Influenza: Questions and Answers

Information about the disease and vaccines

What causes influenza?

Influenza is caused by influenza viruses. Two types of influenza, A and B, routinely cause outbreaks in people. Both types can cause mild to severe illness in all age groups. While influenza A viruses infect humans and animals, influenza B viruses affect only humans.

Subtypes of type A influenza virus are identified by two antigenic proteins called hemagglutinin [H] and neuraminidase [N] on the surface of the virus. These proteins can change, or mutate, over time. Because these proteins can change, people can get influenza infections multiple times over their lifetime. An antigen "shift" (major change) creates a new influenza A virus with a new H, or H and N, that can cause a global epidemic if the virus can spread easily among people and if most people do not have immunity against it. This happened most recently in 2009 when the novel H1N1 influenza virus appeared and led to a major pandemic.

How does influenza spread?

Influenza is spread mainly through the air from respiratory droplets made when an infected person talks, coughs, or sneezes. Influenza may also be spread by touching a contaminated surface, then touching the nose, mouth, or eyes.

How long does it take to develop symptoms of influenza after being exposed?

The incubation period of influenza is usually two days but can range from one to four days.

What are the symptoms of influenza?

Typical influenza disease is characterized by sudden onset of fever, aching muscles, sore throat, and non-productive cough. Additional symptoms may include runny nose, headache, a burning sensation in the chest, and sensitivity to light. Typical influenza disease does not occur in every infected person. Someone who has been previously exposed to similar virus strains (through natural infection or vaccination) is less likely to develop serious clinical illness. Not everyone with influenza illness has a fever, especially older adults. Some people may also have nausea, vomiting, or diarrhea; these symptoms are more often seen in children.

How serious is influenza?

Although many people think of influenza as just a common cold, it is really a specific and serious respiratory infection that can result in hospitalization and death. Rates of infection from seasonal influenza are highest among children. The risks for influenza-related complications, hospitalizations, and deaths are highest among adults ages 65 years and older, children younger than 5 years, pregnant people, and people of any age who have medical conditions that place them at increased risk for complications from influenza.

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From 2010–2011 through 2023–2024, the Centers for Disease Control and Prevention (CDC) estimates the annual flu-related burden of 9–41 million illnesses, 4.3–18 million medical visits, 120,000–710,000 hospitalizations, and 6,300–52,000 deaths. The 2024–25 season was particularly severe. Preliminary estimates for 2024–25 season include 47–82 million illnesses, 21–37 million outpatient visits, 610,000–1,300,000 hospitalizations, and 27,000–130,000 deaths. While the average of 129 pediatric deaths were reported during the years 2010–2024, 275 flu-related deaths were reported in 2024–25 (see https://www.cdc.gov/flu-burden/php/data-vis/index.html).

While the 2020–21 and 2021–22 seasons' disease burden was limited as a result of measures taken by many people to reduce the transmission of COVID-19, such as wearing face masks in public, less travel, and reducing social interactions, influenza returned to pre-pandemic levels in 2023. For additional details, see www.cdc.gov/flu-burden/php/about/index.html.

What are possible complications from influenza illness?

The most frequent complications from influenza are viral and bacterial pneumonia. Other complications include inflammation of the heart (myocarditis), brain (encephalitis) or muscle (myositis). Influenza also can worsen chronic medical conditions like cardiovascular disease, leading to heart attacks or worsening congestive heart failure, and worsening asthma and diabetes.

Reye syndrome is a complication that occurs almost exclusively in children—patients suffer from severe vomiting and confusion, which may progress to coma because of swelling of the brain. To decrease the chance of developing Reye syndrome, infants, children, and teenagers should not be given aspirin for fever reduction or pain relief.

What is the best way to prevent influenza?

The best way to prevent influenza is with annual influenza vaccination.

Is there an alternative to vaccination in preventing influenza?

Vaccination is among the best ways to prevent influenza and its complications. Some steps that may help prevent the spread of respiratory illnesses, like influenza, include:

1. Cover your nose and mouth with your sleeve or a tissue when you cough or sneeze—throw the tissue away after you use it and then wash your hands.
2. Wash your hands often with soap and water, especially after you cough or sneeze. If you are not near water, use an alcohol-based hand sanitizer.
3. Stay away as much as you can from people who are sick.
4. If you get influenza, stay home from work or school for at least 24 hours after the fever has ended. If you are sick, don't go near other people to avoid infecting them.
5. Try not to touch your eyes, nose, or mouth. Viruses often spread this way.
6. Wearing a high-quality face mask or N95 respirator, especially in crowded public areas when respiratory viruses are circulating, can reduce the risk of spreading or catching respiratory viruses, including influenza.
7. Improve air quality by improving ventilation, purifying indoor air, or gathering outdoors.

