

Training Bulletin

Influenza Educational Review 2016/2017

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Emergency Health Services Branch
Ministry of Health and Long-Term Care



To all users of this publication:

The information contained in this training bulletin has been carefully compiled and is believed to be accurate at date of publication.

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Influenza Educational Review 2016/2017

Introduction

Influenza continues to be a major cause of morbidity and mortality worldwide. Influenza is ranked among the top 10 leading causes of death among the Canadian population. The Fluwatch program which collects flu related data and reports an average of 23,000 laboratory confirmed cases of influenza annually. ¹Health Canada estimates that in a given year up to 12,200 hospitalizations related to influenza may occur and that as many as 3,500 Canadians, mostly seniors, may die of influenza and other serious flu-related complications. Rates of influenza infection are highest in children aged 5-9 years, but rates of serious illness and death are highest in children aged <2 years, older persons (>65 years), and persons with underlying medical conditions. It is estimated that between 10-20% of the population becomes infected with influenza each year. ¹ Both the Public Health Agency of Canada (PHAC) and the Center for Disease Control and Prevention (CDC) in the United States recognize that the morbidity and mortality from influenza can be significantly reduced through the vaccination of recommended recipients (*i.e.* people at high risk of influenza-related complications or those more likely to require hospitalization, people capable of transmitting influenza to those at high risk for complications, including health care and other care providers).¹

- In Ontario, a Universal Influenza Immunization Program (UIIP) offers influenza vaccine at no cost to anyone 6 months of age and older who lives, works or attends school in Ontario. The influenza vaccine may be administered to anyone ≥ 6 months of age who do not have any contraindications.¹
- For the 2016/17 UIIP in Ontario, the following publicly funded vaccines will be available: trivalent inactivated influenza vaccine (TIV), quadrivalent inactivated influenza vaccine (QIV) and live attenuated influenza vaccine (LAIV). TIV is available for persons 18 years of age and older, QIV is available for children 6 months to 17 years of age and LAIV is available for children 2 to 17 years of age.
- Current influenza vaccines authorized for use in Canada are immunogenic, safe and associated with minimal side effects. All influenza vaccines available for use in Canada have been authorized for use by Health Canada.¹

For more information on the UIIP for the 2016/2017 season, please refer to the ministry's website at <http://www.health.gov.on.ca/en/pro/programs/publichealth/flu/uiip/>.

¹ Public Health Agency of Canada. *An Advisory Committee Statement (ACS) National Advisory Committee on Immunization (NACI) – Canadian Immunization Guide Chapter on Influenza and Statement on Seasonal Influenza Vaccine for 2016-2017*. Ottawa, ON. Retrieved August 2016 from <http://www.phac-aspc.gc.ca/naci-ccni/assets/pdf/flu-2016-grippe-eng.pdf>

The past experience of Health Care Workers (HCWs), including paramedics, has provided them with a heightened awareness about infectious respiratory diseases, their higher risk of acquiring viral respiratory infections related to occupational exposure and their potential to unknowingly transmit such infections to high risk patients based on the following risks:

- Adults may spread influenza to others one (1) day before the onset of symptoms and up to 5 to 7 days after infection, and
- Many health care workers experience sub-clinical infection.¹ In a British study, 59% of HCWs with serologic evidence of recent influenza infection could not recall having influenza.²

In 2009, the (H1N1) 2009 influenza virus emerged as a global pandemic threat. CDC reports only two (2) subtypes of influenza A viruses, (H1N1 and H3N2) are currently circulating among humans.³ “Based on knowledge about past pandemics, the H1N1 (2009) virus is expected to continue to circulate as a seasonal virus for some years to come.”⁴

There are programs that monitor circulating strains of the flu virus (like H1N1) and assess their sensitivity to antiviral medications. The three seasonal influenzas – A, B, and C cannot be reliably predicted and as such, paramedics must remain alert and take all necessary precautions when managing patients with suspected infectious respiratory illnesses.

One of the most important lessons learned as a result of respiratory infection outbreaks is that prevention is the key to containing and controlling the spread of infectious diseases, including influenza. Systematic reviews have also demonstrated that influenza vaccine decreases the incidence of pneumonia related hospital admissions, deaths in the elderly, the number of physician visits, hospitalizations, deaths and exacerbations in high risk persons.¹

The National Advisory Committee on Immunization (NACI) releases an annual statement on influenza vaccination which provides medical, scientific and public health advice relating to influenza vaccination. The information in this training bulletin includes information and the recommendations from the NACI *Statement on Seasonal Influenza Vaccine for 2016-2017*.

² Nguyen-Van-Tam J, Granfield R, Pearson J, Fleming, D., & Keating, N. (1999). Do influenza epidemics affect patterns of sickness absence among British hospital staff? *Infection Control and Hospital Epidemiology*, 20(10), 691-694.

³ Centers for Disease Control and Prevention. (2013). *Influenza Type A Viruses and Subtypes*. Retrieved April 2013 from <http://www.cdc.gov/flu/avianflu/influenza-a-virus-subtypes.htm>

⁴ Centers for Disease Control and Prevention. (2010). *2009 H1N1 Flu*. Retrieved August 2010.

