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<tr>
<th>Program Name:</th>
<th>How to “Influenze” your patients' decisions about the Flu Shot</th>
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Learning objectives:

Upon successfully completing this continuing education lesson, the learner will be better able to:

1. Describe the impact of influenza on different age groups and explore why young and elderly are most vulnerable
2. Describe and understand drift and shift of influenza strains and its impact on the spread of communicable disease
3. Compare influenza vaccine products available with respect to vaccine content and route of administration
4. Address common concerns patients may present related to influenza vaccination
5. Educate patients on influenza vaccine development and safety of its components
6. Identify the most appropriate influenza vaccine for a specific patient type

Test your Knowledge

Answer the following statements as being True or False:

<table>
<thead>
<tr>
<th>Statement</th>
<th>True</th>
<th>False</th>
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<tbody>
<tr>
<td>Death and disability due to influenza is highest in children</td>
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<td>Immunization is an individual and societal health strategy</td>
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<td>People who are vaccinated against the flu annually can miss a year and still maintain immunity</td>
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<td>After January there is not much point in being vaccinated for the flu</td>
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<td>Most people realize how serious the flu can be</td>
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<td>People with mild illness (i.e. cold, low-grade fever) can still get the flu shot</td>
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<td>Allergy to eggs is a contraindication to the flu vaccine</td>
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<td>Flu vaccination should be offered to all children aged 2 years and older</td>
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<td>Women who are pregnant can be vaccinated during any trimester</td>
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<tr>
<td>Children can receive the flu vaccine at the same time as their childhood immunizations</td>
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Pre-Course Survey

1. How well do you feel you could address patient concerns related to influenza vaccination? (1=not at all, 5=very well)
2. How comfortable do you feel discussing potential safety issues related to the flu vaccine? (1=not at all comfortable, 5=very comfortable)
3. How would you rate your ability to discuss the differences between different influenza vaccine products currently available? (1=no understanding, 5=very good understanding)
4. How confident are you in identifying patients who should or should not receive the flu vaccine? (1=not at all confident, 5=very confident)
5. How confident are you in when to initiate antiviral treatment? (1=not at all confident, 5=very confident)
Pre-Test

1. Which of the following are typical symptoms of influenza?
   a. Gradual onset rash and tiredness
   b. Sudden onset vomiting and diarrhea without a fever
   c. Sudden onset fever, dry cough and tiredness
   d. Gradual onset fever, anorexia and diarrhea

2. Which of the following individuals should you speak to about receiving the influenza vaccine at today’s appointment?
   a. A 22-year old who has an appointment to refill his medications for asthma in the month of May
   b. The mother of a 2-month-old in the month of September (for the child)
   c. A 47-year-old who has an appointment to discuss medication for newly diagnosed diabetes in August
   d. A 65-year-old who received the flu shot in September and is seeing you today to discuss an recent injury received while skiing in December

3. Which of the following individuals would be the best candidate to receive the intra-nasal LAIV?
   a. An 18-month-old child who is otherwise healthy
   b. A 62-year-old female who is otherwise healthy
   c. A 4-year-old child whose mother has had a liver transplant
   d. A 20-year-old male who has recently had an asthma attack

4. What is the best recommendation for a woman who is 2 months’ pregnant who has asked about receiving the flu vaccine?
   a. Any of the vaccines is suitable for her
   b. She should not receive any flu vaccine during pregnancy
   c. She can receive any of the TIV vaccines
   d. She should avoid the flu vaccine that contains an adjuvant

5. Which of the following describes a difference between the TIV and LAIV products?
   a. LAIV can be used in individuals with egg allergies as eggs are not used in the manufacturing process
   b. LAIV should not be used in children with mild asthma but TIV can be used in this population
   c. LAIV has shown greater efficacy over TIV in all age groups
   d. LAIV should be avoided in health care workers due to the risk for viral shedding
6. Which of the following is the ideal immunization approach for a 10-month old child who has never received the influenza vaccine in the past?
   a. Two doses (0.25 mL) of TIV (Fluviral®, Agriflu®, Vaxigrip®, or Fluzone®) at least two months apart
   b. Two doses of LAIV (FluMist®) at least four weeks apart
   c. Two doses (0.25 mL) of TIV (Fluviral®, Agriflu®, Vaxigrip®, or Fluzone®) at least four weeks apart
   d. Two doses (0.5 mL) of TIV (Fluviral®, Agriflu®, Vaxigrip®, or Fluzone®) at least four weeks apart

7. Which of the following statements regarding flu and the flu vaccine use in individuals 65 years of age and older is true:
   a. Only those with chronic disease are considered to be at high-risk for complications related to influenza
   b. Adjuvanted TIV is required to stimulate an immune response
   c. Vaccination should occur late into the season to ensure immunity lasts into the spring
   d. All individuals 65 years of age and older should receive the flu vaccine

