximately 70% to 90% efficacy in preventing influenza illness in healthy adults and children.[1] Even in seasons where there is mismatch between the virus proteins in the vaccine and the influenza viruses in the community, the vaccine offers 50% protection in healthy adults.[1]

Vaccine efficacy in certain populations may be less (eg, immunocompromised patients, elderly) than in healthy adults.[1] The possibility of lowered efficacy should not prevent immunization in those at high

risk of influenza, since protection is still likely to occur.[1]

FLU TIP: The benefits of the vaccine in the elderly are very significant. It has been shown to reduce the incidence of pneumonia, hospital admission, and death in this increasing population.[1]

Protection

When the influenza vaccine or nasal spray is administered, the body will develop antibodies to the proteins in the vaccine.[1] The antibody levels that offer protection are normally achieved within two weeks after immunization, but there may be some protection before that time.[1]

With the influenza virus changing over time, immunity in one season will not reliably prevent infection in another season because of antigenic shift and drift.[1]

FLU TIP: There are some people who think getting an influenza vaccine every year will lower their immunity. There is NO evidence that an annual vaccine affects the immune response to the vaccine.[1]

Dosing

All people receiving intramuscular TIV should receive a full dose (0.5 mL with 15 µg haemagglutinin).[1] The dosing for intradermal TIV (TIV-ID) is 9 µg/0.1mL (ages 18-59 years) and 15 µg/0.1mL (≥ 60 years),[1] while LAIV is administered as two doses (both doses are in a single sprayer), one in each nostril.[1]

Children younger than 9 years of age who have never received the influenza vaccine will require two doses at least 4 weeks apart.[1] If the child (older than 9 years) has received a previous seasonal flu shot they will only need to receive one dose for every season thereafter.[1] None of the current influenza vaccines are recommended to be used in children younger than 6 months of age.[1]

FLU TIP: For parents wanting to protect a newborn from the flu, encourage washing of the hands regularly and to immunize everyone in the household. By preventing the flu in the family, you help to protect the young infant from exposure.

TABLE 4 - Choice of influenza vaccine for selected age and risk groups[1]

Age group	Vaccine types available for use	Healthy patient	Patients with chronic health conditions	Comments
Children 6–23 months	TIV	-	-	Only TIV is indicated
Children 2–17 years	TIV LAIV	LAIV	TIV LAIV	LAIV is not recommended in immunocompromised children
Adults 18–59 years	TIV TIV-ID (9 µg) LAIV	TIV TIV-ID (9 µg) LAIV	TIV TIV-ID (9 µg) LAIV	LAIV is not recommended in immunocompromised adults (consider TIV-ID [15 µg])
Adults 60–64 years	TIV TIV-ID (15 µg)	TIV TIV-ID (15 µg)	TIV TIV-ID (15 µg)	
Adults 65+ years	TIV TIV-ID (15 µg) TIV MF59	TIV TIV-ID (15 µg) TIV MF59	TIV TIV-ID (15 µg) TIV MF59	
Pregnant women	TIV TIV-ID (9 µg)	TIV TIV-ID (9 µg)	TIV TIV-ID (9 µg)	

TIV—trivalent inactivated vaccine, TIV-ID—trivalent inactivated vaccine intradermal, LAIV—live attenuated influenza vaccine, TIV MF59—trivalent inactivated vaccine with MF59 adjuvant.

Administration

Most of the TIV vaccines are administered by intramuscular injection. For adults and children 12 years of age and older, the recommended site for injection is the deltoid muscle (outside of upper arm).[1] For children 6 months to 12 years the TIV vaccines should be in the anterolateral thigh muscle.[1]

The recommended administration for TIV-ID (just below the skin) is available in a specialized syringe to help the immunizer give the injection. The LAIV vaccine is administered intranasally with a specialized syringe.[1] The patient will have half of the dose administered in one nostril and the other half in the second nostril.[1]

FLU TIP: All of the TIV vaccines can be safely administered with any other vaccines, as long as they are given at different injection sites (ie, different limbs or in the same limb at least 2 cm apart).