The following is a summary of the changes that have been incorporated into the Influenza Educational Review for 2016/2017 based on the advice presented within the NACI *Statement on Seasonal Influenza Vaccine for 2016-2017*.¹

- Seasonal trivalent vaccine for 2016-2017 is available through the publicly funded UIIP as recommended by the WHO for the northern hemisphere and it contains the following: an A/California/7/2009 (H1N1)pdm09-like virus; an A/Hong Kong/4801/2014 (H3N2)-like virus, and a B/Brisbane/60/2008-like virus.
- WHO recommends that the seasonal quadrivalent influenza vaccines for 2016-2017 contain two (2) influenza B viruses. The vaccines will contain the above three (3) viruses and B/Phuket/3073/2013-like virus.⁵

There are a number of key information points for recommended recipients of the influenza vaccine. The following is an outline:

- Adults who have previously received the seasonal influenza vaccine should continue to receive one full dose of TIV influenza vaccine each year. Similarly, children who have previously received the seasonal influenza vaccine should receive one full dose of QIV influenza vaccine each year.
- NACI recommends influenza vaccination for all individuals aged 6 months and older, with particular focus on people at high risk of influenza-related complications or hospitalizations, including all pregnant women and people capable of transmitting influenza to those at high risk.
- After careful review, NACI concluded that egg allergic individuals may be vaccinated against influenza using the full dose of live attenuated influenza vaccine (LAIV). NACI also recommends that egg allergic individuals may be vaccinated against influenza using inactivated TIV or QIV without a prior influenza vaccine skin test and with the full dose, with consideration being given to the most appropriate setting for the vaccine administration. These individuals should always be kept under observation for 30 minutes post vaccination.
- As a precautionary measure, LAIV recipients should avoid close association with persons with severe immune compromising conditions (*e.g.*, bone marrow transplant recipients requiring isolation) for at least two weeks following vaccination, because of the theoretical risk of transmitting a vaccine virus and causing infection.
- NACI recommends that TIV, instead of LAIV, should be used for health care workers providing care to those with immune compromising conditions, unless the individual will only accept LAIV. NACI takes a precautionary approach with this recommendation based on a theoretical concern that the live virus in the LAIV may shed vaccine virus that could be transmitted to a person with an immune compromising condition who could theoretically develop serious illness.⁶
- NACI recommended avoiding re-vaccination if Guillain-Barré syndrome (GBS) developed within six weeks after a previous influenza immunization.

⁵ World Health Organization. (2015). *Recommended composition of influenza virus vaccines for use in the 2016-2017 northern hemisphere influenza season*. Retrieved August 2016 from http://www.who.int/influenza/vaccines/virus/recommendations/2016_17_north/en/

⁶ Centers for Disease Control and Prevention. (2014). *How Flu Spreads*. Retrieved September 2014 from: <http://www.cdc.gov/flu/about/disease/spread.htm>

- NACI recommends that if a health care worker, or another caregiver, receives LAIV and is providing care to individuals with severe immune compromising conditions (defined as hospitalized and requiring care in a protected environment), they should wait two weeks following receipt of LAIV before continuing to provide care to such individuals.⁷
- NACI recommends that either the inactivated or the live attenuated influenza vaccine can be administered either on the same day or at least four weeks apart as other live attenuated or inactivated vaccines. In theory, the administration of two live vaccines sequentially with less than 4 weeks could reduce the efficacy of the second vaccine. However, studies have shown there is no interference when administering LAIV concomitantly with measles, mumps, rubella (MMR) measles, mumps, rubella, varicella (MMRV) or oral polio live vaccines.
- Children 6 months to less than 9 years of age who have never received the influenza vaccine before need two doses` given 4 weeks apart this influenza season.
- All of the influenza vaccines available under the UIIP have been authorized for use in Canada.

The following individuals should not get the LAIV:

- Children younger than 2 years of age (due to increased risk of wheezing);
- People who have had a serious allergy (anaphylaxis) to a previous dose or to any ingredient in the vaccine, with the exception of egg*;
- People who have developed Guillain-Barré Syndrome (GBS) within six weeks of a previous influenza vaccination;
- People with severe asthma (on high dose inhaled or oral steroids or medically attended wheezing in the last 7 days prior to vaccination) or active wheezing;
- People with weakened immune system due to disease or medical treatment;
- People who are on long-term aspirin or aspirin-containing therapy;
- People taking a medication active against influenza (influenza antiviral medication);
- Pregnant women**.

* NACI concludes that egg allergic individuals may be vaccinated against influenza using the full dose of LAIV.

** Breastfeeding mothers, upon consultation with their health care provider, may receive LAIV as long as they do not have any contraindication to getting that vaccine, as noted above.

⁷ National Advisory Committee on Immunization. (2011) Recommendations on the use of live, attenuated influenza vaccine (Supplemental Statement on Seasonal Influenza Vaccine for 2011-2012. *Canada Communicable Disease Report*, 37(ACS-7), 1-77.