8. Jane is a 37-year-old female who would like to receive the flu vaccine. She has been told in the past that her allergy to eggs is a contraindication. She tells you that her reaction to eggs is a rash and that she has never had a respiratory response after exposure. What would you advise in this situation?
   a. Jane should not receive the vaccine due to her egg allergy
   b. Jane can receive the full dose of the TIV vaccine with observation for 30 minutes following administration for symptom development
   c. Jane requires an influenza vaccine skin test prior to administration of the vaccine
   d. Jane can receive a full dose of the LAIV vaccine with observation for 30 minutes following administration for symptom development

9. Scott is a 10-year-old boy who has mild asthma. He is generally well controlled with an ‘as needed’ bronchodilator which he uses before playing sports. He has an appointment today for his flu vaccine. She has told Scott that he no longer needs to get the needle for this immunization. His mother tells you that two days ago Scott had a severe asthma attack at school and has been started on a 5-day course of prednisone. What advice should you give Scott’s mother about the flu shot today?
   a. Scott can receive the IN LAIV vaccine today as asthma is not a contraindication
   b. Scott can receive the vaccination today but he will need to be given the IM TIV product
c. Scott can receive the LAIV but he will need to wait until he has finished his course of prednisone and have had at least 7 days without wheezing
d. B or C

10. Francine is a 34-year-old mother of two children - Emily aged 8 months and Dustin aged 30 months. She has come to see you today to have Dustin receive his flu shot for the first time. What information should you give Francine about vaccinating her children?
   a. Both children should be vaccinated today but Emily must receive the TIV while Dustin can receive either TIV or LAIV
   b. Only Dustin can receive vaccination at this time and he can receive either TIV or LAIV
   c. Only Dustin can receive vaccination at this time and he can receive either TIV or LAIV
   d. Both children should be vaccinated today and they can both receive LAIV
Introduction

Epidemiology

Each year in developed countries, between 10% and 20% of the population becomes infected with influenza. (1) In Canada, the influenza season generally begins in the late fall but can begin as early as August. (2) As of January 5, 2013 there have been 13,073 confirmed cases of influenza in Canada. (3) Influenza is more common in children but the greatest number of serious illness, disability and death are highest in older persons (>65 years) or those with underlying medical conditions. (2)

Influenza vs. the common cold

Testing to confirm influenza is often either not sought out or is sought too late which leads to both underreporting of the disease and also misdiagnosis as a common cold. Onset of flu symptoms is generally sudden and last a week to ten days; however, severe complications, which can prolong recovery, can occur in those 65 years of age and older or adults and children with chronic conditions. (2)

Did you know?
Despite clear benefits and safety with the flu vaccine, immunization rates continue to be low.

Just how serious is the flu?

The flu is serious

While the true burden of influenza is difficult to determine due to underreporting, it is estimated that in any year there are up to 20,000 hospitalizations and 4,000 deaths related to influenza (mostly seniors). (2)

Cases of adult influenza-related hospitalizations during the 2011-2012 year are believed to be under-reported due to different reporting requirements in the provinces and territories. The Public Health Agency of Canada (PHAC) reports that from September 2011 to April 2012, 858 influenza-associated hospitalizations were reported – of these, only 43% of these individuals had been immunized. Fifty-five percent of these individuals were 65 years of age or older in this period. There were 73 influenza-related deaths reported of which 78% were 65 years of age or older. (2)

During the 2011-2012 influenza season there were over 500 pediatric influenza-associated hospitalizations and five deaths were reported. Immunization data was gathered on about 60% of these cases that showed that only 12% were immunized for the current season. (2)

Comment [NM1]: Symptoms generally include:
- headache
- chills
- cough
- fever
- loss of appetite
- muscles aches
- fatigue
- runny nose
- sneezing
- watery eyes
- throat irritation
Less commonly in adults but more often in children symptoms may also include:
- nausea
- vomiting
- diarrhea
- otitis media

Comment [NM2]:
- pneumonia
- Kidney failure
- encephalitis
- death

Comment [NM3]:
- heart disease
- liver disease
- kidney disease
- blood disorders
- diabetes
- severe obesity
- asthma and chronic lung disease
- people taking cancer drugs or people with HIV/AIDS
- neurological disorders
- splenectomy
- lymphoma

How to ‘Influenze’ your patients’ decisions about the flu shot - www.advancingin.com
Influenza transmission

Influenza viruses are spread from person to person primarily through droplets (e.g., when an infected person coughs or sneezes near a susceptible person) and by touching objects and surfaces that are contaminated with the virus (e.g., doorknobs, telephone receivers).

Did you know?
The following measures can reduce the spread of influenza:
- Good hand hygiene practices, such as hand-washing or use of an alcohol-based hand rub after contact with the eyes, mouth, nose or secretions
- Avoid handling soiled tissues or objects used by an ill person
- Cover coughs and sneezes
- Stay home if you are ill

The incubation period for influenza is 24 to 72 hours. Adults with influenza remain infectious for 3 to 5 days after onset of symptoms, and children may remain infectious for up to a week after onset. (3)
Immunity

Immune response

The immune system is a network of cells, proteins, tissues and organs that prevent infection and growth of bacteria, viruses and parasites in the body. It has two components: the innate system and the adaptive (or acquired) system. The flu vaccine contains antigens from up to three viruses that stimulate an immune response without causing symptoms of the disease. Following vaccination, the immune system recognizes the antigens on the surface of the viruses selected for the vaccine and produce virus-specific antibodies to help the body fight the infection.