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Are any drugs available to prevent or treat influenza?

There are four influenza antiviral drugs recommended for use in selected patients. Two can be used for treatment or prevention, while two are recommended only for treatment. All four provide protection against both A and B viruses.

Use of antiviral medications can reduce the severity and length of influenza illness. People with severe illness and people at increased risk of severe illness (e.g., people at high risk of influenza complications, such as young children, people with chronic medical conditions, and older adults) should be treated with influenza antiviral medications when influenza is suspected.

Antiviral medicine is also recommended for use in certain outbreak situations (e.g., nursing home outbreaks); in such cases, antiviral medication can be used for both treatment and prevention (also called prophylaxis). CDC has more information on the use of influenza antiviral medications at www.cdc.gov/flu/professionals/antivirals/index.html.

If I contract influenza, what should I do?

If you get sick with symptoms of influenza, stay home if you can, except to get medical care, to avoid spreading influenza to others. If you are very sick, worried about your illness, or if you are at increased risk of complications due to your age or health status, contact your healthcare provider or seek medical attention.

There are antiviral medications that can treat influenza, but they are different from the antiviral medications that treat COVID-19, so you may need to be evaluated or tested to determine what treatment is recommended.

You can also take over-the-counter medications to relieve the symptoms of influenza (but never give aspirin to children or teenagers who have influenza-like symptoms, particularly fever). Prescription influenza antiviral medications are most beneficial when given within the first 1 to 2 days of influenza illness.

When is a person with influenza contagious?

A person may be contagious from 1 day before symptoms start through 5–7 days after illness onset.

Can you get influenza more than once?

Yes. Influenza viruses change frequently and infection with one strain does not provide protection against all strains.

When did the first influenza vaccine become available?

The first influenza vaccine in the United States became available in 1945.

What kind of influenza vaccines are available?

Some influenza vaccines are made by growing influenza viruses in eggs, then inactivating (killing and disrupting) the viruses and purifying the vaccine to remove almost all of the egg protein. These egg-culture-based vaccines are given as an intramuscular injection. Two other influenza vaccines (cell-culture based inactivated vaccine and recombinant influenza vaccine [RIV]) are made without the use of eggs. These vaccines are also given as an intramuscular injection. An egg-cultured nasal spray influenza vaccine containing live viruses that have been weakened (attenuated) is also available.

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Influenza vaccines in the United States contain 3 strains of influenza virus. CDC has more information about different influenza vaccines at www.cdc.gov/flu/vaccine-process/.

How are the vaccines made?

Every year, manufacturers develop and produce vaccine that contains virus strains that World Health Organization and, in the U.S., the FDA and CDC believe are most likely to circulate during the upcoming influenza season. Influenza vaccines contain both type A and type B viruses.

For the inactivated (injectable) vaccine, the viruses are inactivated (killed), purified, and packaged in vials or syringes. Live attenuated influenza virus vaccine is packaged in a special nasal sprayer. Recombinant technology is used to make recombinant influenza vaccine; this vaccine only includes one part of the influenza virus, the hemagglutinin, in the vaccine. For more information about how influenza vaccines are made, see www.cdc.gov/flu/vaccine-process/.

How are influenza vaccines given?

The inactivated and recombinant vaccines are given as an intramuscular injection. The live attenuated vaccine is sprayed into the nose.

Who should get influenza vaccine?

Annual influenza vaccination is recommended for all people ages 6 months and older who do not have a contraindication to the vaccine.

Which children need a second dose of influenza vaccine in the same season?

Children ages 6 months through 8 years should receive two doses of influenza vaccine, separated by at least 4 weeks, the first time they receive influenza vaccine. Children who received 2 or more total doses of influenza vaccine before the most recent July 1 need only one dose for the current season. Your doctor or other healthcare professional should be able to tell you if your child needs a second dose.

Five different influenza vaccines, all given as intramuscular injections, can be given to children age 6 months and older. For children age 2 years and older, a nasal spray vaccine can be given if there are no contraindications.

Which influenza vaccines are preferred for adults age 65 and older?

Three vaccines are preferred for adults age 65 or older because they are likely to be more effective in this age group than standard dose, egg-based influenza vaccines.