NOTE: Both children and adults can shed live vaccine viruses from their nose after LAIV administration and studies have shown that younger children are more likely to shed virus than older children and adults. Younger children also shed higher numbers of virus than older children and adults. Children may shed for an average duration of 7.6 days, with peak shedding around day 2-3 after vaccination; shedding is infrequent after day 11 post vaccination.

It is rare for shed virus to spread to others and cause illness since shedding generally occurs at levels too low to transmit the virus.

Serious illnesses have not been reported among unvaccinated persons infected with vaccine virus through close contact with a vaccinated person. However, as a precautionary measure, LAIV recipients should avoid close contact with persons with severe immune compromising conditions (e.g., bone marrow transplant recipients requiring isolation in hospital) for at least two weeks following vaccination, because of the theoretical risk for transmitting a vaccine virus and causing infection. No transmission has ever been reported in a health care setting.

The following are the changes in the influenza vaccine recommendations since the release of the *Statement on Seasonal Influenza Vaccine for 2016-2017*:

- NACI now includes adults with neurologic or neurodevelopment conditions among the groups for whom influenza vaccination is recommended.

In their *Statement on Seasonal Influenza Vaccine for 2016-2017*; NACI considers “the provision of influenza vaccination for HCWs involved in direct patient care to be an essential component of the standard of care for influenza prevention for the protection of their patients. HCWs who have direct patient contact should consider it their responsibility to provide the highest standard of care, which includes receiving annual influenza vaccination. Refusal of HCWs who have direct patient contact to be immunized against influenza implies failure in their duty of care to patients.”¹

For the purposes of the document, NACI defines a HCW as a person who provides direct patient care as well as an individual who provides health services in an indirect fashion, such as a person who performs administrative activities. The term “direct patient contact” is defined as activities that allow opportunities for influenza transmission between HCWs and patients. Vaccination of paramedics should be encouraged in order to minimize the disruption of services and routine activities during annual epidemics. Employers and paramedics should consider yearly influenza immunization as this has been shown to decrease work absenteeism due to respiratory and other illnesses.¹

This training bulletin has been produced to provide paramedics with the information necessary to help limit the spread of influenza. This information is especially important since a substantial number of patients transported in ambulances each year are within the high risk categories. The information within the Routine Practices and Additional Precautions section of this bulletin is consistent with the *Patient Care and Transportation Standards* version 2.2 and the *Infection Prevention and Control-Best Practices Manual for Land Ambulance Paramedics* (March 2007).

What is Influenza?

Influenza, commonly referred to as the “flu”, is a highly contagious respiratory disease that is caused by the influenza virus and generally occurs each year in the late fall and winter months. There are three types of influenza viruses, influenza A, B and C.¹

Human influenza viruses A and B are responsible for seasonal epidemics, while influenza type C infections typically cause a much milder respiratory illness and are not thought to cause epidemics. Influenza A viruses are classified into subtypes on the basis of two surface antigens: hemagglutinin (HA) and neuraminidase (NA). Three subtypes of hemagglutinin (H1, H2 and H3) and two subtypes of neuraminidase (N1 and N2) are associated with widespread human influenza A infection.

Immunity to the HA and NA proteins will reduce the likelihood of becoming infected and lessens the severity of the disease if infection does occur. Infection with a virus of one subtype gives little or no protection against viruses of other subtypes. Influenza B viruses have evolved into two antigenically distinct lineages since the mid-1980's; represented by B/Yamagata/16/88-like and B/Victoria/2/87-like viruses. Viruses from both the lineages contribute to influenza illness each year.¹

Over time, influenza viruses can change or mutate. The most common way that a virus can change is called “antigenic drift”. The small changes that occur in the virus produce “new” virus strains that may not be recognized by the body’s immune system. Antigenic drift, which may occur in one or more influenza vaccine components, generally requires seasonal influenza vaccines to be reformulated annually. This is the main reason why people get influenza multiple times throughout their lifetime and why annual immunization is recommended.¹

More than 100 viruses are capable of causing respiratory infections with similar symptoms. Influenza vaccines provide protection from influenza only. This is the reason that people who receive the flu vaccine may still experience colds and influenza-like illness as other respiratory organisms can cause symptoms similar to influenza.

Identification of Influenza Strains for Vaccine Purposes

Antigenic characteristics of current and emerging influenza strains are tracked by the WHO. This allows the WHO to recommend the most appropriate strains to be included in each year’s supply of influenza vaccine. LAIV contain standardized quantities of fluorescent focus units (FFU) of live attenuated influenza virus reassortants. Inactivated seasonal influenza vaccines (TIV) contain standardized amounts of the HA protein from representative seed strains of the two human influenza A subtypes (H3N2 and H1N1) and one of the two influenza B lineages (Yamagata or Victoria). QIV contain standardized amounts of the HA protein from the representative seed strains of the two human influenza A subtypes (H3N2 and H1N1) and from the two influenza B lineages (Yamagata and Victoria).¹ All influenza vaccines that the WHO predicts will best provide immunity to the influenza types are determined to be associated with the next influenza season.