Selection of the vaccine components and antigenic drift and shift

Viral genomes are constantly mutating, producing viruses with new forms of antigen. If the new antigen forms are sufficiently different from the antigens used for previous years’ vaccination the individual’s immune system will not respond to it. This process of viral mutation to produce new influenza strains is referred to as either antigenic drift or antigenic shift. To meet the challenge of antigenic drift and shift, individuals need to receive a vaccination annually.

The influenza viruses selected for inclusion in the seasonal flu vaccines are updated each year based on which influenza virus strains are circulating, how they are spreading, and how well current vaccine strains protect against newly identified strains.

National influenza centers conduct year-round surveillance for influenza and study influenza disease trends. Vaccine viruses are chosen to maximize the likelihood that the influenza vaccine will protect against the viruses most likely to spread and cause illness among people during the upcoming flu season. The World Health Organization (WHO) recommends specific vaccine viruses for inclusion in influenza vaccines, but each individual country makes their own decision for which strains should be included in influenza vaccines licensed in their country.

On February 23, 2012 the WHO recommended that the Northern Hemisphere’s 2012-2013 seasonal influenza vaccine be made from the following three vaccine viruses:

• A/California/7/2009 (H1N1)pdm09-like virus;
• A/Victoria/361/2011 (H3N2)-like virus;
• B/Wisconsin/1/2010-like virus (from the B/Yamagata lineage of viruses).
While the H1N1 virus used to make the 2012-2013 flu vaccine is the same virus that was included in the 2011-2012 vaccine, the recommended influenza H3N2 and B vaccine viruses are different from those in the 2011-2012 influenza vaccine for the Northern Hemisphere.

**Ideal time for vaccination against the flu**

Humoral antibody levels that correlate with vaccine protection are generally achieved by two weeks after immunization. Given the potential for influenza activity to start early in the fall season, health care providers should offer the seasonal vaccine as soon as it becomes available. Various factors may influence local decisions for when to start vaccination and practitioners should follow the local public health recommendations.(2)

Ideally, vaccination should be done prior to the start of influenza season; however, immunization against the flu can be ongoing throughout and up to the end of the influenza season – even if influenza activity has been documented in the local community.(2)

**Potential patient barriers to immunization**

Each year, individuals need to make the decision regarding immunization against the flu for themselves and/or their family. While vaccination confers individual protection, immunization programs are a population-based health strategy and broad public protection relies on high immunization coverage rates. Many patients do not get the flu shot because of concerns or fears they may have which may not be grounded in facts. These beliefs present barriers to immunization, which the health care provider needs to be prepared to identify and address. Here are some of the common concerns people may raise and information to help address those concerns:

The flu isn’t a serious disease.

Influenza is a serious disease affecting the respiratory tract and in susceptible individuals can lead to pneumonia, other serious conditions and death. The elderly are at greatest risk for catastrophic disability; however children are also high risk for complications. Last year there were 524 pediatric influenza-related hospitalizations. The following links can bring home the significance of influenza in children.

http://youtu.be/aJzcVHB0PXQ
I have never had the flu shot and I haven’t gotten sick so why start getting it now?

Programmer, please toggle to the following information:

The concept of herd immunity supports the notion that a population with a high percentage of people immunized against a particular infection will result in less non-immunized people getting the infection. A number of electronic resources are available to help practitioners talk about herd immunity in a way that helps patients understand why vaccination is not simply for the purpose of individual protection against disease but is a population or societal health strategy. This is an important message to help individuals realize why they may not have become sick when not being immunized as well as helping to explain how individual immunization helps protect the broader community.

http://www.nhs.uk/Video/Pages/Vaccinationanimation2.aspx?searchtype=Search&searchterm=vaccination&offset=1&
http://www.health.harvard.edu/video/herd-immunity/

Side effects from the flu shot are as bad as getting the flu.

Programmer, please toggle to the following information:

The flu vaccine is generally well tolerated; side effects from the injection are generally sore arm (injection site reactions such as redness, swelling or itch). Intranasal administration generally causes some nasal congestion.

Adverse events related to immunization should be reported to the Canadian Adverse Events Following Immunization Surveillance System (CAEFISS) as part of the post-marketing surveillance for vaccines approved for use in Canada. A useful link can be found at: http://www.phac-aspc.gc.ca/im/vs-sv/caefiss-eng.php. Pediatric post-marketing surveillance adverse event reporting as well as vaccine failures and selected infectious diseases can be sent to the Canadian Immunization Monitoring Program, Active (IMPACT) at: http://www.cps.ca/en/impact.