The LAIV can be administered at the same time as any other vaccine. After administering LAIV at least 4 weeks should pass before another live vaccine (eg, MMR, shingles vaccine, chicken pox vaccine) is administered.[1]

Adverse effects

Trivalent inactivated influenza vaccines

Trivalent inactivated influenza virus vaccines cannot cause influenza because the vaccine does not contain any live virus.[1] The most common adverse effect in adults is soreness at the injection site lasting up to two days, but this rarely interferes with normal activities.[1] In healthy adults there was no increase in rate of fever or other systemic side effects compared with placebo.[1] The TIV with adjuvant more commonly causes local reactions (pain, redness, and swelling) than other TIV products but they are still classified as mild and transient.[1]

In children the most common reaction include mild local reactions, primarily soreness at the injection site.[1] Fever after immunization occurs in ≤ 12% of immunized children 1 to 5 years.[1]

Live attenuated influenza vaccine

An LAIV is a live vaccine, and is administered via the nasal passage. The most common adverse effects include nasal congestion and runny nose.[1] Increased risk of wheezing was seen in clinical trials of children younger than 2 years of age (LAIV is not indicated in this group).

Precautions and contraindications

The influenza vaccine should not be given to anyone who has had an anaphylactic reaction to a previous dose of the vaccine or who is allergic to any component of the vaccine.[1] In the past, experts recommended that anyone with a hypersensitivity to eggs (hives, swelling of the mouth and throat, difficulty in breathing, low blood pressure, shock) should not routinely receive the flu shot.[1] A growing number of studies have shown that most people who are allergic to eggs can safely receive TIV.[1] The NACI now recom-

mends that such individuals be vaccinated against influenza using TIV without a prior influenza vaccine skin test.[1]

It is important to note that LAIV should NOT be administered to children < 24 months due to an increased risk of wheezing.[1] It should also not be given to people with severe asthma (ie, those taking oral or high-dose inhaled steroids) or those who have seen a physician in the last 7 days on account of wheezing.[1] An LAIV is not recommended in children taking ASA therapy, pregnant women, and immunocompromised patients (eg, cancer or HIV patients).[1]

FLU TIP: People with a high fever and those who are seriously ill (eg, pneumonia) should not be vaccinated until symptoms have improved.[1]

People with a mild infection and even with a low-grade fever may be given the influenza vaccine.[1]

Recommendations for influenza vaccination

The NACI recommends that priority for the seasonal influenza vaccine should be given to the following individuals[1]:

- patients at high-risk of influenza-related complications;
- patients capable of transmitting influenza to patients at high-risk of complications; and
- patients who provide essential community services

Table 3 lists the higher priority groups for influenza immunization.

FLU TIP: Although NACI recommends giving priority to some patients for the influenza vaccine, it also encourages the use of influenza vaccine for all Canadians who have no contraindications.[1]

Choice of influenza vaccine

With all of the different choices of influenza products many times a question may be asked regarding the preferred vaccine for a particular patient. Many times, the choice of vaccine is determined by the provincial coverage of the product and in most cases this will be a TIV product. NACI has developed a list of preferred vaccines for each age group. These recommendations are listed in Table 4.

Role of the technician

Influenza immunization is a crucial strategy to help reduce the number of people who become seriously ill from the flu each year. All healthcare professionals should take an active role in educating patients about the role of the vaccine in reducing death, hospitalizations, and serious complications caused by the influenza virus.

As an ever increasing number of pharmacists are immunizing patients in the pharmacy setting, the technician is well placed to help facilitate this process. Technicians can play an active role helping to identify patients at high risk of influenza-related complications and encourage them to protect themselves through immunization.

Several strategies technicians can utilize are as follows:

- Actively asking high-risk patients (eg, pregnancy, elderly, young children, patients with chronic conditions, Aboriginal patients) if they have had their flu shot and encouraging each patient to receive this immunization annually.
- During the immunization season (September through January) consider asking each patient filling a prescription if they have had their annual flu shot and to document it within the pharmacy dispensary system. Just talking about the flu shot increases patient awareness and can have a dramatic effect on influenza immunization rates in a community.
- Identify and direct patients with false information or misconceptions regarding the influenza vaccine to the pharmacist for further education and counselling.
- Actively support any influenza vaccine clinics by wearing buttons on fighting the flu and placing posters in the pharmacy and local businesses.
- Technicians can also help the pharmacist facilitate the immunization process by helping to manage some of the key logistics associated with offering influenza clinics in the pharmacy setting.

Through active promotion of influenza immunization, all pharmacy staff can play an active role in improving the health of their communities.