The publicly funded influenza vaccines offered through the UIIP will contain the following recommended trivalent vaccines use in the 2016-2017 influenza season (northern hemisphere winter): an A/California/7/2009 (H1N1)pdm09-like virus and A/Hong Kong/4801/2014 (H3N2)-like virus and a B/Brisbane/60/2008-like virus. Also, the WHO recommended that quadrivalent vaccines containing two influenza B viruses contain the above three viruses and a B/Phuket/3073/2013-like virus.

Seasonal Influenza Vaccine Effectiveness

Protection from the vaccine generally develops by two weeks after the vaccination, and may last up to one year in healthy adults and children. When there is a good match between circulating influenza virus and the vaccines for the current season, the vaccine is 60-80% effective in healthy children and adults and about 50% in the elderly. Vaccination is the most effective way to prevent flu. Although the flu shot is not 100% effective, it still prevents many illnesses, hospitalizations and deaths due to flu.

Systematic reviews have also demonstrated that influenza vaccine decreases the incidence and severity of pneumonia, hospital admission, work absenteeism and death in the elderly.¹

Best efforts are made to predict the upcoming year's circulating strain(s) and to include those strains in the vaccine, however, there may be influenza seasons where a good match is not achieved. In these seasons, the efficacy of the vaccine is not optimal, but still provides some measure of protection.

Each year there is a new vaccine to protect against the influenza virus strains that are expected in the coming influenza season. Even if the strains have not changed, getting the influenza vaccine every year is necessary to maximize protection.¹

Signs and Symptoms of Influenza

A person is considered contagious and can spread the influenza virus up to one (1) day before the onset of symptoms during the incubation period with a communicability of 3 to 7 days from clinical onset of symptoms.⁸ Heymann, 19th edition states; “The average incubation period is 1-4 days (on average 2 days) and the period of communicability is greatest in the first 3-5 days of illness but can last up to 10 days or longer in immune-compromised persons”⁹. Persons with sub-clinical infection are also capable of spreading the infection.² Influenza symptoms usually come on suddenly and may include any of the following signs and symptoms:

- Fever, chills
- Sore throat
- Headache
- Tiredness (can be extreme)
- Body aches
- Dry cough
- Loss of appetite
- Nasal congestion

Nausea, vomiting and diarrhea may accompany influenza infection, especially in children, but these are not common symptoms. Sometimes influenza can be mistaken for the common cold. However, in most cases influenza onset is faster and has more severe symptoms than a cold.

Illness due to influenza usually lasts from five to seven days¹⁰; however, complete recovery can sometimes take one to two weeks. Complications of influenza include pneumonia, bronchitis, and sinus and ear infections. Influenza often exacerbates symptoms in people with chronic health problems such as asthma and chronic obstructive pulmonary disease (COPD), causing complications and possibly respiratory or heart failure. The seasonal influenza vaccine is an important protective resource that paramedics have access to every year, in time for the influenza season.

Modes of Influenza Virus Transmission

Influenza transmission occurs predominately by large respiratory droplets (particles $>5\mu$ [microns] in diameter) that are expelled from the respiratory tract during coughing or sneezing. Particles do not remain suspended in the air; however, people with the flu can spread it to others up to 2 metres away.⁶ Transmission also occurs through direct contact with respiratory droplets/secretions or contaminated objects (including equipment), followed by touching one’s nose, mouth or eyes. The influenza virus can survive for several hours on environmental surfaces.

⁸ Public Health Agency of Canada. Influenza. (2011). *Flu (influenza)*. Retrieved October 2011 from <http://www.phac-aspc.gc.ca/influenza/>

⁹ Control of Communicable Disease Manual: 19th Edition. Edited by David Heymann. (2008)

Recommended Recipients of Seasonal Influenza Vaccine

All individuals aged 6 months or older, who live, work or attend school in Ontario and who have no contraindications and are planning on traveling internationally this year, regardless of whether or not they are considered to be at high risk or healthy, are encouraged to receive the publicly funded influenza vaccine through the UIIP. In Ontario, the 2016/2017 seasonal influenza vaccine is recommended for the following groups according to the NACI:

1) People at high risk of influenza-related complications or hospitalization:

- All pregnant women*
- Adults 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 or both);
 - renal disease;
 - anemia or hemoglobinopathy;
 - neurologic or neurodevelopment conditions**;
 - morbid obesity (BMI \geq 40);
 - Children and adolescents (age 6 months to 18 years);
 - undergoing treatment for long periods with acetylsalicylic acid, because of potential increase of Reye's syndrome associated with influenza.
- People of any age who are residents of nursing homes and other chronic care facilities.
- People \geq 65 years of age.
- All children 6 to 59 months of age.
- Aboriginal peoples.

*The risk of influenza-related hospitalization increases with length of gestation, i.e. it is higher in the third than in the second trimester.

** These include seizure disorders, febrile seizures and isolated developmental delay in children and neuromuscular, neurovascular, neurodegenerative, neurodevelopmental conditions and seizures disorders in adults, but excludes migraines and neuropsychiatric conditions without neurological conditions.

2) 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; and
 - members of a household expecting a newborn during the influenza season.
- Those providing regular child care to children ≤59 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 (e.g. crew on ships).

3) Others:

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

Note: Healthy persons aged 5 to 64 years benefit from influenza vaccination.

Note: Currently available influenza vaccines are not authorized for use in infants under 6 months of age.