Comment [NM10]: Patients may raise concern about Guillain-Barre Syndrome (GBS) and the flu. There was an increased risk for GBS associated with the 1976 influenza vaccine that protected against the swine flu. The cause for this is unknown. It is important that individuals understand the risk of this occurring is small—for example, there was approximately 1 individual develop GBS for every 100,000 who got the swine flu in 1976.
I’m healthy and so I don’t need the flu shot.

Programmer, please toggle to the following information:

The National Advisory Committee on Immunization (NACI) encourages influenza vaccine for all Canadians, because significant illness and societal costs also occur in people not considered to be at high risk of complications.

It’s too late for me to get it this year.

Programmer, please toggle to the following information:

Flu vaccine can be given before or during the flu season. The best time to get vaccinated is October to mid-November. But you can get vaccinated throughout the influenza season as outbreaks can occur right through to the spring.

I had the flu shot last year so I don’t need to get it this year.

Programmer, please toggle to the following information:

The influenza virus strains circulating the world change on a regular basis. This is why the vaccine is developed against the influenza viruses most likely to spread. Even if you got vaccinated last year, you may not be protected against this year’s flu.

I have asthma so I shouldn’t get the flu shot.

Programmer, please toggle to the following information:

Stable, non-severe asthma is not a contraindication to the flu shot.

NACI recommends the following regarding who should be immunized:

- Individuals at high risk of influenza-related complications including:
  - adults and children with underlying health conditions including cardiac and pulmonary disorders, metabolic disorders, renal disease, and anemia;
  - residents of nursing homes and other chronic care facilities;
  - people ≥ 65 years of age;
  - children 6 to 59 months of age;
  - pregnant women; and
  - Aboriginal peoples;

- Individuals capable of spreading influenza to individuals at high risk of complications such as:
  - health care providers in facilities and community settings;
  - household contacts of high-risk persons including infants <6 months of age;
  - those providing care to children ≤ 59 months of age; and
  - those providing services in closed settings to those at high risk (e.g. crew on a ship); and

- Individuals who provide essential community services.
Practitioners should assess the history of reactions to egg in individuals reporting to be egg-allergic. CSACI defines egg allergy as immediate symptoms within 1-2 hours after exposure, such as urticarial and angioedema, respiratory, GI or cardiovascular symptoms plus confirmatory allergy tests.

Individuals are considered to be at lower risk for severe allergic reaction to the flu vaccine if:
- they have mild GI or local skin reaction to egg
- can tolerate ingestion of small amounts of egg or
- they have a positive skin/specific IgE test to egg when exposure to egg is unknown

These individuals can be vaccinated for influenza using a single vaccine dose.

Individuals are considered to be at higher risk for severe allergic reaction to the flu vaccine if:
- they have a history of respiratory or cardiovascular reaction to egg
- they have generalized hives when exposed to egg
- They have poorly controlled asthma

Immunization for the flu in these individuals can be delivered using one of two protocols defined by CSACI including:
- A regular full dose of inactivated vaccine with observation for 30 minutes for development of symptoms
- A two-step graded dosing approach in which the individual is given 10% of the dose followed by 30 minutes of observation. If no symptoms develop, they can be given the remaining 90% of the dose with observation for a further 30 minutes.

You can get the flu shot at the same time you have a mild fever or if you have a mild respiratory illness (like a cold). But if you are very sick, you may need to get your flu shot at another time. There is the concern that these individuals may not return for the vaccine if not given at the initial time they present.
Influenza Vaccines in Canada

Products currently available

There are currently eight seasonal trivalent vaccines authorized for use in Canada; provinces and territories may limit coverage to specific products based on various factors such as cost-benefit evaluation, product shelf-life or program implementation strategy. For 2012-2013, six of the eight authorized vaccines will be available to some extent throughout Canada.

Practice Pearl
Continue to immunize patients against the flu throughout the entire flu season even if influenza is actively circulating or has circulated in your community. There can be more than one influenza peak and the season can extend well into April.

The eight authorized flu vaccines contain strains of influenza viruses that are antigenically equivalent are latex-free and are manufactured using a process involving chicken eggs; however, they may differ in several respects.

Patient-specific vaccine selection

With a variety of products from which to potentially select, what are some of the major differences that may influence product selection?

NACI provides a summary of influenza vaccine indications by patient age. Some of the important differences in product formulation include:

- Route of administration
- Inactivated vs. live attenuated vaccine type
- Inclusion of an adjuvant

Route of administration

Routes of administration for authorized products include: intramuscular (IM), intradermal (ID) and an intranasal (IN) spray. Currently the product approved for intradermal administration is not available through publicly funded programs in Canada.