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QUESTIONS

Please select the best answer for each question or answer online at www.CanadianHealthcareNetwork.ca for instant results.

1. Approximately how many Canadians are hospitalized because of influenza each year?

a) 4,000 b) 8,000
c) 10,000 d) 20,000

2. Which influenza virus type is commonly associated with pandemics?

a) Influenza A b) Influenza B
c) Influenza C d) All of the above

3. Which of the following statements regarding antigenic shift and drift is true?

a) Antigenic drift is usually worse than an antigenic shift
b) Antigenic shift can occur through the mixing of human and animal influenza type A viruses
c) Antigenic drifts commonly lead to global influenza pandemics
d) All of the above

4. Which of the following is a method by which the influenza virus is transmitted?

a) Direct contact with the virus landing on the nose
b) Touching an object with a virus and then bringing the hand to the mouth or nose
c) Cough secretions landing on the mouth or in the eyes
d) All of the above

QUESTIONS (Continued)

Please select the best answer for each question or answer online at www.CanadianHealthcareNetwork.ca for instant results.

5. What is the average time between infection and the appearance of flu symptoms?
a) 12 hours b) 1 day
c) 2 days d) 7 days

6. Which of the following symptoms is MORE common with a common cold than with influenza?
a) Headache b) High fever
c) Sneezing d) Extreme fatigue

7. Which of the following strategies is recommended to prevent being infected with the flu?
a) Wash hands with soap and water for at least 20 seconds
b) Use an nonalcoholic hand sanitizer
c) Cough into the hand
d) All of the above

8. How many strains of influenza are included in the trivalent inactivated influenza vaccine?
a) 1 b) 3
c) 8 d) 10

9. What is an adjuvant?
a) It is added to the vaccine as a preservative
b) It is added to the vaccine to keep it stable
c) It is added to the vaccine to increase the amount of antibodies
d) None of the above

10. What is the approximate efficacy of the influenza vaccine in healthy adults in children?
a) 20%–40% b) 40%–50%
c) 50%–60% d) 70%–90%

11. How long does it normally take to develop antibodies after giving the influenza vaccine?
a) 5 days b) 7 days
c) 14 days d) 30 days

12. If a child is 8 months old, which vaccine should be used?
a) Trivalent inactivated influenza vaccine
b) Live attenuated influenza vaccine
c) Trivalent inactivated influenza vaccine with adjuvant
d) None of the above

13. Which of the following is a difference between trivalent inactivated influenza vaccine (TIV) and trivalent inactivated vaccine ID vaccine (TIV-ID)?
a) The TIV-ID product has to be administered in the abdomen
b) The dose of influenza strains is much higher in the TIV-ID format
c) The TIV vaccine has to be administered by the intramuscular route
d) All of the above

14. Which of the following patients should not use the live attenuated influenza vaccine?
a) Children < 2 years of age
b) Immunosuppressed patients
c) Pregnant women
d) All of the above

15. What age group is the TIV with adjuvant indicated for?
a) < 2 years b) 2–17 years
c) 18–59 years d) 65+ years

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2. a b c d	**5.** a b c d	**8.** a b c d	**11.** a b c d	**14.** a b c d
3. a b c d	**6.** a b c d	**9.** a b c d	**12.** a b c d	**15.** a b c d

First Name _____ Last Name _____

Pharmacy Name _____

Primary Licensing Province _____ Licence # _____ Secondary Licensing Province _____ Licence # _____

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Postal Code _____ Telephone _____ Fax _____

Email _____ Year Graduated _____

Type of practice
❑ Drug chain or franchise
❑ Banner
❑ Independent
❑ Mass merchandiser
❑ Grocery store pharmacy
❑ Hospital pharmacy
❑ Other (specify): _____

❑ Full-time technician
❑ Part-time technician

Are you a certified technician?
❑ Yes ❑ No

Please help ensure this program continues to be useful to you by answering these questions.

1. Do you now feel more informed about Influenza vaccination: protecting our communities? ❑ Yes ❑ No
2. Was the information in this lesson relevant to you as a technician? ❑ Yes ❑ No
3. Will you be able to incorporate the information from this lesson into your job as a technician? ❑ Yes ❑ No ❑ N/A
4. Was the information in this lesson... ❑ Too basic ❑ Appropriate ❑ Too difficult
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