Note: Children 24-59 months of age are among recommended recipients at high risk of influenza-related complications or hospitalization and should receive the seasonal influenza vaccine. This means ALL children 6 to 59 months of age, regardless of chronic conditions, are recommended. Accordingly, individuals providing regular child care to children 6 to 59 months, whether in or out of the home, are also recommended recipients of seasonal influenza vaccination.

Ways to Reduce the Risk of Influenza for You and Your Patient

Immunization

There is clear scientific evidence that immunization each year is the most effective way to prevent being infected with the influenza virus.

In the NACI document titled *Statement on Seasonal Influenza Vaccine for 2016-2017*, the following statements are made:

- *“Vaccination is recognized as the cornerstone for preventing or attenuating influenza for those at high risk of serious illness or death from influenza infection and related complications.”*
- *“People who are potentially capable of transmitting influenza to those at high risk should receive annual vaccination regardless of whether the high risk person(s) is immunized”.*
- *“Transmission of influenza between infected HCWs and their vulnerable patients results in significant morbidity and mortality.”*
- *“In one study, 59% of HCWs with serologic evidence of recent influenza infection could not recall having influenza, suggesting that many HCWs experience subclinical infection.”*
- *“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.”*

HCW Influenza Immunization Promotional and Educational Toolkit

In 2013-2014, building on the recommendations of the HCW Influenza Immunization Task Group established by the former Chief Medical Officer of Health, the ministry developed a coordinated provincial-wide communications campaign “Let’s Get Fluless”¹⁰ to create a rallying call to increase HCW vaccination rates in health care facilities across the province. Posters, banners, decals and educational materials were sent to hospitals, long-term care homes and public health units in the first year of the campaign.

Building off the momentum of previous year’s campaigns, the ministry developed a promotional, educational electronic toolkit that it shared with health care facilities for the first time in 2014-2015. For the 2016-2017 influenza season a revised promotional, educational electronic toolkit has been made available to hospitals, Long Term Care facilities, local public health authorities and other key health sector partners. It includes:

1. The “Let’s Get Fluless” Customizable Poster;
2. A handout of the most important reason why health care workers should get the flu shot;
3. A fact sheet for professional staff.
4. A poster listing the top reasons to get the flu shot.

Influenza Control Standard

For more information regarding the responsibilities of paramedics and ambulance service operators to prevent and control the spread of influenza, please refer to Section C (Influenza Control) of the *Patient Care and Transportation Standards*, version 2.2 and as outlined by clause 11(d) of O. Reg. 257/00 under the *Ambulance Act*.

Routine Practices and Additional Precautions

In addition to the requirements in Section C, the *Patient Care and Transportation Standards*, version 2.2 describe Routine Practices and Additional Precautions for preventing the transmission of infection, especially infectious respiratory diseases. Routine Practices are to be followed at all times.

Appropriate and consistent use of these practices not only reduces the incidence of cross infection of patients, especially the most vulnerable, but also the incidences of infection transmission to co-workers, family members and the public.

The following is a brief summary of Routine Practices and Additional Precautions (droplet/contact) that are to be followed at all times.

¹⁰ Ministry of Health and Long-Term Care, Let’s Get Fluless, Health Care Workers. Retrieved October 2016.
<http://www.health.gov.on.ca/en/pro/programs/publichealth/flu/healthcareworkers.aspx>

Hand Hygiene

Hand hygiene is the most important measure in preventing the spread of infection. The use of an alcohol-based hand rub containing 70-90% alcohol (isopropanol or ethanol) is the most effective method of hand hygiene as it kills organisms in seconds when applied correctly. Alcohol-based hand rubs are the preferred method for cleaning hands, with the exception of when hands are visibly soiled. When hands are visibly soiled, first remove the soil by washing hands or with a moistened towel/towelette followed by alcohol hand rub. Hands must be rubbed until completely dry. It is important not to touch one's face and mucous membranes (including eyes) with the hands until appropriate hand hygiene has been completed.

Washing hands with soap and water is an effective method to remove microorganisms. Soap suspends easily removable organisms from the skin and allows them to be rinsed off.

Hand hygiene shall be performed:

- before patient contact;
- after direct patient contact;
- after contact with blood, body fluids, secretions, excretions, items known or considered likely to be contaminated with secretions, etc.;
- before contact with the paramedic's face;
- before cleaning/decontamination of equipment and vehicles;
- immediately after removing gloves and other protective equipment.

In addition to the points above, it is considered best practice to perform hand hygiene:

- any time hands are visibly soiled;
- before performing invasive procedures;
- before entering the emergency department;
- before leaving the emergency department;
- before and after handling food;
- before and after smoking;
- after using the bathroom, or other personal body functions (*e.g.* sneezing, coughing);
- at the end of a shift;
- whenever there is doubt about the necessity to do so.