There are currently no published studies describing the effects of intradermal TIV on rate or outcomes of influenza. Manufacturer funded studies demonstrate non-inferiority for immunogenicity compared to IM TIV (9 µg ID vs. 15 µg IM in adults 18-59 years of age and 15 µg ID vs. 15 µg IM in adults over 60 years of age). ID of administration is thought to be effective due to the large number of antigen-presenting dendritic cells found in the skin – which may stimulate both antibody production and cell-mediated immune responses.
Inactivated vs. live attenuated vaccine type
IN live attenuated influenza vaccine (LAIV) produces both local mucosal and systemic antibody response that produces an immune response that mimics an immune response that mimics natural infection with wild-type viruses – the local mucosal antibodies protect the upper respiratory tract that is thought to be more important for protection than serum antibody response. IN administration demonstrated superior efficacy compared to TIV in studies in children aged 6 months to 18 years of age and was of similar efficacy in individuals 18-59 years of age. (2) It is suitable for individuals in these age groups who are unwilling to receive immunization involving needles. Individuals who are concerned about the use of a live vaccine should be educated that an attenuated live vaccine is a vaccine prepared from live microorganisms or viruses cultured under adverse conditions leading to loss of their virulence but retention of their ability to induce protective immunity.

Inclusion of an adjuvant
Influenza complications are most severe in individuals with a weakened immune system such as the elderly and those with chronic conditions. The use of adjuvants has been proposed as a strategy to increase the efficacy of vaccines for increasing immunogenicity. The efficacy of adjuvant-containing influenza vaccine compared to non-adjuvant influenza vaccine was studied in residents in long-term care (n=3178). This study demonstrated that adjuvant-containing vaccine was more effective than non-adjuvant-containing vaccine in preventing influenza-like illness (not laboratory confirmed influenza) in patients with chronic illnesses. Currently NACI does not preferentially recommend the use of adjuvant-containing influenza vaccine over non-adjuvant products.
Case 1 – I’m healthy, do I need the flu shot?

MEET the patient

Sandra is a 32-year-old female who has a 6-month-old daughter. Sandra has a regular appointment today and asks about the flu vaccine for herself and her daughter. Sandra is an otherwise healthy individual who has received the flu vaccine yearly in the past she worked as a nurse at a local hospital. She is now on maternity leave and wonders whether the vaccine is still necessary. Her daughter is now due for her routine immunizations (e.g. DTaP-IPV, Hib) and she isn’t sure when the flu shot should be given.

Flu vaccine use in healthy adults

There are a variety of influenza vaccines now authorized for use in Canada and so it is important for practitioners to be familiar with the differences between products related to age indications, route of administration and dosage.

NACI makes the following recommendation regarding influenza vaccine use in Canada:

To reduce the morbidity and mortality associated with influenza, immunization programs should focus on those at high risk of influenza-related complications, those capable of transmitting influenza to individuals at high risk of complications and those who provide essential community services.

While it is important that vaccination efforts be strongly directed toward high-risk groups, significant illness and health care costs can be experienced due to influenza illness in those who are not at high risk. As such, all Canadians should be encouraged to obtain the flu vaccine.

What if Sandra is allergic to aminoglycosides? There is one flu vaccine that does not contain traces of antibiotics (Fluviral®).

What if Sandra said she was allergic to eggs? All flu vaccines authorized for use in Canada are currently produced using egg products although the level of ovalbumin content is small and is associated with low risk for adverse events. NACI currently recommends that egg-allergic individuals may be vaccinated against influenza using TIV but not using LAIV due to lack of data on its safety in egg-allergic individuals. Two vaccine delivery protocols can be used for egg-allergic individuals, depending
on their level of risk for an allergic reaction. Egg-allergic individuals at lower risk for severe allergic reaction can be vaccinated for influenza using a single vaccine dose. The two-step graded protocol is recommended for individuals who are at higher risk for severe allergic reaction.

What if Sandra were pregnant or nursing? All women who are pregnant, regardless of the stage of pregnancy, or nursing should receive the flu vaccine. There are several reasons why women who are pregnant should be vaccinated against influenza. NACI considers the TIV flu vaccine to be both safe and effective for use in pregnant women. LAIV should not be used in pregnant women due to lack of safety data but it is not contraindicated in nursing mothers.

**Flu vaccine use in children under the age of 2**

Sandra is taking her daughter for her regular immunizations in two weeks and she asks you whether she can receive the flu vaccine at the same time. Children who are due for their regular immunizations (e.g. DTaP-IPV, Hib, MMR) can be vaccinated for the flu vaccine at the same time. It is recommended that the health care provider use different injection sites for the two vaccines; however. If this is the first time receiving the influenza vaccine, two doses, a minimum of 4 weeks apart, should be given. In the event that the flu vaccine is not given at the same time as other vaccines, the flu vaccine should be given at least four weeks after the other vaccines. TIV should be used in this age group, as LAIV is not authorized for use in children under age 2 years due to increased risk for wheezing.

Should her daughter receive only a half-dose of vaccine as recommended in prior years? No, the 2012-2013 statement from NACI recommends that children aged 6 to 35 months of age should be given a full dose of TIV (0.5 mL) instead of the previously recommended half dose (0.25 mL) as there is evidence to suggest moderate improvement in antibody response without an increase in reactogenicity with the full dose of vaccine.