As a reminder, always follow Routine Practices which includes frequent hand hygiene. This information is included on the Public Health Ontario website "*Just Clean Your Hands Hand Care Program*" at:

<http://www.publichealthontario.ca/en/eRepository/hand-care-program.pdf>

The Public Health Ontario '*Protecting Your Hands Fact Sheet for Health Care Providers*' can be found at:

<http://www.publichealthontario.ca/en/eRepository/hand-care-assessment.pdf>

Gloves

Gloves are to be used as an additional measure, not as a substitute for proper hand hygiene. Medical grade, non-latex, non-sterile gloves shall be worn when anticipating contact with blood, body fluids, secretions, excretions, mucous membranes or non-intact skin. In addition:

- gloves must cover the sleeve cuffs when a gown is worn;
- gloves should be changed between patient care activities and procedures with the same patient after contact with materials that may contain high concentrations of microorganisms such as after open suctioning of an endotracheal tube;
- hand hygiene must be performed immediately after removing gloves, before touching one's nose, mouth or eyes, or touching another person;
- gloves should not be worn in the cab of an ambulance to prevent contamination of surfaces and equipment.

Gowns/Coveralls

Long-sleeved gowns or coveralls are to be worn to protect uncovered skin and to prevent soiling of clothes during procedures and patient care activities that may generate splashes or sprays of blood, body fluids, secretions or excretions, which include cough producing and aerosol-generating procedures. Gowns should be securely tied at the neck and waist and discarded in an appropriate hazardous materials receptacle as soon as the interaction is complete.

Masks

Masks, protective eyewear or face shields shall be worn to protect the mucous membranes of the eyes, nose and mouth during procedures and patient care activities likely to generate splashes or sprays of blood, body fluids, secretions or excretions, which include cough-producing and aerosol-generating procedures.

However, to minimize the transmission of infectious respiratory diseases transmitted by large droplets, including influenza, a mask should be worn when face to face with patients exhibiting new onset cough or respiratory symptoms.

In the general health care setting, fluid resistant surgical masks are considered adequate to prevent transmission of respiratory infections spread predominantly by large droplets. However, in the pre-hospital setting where situations are often uncontrolled and procedures with potential for aerosolization are frequently carried out, the routine use of a Particulate Respirator Mask is encouraged.

Masks should be:

- used and changed according to manufacturer's recommendations;
- removed carefully, using the straps so as not to self-contaminate;
- discarded if crushed, wet or contaminated by patient or paramedic's secretions;
- seal checked on each use (if a particulate respirator mask is used).

Appropriate hand hygiene needs to be performed after removal of the mask.

Particulate Respirator Mask

When in contact with patients in the pre-hospital setting presenting with respiratory symptoms suggestive of a respiratory infection, or when performing a procedure with potential for aerosolization, paramedics must wear a particulate respirator mask. Particulate respirator masks are designed to filter sub-micron particulate ranging in size from 0.1 to >10 microns.

In cases of airborne respiratory infection, such as tuberculosis or measles, standard surgical masks do not afford paramedics the necessary level of protection provided by a particulate respirator mask, because they filter less than 50% of airborne particles that are 1-5 microns in size. Standard surgical masks also do not provide an adequate facial seal necessary to prevent infection. The choice of particulate respirator mask must comply with the Particulate Respirator Mask minimum requirements, as listed in the most current version of the *Provincial Equipment Standards for Ontario Ambulance Services*. This will ensure that the particulate respirator mask will filter a minimum of 95% of airborne particles, ranging in size from 0.1 to >10 microns to maximize protection for the paramedic.

Particulate respirator masks must be qualitatively fit tested and seal checked to ensure maximum respirator effectiveness. It is important that individuals perform a particulate respirator mask fit test to determine which respirator mask is best suited to their facial features and respiratory needs. Once the testing is complete, paramedics should note and use the appropriate style and size of particulate respirator mask assigned to them.

Protective Eyewear

Protective eyewear shall be utilized to prevent the exposure of the conjunctiva of the eyes from respiratory droplets that might contain infectious microorganisms. Paramedics should consider the following points with respect to eye protection:

- Prescription eye glasses do not provide adequate protection against splashes and sprays. Paramedics must utilize appropriate protective eyewear specifically designed to be worn over prescription eye glasses.
- Appropriate eye protection that does not impair vision and thereby interfere with patient care must be chosen.
- To prevent self-contamination, paramedics must not touch their eyes or face during care of a patient with a respiratory infection.
- Protective eyewear must be removed carefully to prevent self-contamination.
- Following the removal of eye protection, appropriate hand hygiene must be performed.

Masking of Patients with Symptoms of Respiratory Infection

As an added precaution, patients presenting with symptoms of an undiagnosed respiratory infection should be fitted with a surgical mask, if tolerated, to contain respiratory secretions.

Oxygen Administration for Patients with Symptoms of Respiratory Infection

The patient will wear:

- a surgical mask, if tolerated, with a nasal cannula if low concentration oxygen is required;
- low flow/high concentration oxygen mask outfitted with a hydrophobic submicron filter if high concentration oxygen is required;
- for patients requiring ventilatory assistance using a face mask or an endotracheal tube (ETT), a tube extender and a hydrophobic submicron filter shall be used. A tube extender is not necessary for pediatric patients and must not be used for any infants (<1 year old).

Use of Antiviral Agents for Influenza Prevention

There are a number of antiviral medications approved by the Public Health Agency of Canada for prophylactic use in the prevention of influenza virus infections. Prescriptions for antiviral agents, as for all other prescription medications, are the responsibility of the individual's physician. Paramedics should discuss the use of antiviral medications directly with their personal physician if they have been in direct contact with a person suspected with influenza. Antivirals should be started within 48 hours of contact with an ill, infectious person for maximum efficacy. Antivirals can help reduce the severity of the illness and the recovery time.¹¹

Paramedics should review the *Patient Care and Transportation Standards*, version 2.2 Section C – Influenza Control in relation to requirements for unvaccinated paramedics when providing patient care during declared outbreaks, including the use of antiviral medications and PPE.

¹¹ Centers for Disease Control and Prevention (2015). Use of Antivirals, background and Guidance on the Use of Influenza Antiviral Agents. Retrieved October 2015 from <http://www.cdc.gov/flu/professionals/antivirals/antiviral-use-influenza.htm>

Frequently Asked Questions

When is influenza season?

This will vary, but in Canada, influenza season usually runs from October to May.

Can getting the influenza vaccine cause me to come down with influenza?

No. The injectable vaccine contains an inactivated influenza virus and therefore cannot cause influenza. Soreness at the injection site is the most common side effect and may last up to two days. Taking acetaminophen may prevent soreness at the injection site. Other potential side effects, such as allergic reactions, are rare.

Unlike the injectable vaccine (QIV) which contains inactivated viruses, the LAIV contains live attenuated (weakened) viruses. Just like the inactivated vaccine, the viruses in the LAIV **cannot cause influenza illness**. The live attenuated viruses are temperature sensitive, which means they are designed to only work at cooler temperatures found within the nose. The viruses cannot infect the lungs or other areas where warmer temperatures exist.

How soon after vaccination will I be protected?

Protection is generally achieved two weeks following vaccination. However, sometimes individuals may acquire the influenza infection after vaccination, but the disease will be milder.

How effective is the seasonal influenza vaccine?

From the NACI statement on influenza vaccination: “Systematic reviews of randomized controlled trials in healthy children and adults show that inactivated influenza vaccine is about 60-80% effective in preventing laboratory-confirmed influenza infection”.¹

How are the components of the season influenza vaccine determined?

The World Health Organization (WHO) convenes technical consultations each year to recommend viruses for inclusion in influenza vaccines. The publicly funded influenza vaccines offered through the Universal Influenza Immunization Program (UIIP) will contain the three WHO-recommended antigenic strains for the 2016-2017 influenza season in the northern hemisphere: an A/California/7/2009 (H1N1)pdm09-like virus, an A/Hong Kong/4801/2014 (H3N2)-like virus and a B/Brisbane/60/2008-like virus. Also, the quadrivalent vaccines containing two influenza B viruses contain the above three viruses and a B/Phuket/3073/2013-like virus.⁶

Can pregnant women or women that are breast feeding be immunized for influenza?

Yes. The TIV and QIV are recommended for pregnant and lactating women. LAIV should not be administered to pregnant women. However, LAIV is not contraindicated in nursing mothers. Current evidence indicates that TIV influenza vaccine is safe for pregnant women at all stages of pregnancy and for breastfeeding mothers. The TIV influenza vaccine is safe for use in the first trimester. In the past, there was a concern about the administration of the influenza vaccine during the first trimester due to a perceived association between receipt of the influenza vaccine and spontaneous abortion. This was found to be coincidental, not casual, as both conditions are common in the first trimester.¹

Are there any contraindications and/or precautions for the influenza vaccine?

Egg allergy is no longer considered a contraindication for TIV QIV or LAIV. Egg-allergic individuals may be vaccinated against influenza. Individuals with egg allergy should arrange to be vaccinated in a medical clinic, allergy office or hospital where appropriate expertise and equipment to manage respiratory or cardiovascular compromise is available.

All influenza vaccines currently available in Canada are considered safe for use in the persons with latex allergy.

The injectable influenza vaccine should not be administered to those with severe anaphylactic reaction to a previous dose or to any vaccine component, with the exception of egg.

NACI recognizes Oculo-respiratory syndrome (ORS), which is defined as the presence of bilateral red eyes plus one or more respiratory symptoms (cough, wheeze, chest tightness, difficulty breathing, difficulty swallowing, hoarseness or sore throat) that starts within 24 hours of vaccination, with or without facial oedema, was found during the 2000-2001 influenza season not to be considered to be an allergic response.¹

Persons with an acute febrile illness should wait until their fever has abated to be vaccinated.¹

I've heard that the influenza vaccine can cause Guillain-Barré syndrome (GBS). Is this true?

The association between the influenza vaccine and Guillain-Barré syndrome (GBS) has been studied extensively. GBS occurs in approximately 0.002% of the population per year, and is usually caused by food-borne infection. GBS is also caused by both influenza and other infections such as Epstein Barr virus. On very rare occasions, GBS may develop in the days or weeks after receiving the influenza vaccine. The risk of GBS after seasonal influenza vaccination is 1.03 GBS admissions per million vaccinations compared with 17.2 GBS admissions per million influenza infections. Although both influenza vaccines and influenza illness are associated with small attributable risks of GBS, the risk of GBS is actually higher in individuals who become infected with influenza.