**Key learning**

- While individuals at risk for complications are an important group to target immunization promotion, all individuals should consider receiving the flu shot
- Pregnant women can be vaccinated at any time but should receive TIV
- Children can be vaccinated with the flu vaccine at the same time as their regular immunizations
- Egg allergy is not a contraindication to receiving the flu shot
- Children can receive the flu shot as early as 6 months of age. LAIV should not be used in children under the age of 2 due to the increased risk for wheezing

Comment [NM19]:
**Full dose** - A single vaccine dose without the use of a graded challenge. Individuals should be observed for 30 minutes following administration for symptom development.

Comment [NM20]:
**Two-step graded dosing** - A two-step graded process, whereby 10% of the dose is administered followed by 30 minutes of observation. If no symptoms develop, or symptoms are self-resolving, administer the remaining 90% with another 30 minute observation period. If sustained or severe reactions arise after the initial dose, the vaccine is withheld and the individual should be re-evaluated for receipt of the influenza vaccine.

Comment [NM21]:
- Influenza is more likely to cause severe illness in pregnant women compared to non-pregnant women due to changes in the immune system, heart and lungs during pregnancy
- There is an increased risk of premature labor in pregnant women with influenza
- Vaccination during pregnancy provides protection to both mother and child and so the benefits can be seen post-partum when the infant is too young to be vaccinated

Comment [NM22]:
- Measles, mumps and rubella vaccine
Case 2 – I have concerns about the flu shot in my children!

MEET the patient

John is a recent widower with two active school-aged children, Paul who is 8 and Marie who is 4. Paul has stable, non-severe asthma and Marie has no chronic medical conditions. Today John has an appointment to discuss the flu vaccine with you. John has a number of questions about the flu vaccine, which was previously always managed by his wife. Both children are nervous about getting the shot and Marie has been having nightmares about the needle.

The importance of vaccination in children

School aged children carry a significant health care burden related to influenza, as they are an important contributor to influenza-related hospitalizations, emergency room visits and outpatient care. (4)

Did you know?
Herd immunity related to influenza vaccination in children was described in the literature as early as 1972 following an outbreak of Hong Kong Influenza in the Northern Territory of Australia in 1969?

Vaccination is the most effective way to reduce influenza-related morbidity and mortality and it has been shown that vaccinating children aged 5 through 18 years can reduce influenza-related mortality rates in all age groups. (5-7) Despite these benefits, vaccination rates in this population remain low. It is important to remind parents that it’s not always high-risk children who are hospitalized with symptoms of influenza. Children aged 6 months to 2 years need to receive TIV and those 2 years through 17 years of age can receive either TIV or LAIV.

Parental concerns related to vaccination

John has a number of questions about vaccination. He starts by asking what side effects might occur after vaccination. Soreness at the injection site may occur after TIV. Fever and other systemic reactions are infrequent. The most common adverse events after LAIV are nasal congestion and runny nose.

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How can you address Paul’s concern related to Marie’s nightmares regarding the injection? Both TIV and LAIV are vaccine types acceptable for use in children aged 2-17 years of age. LAIV offers advantages for children who are concerned about the injection with TIV.

John had often discussed the use of thimerosal with his wife, who had concerns about it use due to the mercury component. John would like to avoid having his children exposed to it. Can he still have his children vaccinated? Yes. There are a couple of thimerosal-free options for children including the TIV product Agriflu®, and LAIV (FluMist®). Other TIV products that are thimerosal-free are not indicated in individuals less than 18 years of age. Practitioners who have patients who request information about the use of thimerosal in vaccine products can refer to the Canada Communicable Disease Report on this topic.

Special considerations in children

What if Paul has had an episode of wheezing during the last seven days that required a trip to the emergency room? NACI recommends that either TIV or LAIV can be used in children aged 2-17 years of age including those with stable, non-severe asthma. LAIV may confer greater immune response than TIV in healthy children; however LAIV is not recommended in children with medically attended wheezing in the 7 days prior to vaccination.

Practice Pearl
In addition to stressing the importance of vaccinating children, ensure that parents, caregivers and health care providers of children under five years of age also receive the flu vaccine.

What if neither Paul nor Marie had received the flu vaccine in the past? Children aged 6 months through 8 years of age without a history of flu vaccination should receive two full doses of the flu vaccine administered at least 4 weeks apart. This holds true for children whose flu vaccine history is unknown.

What if Paul has a cold on the day he comes for his flu vaccine? Children who have a mild illness, such as a cold, with or without a fever can still be vaccinated against influenza.
Key learning

- Children substantially contribute to the spread of influenza and immunization in this population can have an important societal impact
- IN LAIV can be useful as it provides parents with a non-needle option for vaccination in children 2 years of age and older
- Side effects of the flu vaccine are generally mild and systemic responses are infrequent
- Children with stable non-severe asthma can receive the flu vaccine
- Having a mild illness (i.e. cold, low-grade fever) is not a contraindication to receiving the flu vaccine
Case 3 – Am I too old to benefit from the flu shot?

MEET the patient

James is an elderly gentleman who lives at home with his wife, Cindy. James is 72 years old and is generally in good health. James is responsible for caring for his wife who is currently being treated for cancer.

Flu prevention in the elderly

All individuals 65 years of age or older are considered at high risk for influenza-related complications or hospitalizations regardless of whether they have a chronic health condition. Choice of vaccine for adults over 65 years of age, with or without chronic health conditions, includes any of the TIV vaccines including TIV ID and adjuvanted TIV. LAIV is not indicated in individuals 60 years of age or older. Despite lower immunogenicity and limited data on mortality benefits of the influenza vaccine in the elderly, it remains a cost effective strategy. (8,9)

It is especially important that James receive the vaccine because he cares for someone who is also at high risk, and being vaccinated he will reduce the risk for transmission.

Did you know?
The elderly suffer from immunosenescence. The mechanisms that underlie these age-related development of the immune system and its ability to function range from defects in the hematopoietic bone marrow to defects in peripheral lymphocyte migration, maturation and function. (10)

Special considerations in the elderly

What if James were living in a long-term care facility where there has been an outbreak of influenza and is receiving antiviral therapy? The influenza vaccine should not be given during antiviral therapy due to reduced efficacy. It can be given 48 hours after treatment with the antiviral therapy is completed to ensure that an immune response can be generated.
If all else was the same but if James was 57 years old, could he receive LAIV? No, he should not because individuals can shed the live vaccine for up to 10 days, which might place his wife (who is immune-compromised) at risk for influenza.

**Treating influenza**

What if James were to develop influenza-like symptoms? Treating influenza includes making sure the individual has good fluid intake and gets plenty of rest. Antiviral drugs are important in the treatment and prevention of influenza. The Association of Medical Microbiology and Infectious Diseases provide the following general principles of antiviral treatment in their [guidelines statement on antiviral treatment for influenza](http://www.advancingin.com):

- Treatment should be initiated as rapidly as possible after onset of illness because the benefits are greater with earlier treatment (i.e. <12 hrs. vs. 48 hrs.); benefit is not likely if treatment is delayed more than 48 hours
- Antiviral treatment should be started even after 48 hours post-onset of illness if symptoms are severe enough to warrant hospitalization, is progressive or complicated or the individual belongs to a group at high risk for severe disease
- Treatment duration should routinely be five days but may be continued if clinically indicated

Laboratory testing for influenza may be helpful during an outbreak to determine if influenza is the cause of the outbreak. Samples for influenza testing include nasopharyngeal or throat swab, nasal wash or aspirate as well as blood for antibodies. (11) Testing approaches may include:

- **Rapid influenza test** which provide results within 24 hours which may be useful if it is unclear whether to start antiviral therapy; however, this test offers only ~70% sensitivity.
- **Viral culture**, which provides results in 3 to 10 days making it not useful for the purpose of medication management. Specimens for viral culture should be collected during the early state of disease.
- **Serological testing** is helpful to diagnose recent infection. Two blood samples are collected (one within the first week of infection and the second 2-4 weeks later).

Comment [NM27]: Up to 30% of influenza cases would show a negative test result.
Key learning

- Despite reduced immune response in the elderly, geriatric patients should be offered the flu vaccine
- The flu vaccine can be given 48 hours after completing antiviral therapy
- LAIV can be used in individuals up to the age of 59; however, it should not be used in individuals who are in frequent contact (home, work) with immune-compromised individuals due to shedding of the wild-type virus after vaccination for up to 10 days
- Influenza treatment with antiviral drugs should start early, ideally within 12 hours of symptom onset

Key Learning Points

- Vaccination is the most effective way to prevent influenza occurrence and spread
- Individuals should receive the influenza vaccine yearly even if the strains have not changed
- All individuals should receive the influenza vaccine even if they do not fall into one of the high-risk categories because this can reduce the risk that the disease will spread
- The influenza vaccine is safe and well-tolerated; there are a variety of formulations that permit patient-specific product selection to increase tolerability and effect
- The elderly are the most vulnerable population to complications of the flu but children are also a high risk group and are a large contributor to the spread of the flu virus
Additional Tools and Resources

  - FightFlu.ca offers general information from the Public Health Agency of Canada about the flu and includes links to provincially-relevant flu information for the public and health care providers
  - FluWatch is Canada’s national surveillance system that monitors the spread of flu and flu-like illnesses on an on-going basis. FluWatch reports, posted every Friday, contain specific information for health professionals on flu viruses circulating in Canada.
  - A link to a Public Health Agency of Canada website that offers resources including an information sheet for public display that describes the differences between the flu and the common cold and identifies individuals at risk.
  - An example of a consumer site for information about the flu
  - The current Canada Communicable Disease Report (CCDR) Statement on Seasonal Influenza Vaccine for 2012-2013 prepared by the NACI
- [www.ammi.ca/media/48038/14791_aoki_final.pdf](http://www.ammi.ca/media/48038/14791_aoki_final.pdf)
  - A link to the Association of Medical Microbiology and Infectious Disease Canada guideline for the use of antiviral drugs for influenza (previously included in the NACI Statement in Seasonal Influenza). A link to a useful algorithm is included here: [www.ammi.ca/media/48042/flu_algorithms.pdf](http://www.ammi.ca/media/48042/flu_algorithms.pdf)