As a precaution, the National Advisory Committee on Immunization (NACI) recommends that individuals known to have had GBS within six weeks of a previous influenza vaccination avoid subsequent vaccinations with the influenza vaccine. The risk of GBS associated with influenza vaccinations must be balanced against the risk of GBS associated with influenza infection itself and all the other benefits of influenza vaccinations.¹

Why should I get the influenza vaccine every year?

Every year the influenza vaccine is updated to address the fact that influenza viruses mutate and the influenza vaccine is prepared to include the current and anticipated strains of viruses for the upcoming influenza season. The vaccine used in previous years may not protect against a newer virus. As well, your immunity to influenza declines over time and may be too low to afford adequate protection after one year.

If I get the influenza vaccine every year, will my immune system become weaker, and will I get sick?

The influenza vaccine protects you for the coming season. It does not weaken your ability to fight the flu or other infections. Getting a flu shot every year has been shown to be your best protection against the flu and possibly against passing it on to your patients or to others.

I exercise, eat well and take vitamins. Isn't this enough to protect me from influenza?

While a healthy lifestyle can strengthen your defense system in general, it cannot protect you from a specific infectious agent (bacteria or virus).

I understand that an intranasal mist influenza vaccine is now available. Would the use of this type of product be suitable for paramedics?

The intranasal mist vaccine is publicly funded under the UIIP for persons 2 to 17 years of age. The intranasal vaccine is a live attenuated influenza vaccine (LAIV).

According to the NACI *Statement on Seasonal Influenza Vaccine for 2016-2017*, both children and adults can shed vaccine viruses after vaccination with a LAIV. However, frequency of shedding decreases with increasing age and time from vaccination.

NACI recommends that a TIV, instead of LAIV, be used for HCWs who provide care to individuals with immune compromising conditions, unless the HCW will only accept LAIV. If a HCW or other person receives LAIV and is providing care to individuals with severe immune compromising conditions, they should wait two weeks following receipt of LAIV (*i.e.*, intranasal mist) before continuing to provide care to such individuals.

Where can I go to receive the influenza vaccine?

The seasonal influenza vaccine is available through your local public health unit or your family physician and participating pharmacies. You can also visit www.ontario.ca/page/flu-facts and look at the 'Get a flu shot' to find an influenza immunization clinic near you.

You can also contact your local public health unit. A list of health units can be found at: <http://www.health.gov.on.ca/en/common/system/services/phu/locations.aspx>

Is there a link between the influenza vaccine and an increased risk of Alzheimer's disease?

There is no evidence that influenza vaccine increases the risk of Alzheimer's disease. Alzheimer's is a complex illness involving damage to and degeneration of the neurons within the brain. Its cause isn't fully understood, however it may be due to abnormal protein (amyloid) deposits and inflammation in the brain. While it was once thought that aluminum contributed to this process, most experts believe that there is no clear evidence to support this theory. Moreover, the vaccine does not contain aluminum.¹

The influenza vaccine from the multi-dose vial contains trace amounts of thimerosal; is thimerosal toxic?

Thimerosal is a preservative used in minute quantities in several influenza vaccines. Thimerosal contains *ethyl* mercury, which is structurally different than methyl mercury.

It is important to note that the minute amount of ethyl mercury in the vaccine and the daily average intake for mercury (from food) totals less than the daily tolerated amount defined by national guidelines. There is no evidence that the mercury in thimerosal is harmful at such low levels. Studies have demonstrated that there is no association between vaccination with thimerosal-containing vaccines and neurodevelopment outcomes, including autistic-spectrum disorders. Influenza vaccine manufacturers in Canada are currently working towards production and marketing of thimerosal-free influenza vaccines. All single dose formulations of TIV (and LAIV) are thimerosal-free.¹

References

For further information on the prevention of disease transmission, including influenza, paramedics are encouraged to review the following documents:

Center for Disease Control and Prevention

Influenza Type A Viruses and Subtypes

<http://www.cdc.gov/flu/avianflu/influenza-a-virus-subtypes.htm>

Ministry of Health and Long-Term Care

Let's Get Flulless – February 04, 2016

<http://www.health.gov.on.ca/en/pro/programs/publichealth/flu/healthcareworkers.aspx>

Ministry of Health and Long-Term Care – Emergency Health Services Branch

Basic Life Support Patient Care Standards, Version 2.0 (January 2007)

Ministry of Health and Long-Term Care - Emergency Health Services Branch

Infection Prevention and Control

Best Practices Manual for Land Ambulance Paramedics (March 2007)

Ministry of Health and Long-Term Care - Emergency Health Services Branch

Patient Care and Transportation Standards, version 2.2

Public Health Agency of Canada: *An Advisory Committee Statement (ACS); National Advisory Committee on Immunization (NACI) – Canadian Immunization Guide Chapter on Influenza and Statement on Seasonal Influenza Vaccine for 2016-2017*. Ottawa, ON. (July 2015) <http://www.phac-aspc.gc.ca/naci-ccni/assets/pdf/flu-2016-grippe-eng.pdf>