Discussion Forum

1. What approaches have you found useful to address patient concerns regarding efficacy or safety of the flu vaccine?
2. What steps have you taken to make sure that all your high-risk patients receive the flu vaccine?
Post-Test

11. Which of the following are typical symptoms of influenza?
   a. Gradual onset rash and tiredness
   b. Sudden onset vomiting and diarrhea without a fever
   c. Sudden onset fever, dry cough and tiredness
   d. Gradual onset fever, anorexia and diarrhea

12. Which of the following individuals should you speak to about receiving the influenza vaccine at today's appointment?
   a. A 22-year old who has an appointment to refill his medications for asthma in the month of May
   b. The mother of a 2-month-old in the month of September (for the child)
   c. A 47-year-old who has an appointment to discuss medication for newly diagnosed diabetes in August
   d. A 65-year-old who received the flu shot in September and is seeing you today to discuss a recent injury received while skiing in December

13. Which of the following individuals would be the best candidate to receive the intra-nasal LAIV?
   a. An 18-month-old child who is otherwise healthy
   b. A 62-year-old female who is otherwise healthy
   c. A 4-year-old child whose mother has had a liver transplant
   d. A 20-year-old male who has recently had an asthma attack

14. What is the best recommendation for a woman who is 2 months’ pregnant who has asked about receiving the flu vaccine?
   a. Any of the vaccines is suitable for her
   b. She should not receive any flu vaccine during pregnancy
   c. She can receive any of the TIV vaccines
   d. She should avoid the flu vaccine that contains an adjuvant

15. Which of the following describes a difference between the TIV and LAIV products?
   a. LAIV can be used in individuals with egg allergies as eggs are not used in the manufacturing process
   b. LAIV should not be used in children with mild asthma but TIV can be used in this population
   c. LAIV has shown greater efficacy over TIV in all age groups
   d. LAIV should be avoided in health care workers due to the risk for viral shedding
16. Which of the following is the ideal immunization approach for a 10-month old child who has never received the influenza vaccine in the past?
   a. Two doses (0.25 mL) of TIV (Fluviral®, Agriflu®, Vaxigrip®, or Fluzone®) at least two months apart
   b. Two doses of LAIV (FluMist®) at least four weeks apart
   c. Two doses (0.25 mL) of TIV (Fluviral®, Agriflu®, Vaxigrip®, or Fluzone®) at least four weeks apart
   d. Two doses (0.5 mL) of TIV (Fluviral®, Agriflu®, Vaxigrip®, or Fluzone®) at least four weeks apart

17. Which of the following statements regarding flu and the flu vaccine use in individuals 65 years of age and older is true:
   a. Only those with chronic disease are considered to be at high-risk for complications related to influenza
   b. Adjuvanted TIV is required to stimulate an immune response
   c. Vaccination should occur late into the season to ensure immunity lasts into the spring
   d. All individuals 65 years of age and older should receive the flu vaccine

18. Jane is a 37-year-old female who would like to receive the flu vaccine. She has been told in the past that her allergy to eggs is a contraindication. She tells you that her reaction to eggs is a rash and that she has never had a respiratory response after exposure. What would you advise in this situation?
   a. Jane should not receive the vaccine due to her egg allergy
   b. Jane can receive the full dose of the TIV vaccine with observation for 30 minutes following administration for symptom development
   c. Jane requires an influenza vaccine skin test prior to administration of the vaccine
   d. Jane can receive a full dose of the LAIV vaccine with observation for 30 minutes following administration for symptom development

19. Scott is a 10-year-old boy who has mild asthma. He is generally well controlled with an ‘as needed’ bronchodilator which he uses before playing sports. He has an appointment today for his flu vaccine. She has told Scott that he no longer needs to get the needle for this immunization. His mother tells you that two days ago Scott had a severe asthma attack at school and has been started on a 5-day course of prednisone. What advice should you give Scott’s mother about the flu shot today?
   a. Scott can receive the IN LAIV vaccine today as asthma is not a contraindication
   b. Scott can receive the vaccination today but he will need to be given the IM TIV product
c. Scott can receive the LAIV but he will need to wait until he has finished his course of prednisone and have had at least 7 days without wheezing

d. B or C

20. Francine is a 34-year-old mother of two children - Emily aged 8 months and Dustin aged 30 months. She has come to see you today to have Dustin receive his flu shot for the first time. What information should you give Francine about vaccinating her children?

a. Both children should be vaccinated today but Emily must receive the TIV while Dustin can receive either TIV or LAIV

b. Only Dustin can receive vaccination at this time and he can receive either TIV or LAIV

c. Only Dustin can receive vaccination at this time and he can receive either TIV or LAIV

d. Both children should be vaccinated today and they can both receive LAIV
References