Which influenza vaccines are recommended for solid organ transplant (SOT) recipients?

In June 2024, CDC's Advisory Committee on Immunization Practices (ACIP) voted that adults age 18 through 64 years who had had a solid organ transplant and who take immunosuppressive medication regimens have the option to receive the high-dose inactivated (HD-IIV) or the adjuvanted inactivated (aIIV) influenza vaccines without a preference over other age-appropriate IIV or RIV vaccines.

Who recommends influenza vaccination?

The Centers for Disease Control and Prevention, the American Academy of Pediatrics, the American Academy of Family Physicians, the American College of Physicians, the American College of Obstetricians

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and Gynecologists, the American College of Nurse Midwives, and the American Pharmacists Association all recommend influenza vaccination.

How often should people get influenza vaccination?

Influenza vaccine is given each year because immunity decreases after a year and because influenza vaccine viruses are updated almost every year. An annual vaccination is recommended even if the strains included in the vaccine are not changed from one year to the next.

When should people be vaccinated?

For most people who need only one dose of influenza vaccine, vaccination should ideally be offered in September and October. For people not vaccinated by the end of October, vaccination efforts should continue as long as influenza viruses are circulating and unexpired vaccine is available.

Vaccination in July and August should be avoided for most groups unless there is concern that vaccination later in the season might not be possible. Early vaccination has been associated with some decline in antibody levels and decreased vaccine effectiveness before the end of the influenza season, particularly in older adults.

Vaccination in July and August may be considered for people in their third trimester of pregnancy, to allow time for protective maternal antibodies to transfer to the fetus, providing protection during early infancy. Unvaccinated children younger than age 9 years who need two doses of vaccine should receive their first dose as soon as possible so they can get their second dose before the end of October. Children who need only one dose can be considered for vaccination in July or August.

To avoid missed opportunities for vaccination, providers should offer vaccination during routine healthcare visits and hospitalizations. Travelers should be aware that the influenza season typically occurs from April to September in the Southern Hemisphere and throughout the year in the tropics. If they missed vaccination in the previous season, they should still be vaccinated before they travel, even if it's in the following spring or summer.

Should we vaccinate household members of infants too young to be vaccinated or other people who cannot be vaccinated or are unlikely to respond to vaccination due to illness, age, or immunocompromise?

It is important to vaccinate everyone 6 months or older, including those who live with people who cannot be vaccinated or who are unlikely to respond effectively to vaccination due to advanced age or chronic health conditions. Vaccination of the whole household reduces the risk that the vulnerable person will be exposed to influenza.

If a patient is undergoing treatment for cancer, is it safe to vaccinate them against influenza?

People with cancer need to be protected from influenza. Cancer patients and survivors are at higher risk for complications from influenza, including hospitalization and death. They can and should receive an injectable influenza vaccine (not the live nasal spray vaccine) even if they are being treated for cancer. To find more information on influenza vaccine for patients

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with high-risk medical conditions, see https://www.cdc.gov/flu/highrisk/index.htm.

Is it safe for pregnant people to get influenza vaccine?

Yes. In fact, vaccination with the inactivated or recombinant influenza vaccine is recommended for anyone who will be pregnant during the influenza season. Pregnant people are at increased risk for serious medical complications from influenza. Studies have shown that influenza vaccination during pregnancy helps prevent influenza and its complications in both the mother and newborn during the first 6 months of life. Breastfeeding people may receive influenza vaccine appropriate for their age and health status.

A 2017 study suggested an increase in miscarriage among women who received inactivated influenza vaccine, but earlier studies and a later follow-up study did not find any risk of miscarriage. Please provide details.

A CDC-funded study, published in 2017, found that among women who had been vaccinated early in pregnancy with an influenza vaccine containing the pandemic H1N1 (H1N1pdm09) component and who also had been vaccinated the prior season with a H1N1pdm09-containing influenza vaccine, there was an increased risk of spontaneous abortion (miscarriage) in the 28 days after vaccination. This study did not quantify the risk of miscarriage and did not prove that influenza vaccine was the cause of the miscarriage. Earlier studies have not found a link between influenza vaccination and miscarriage. A larger follow-up study, also funded by CDC, which included 3 more years of data found no association between early miscarriage and influenza vaccination, regardless of previous influenza season vaccination. These results are reassuring regarding the safety of influenza vaccination during pregnancy.

CDC, ACIP, and the American College of Obstetricians and Gynecologists (ACOG) recommend vaccination during any trimester of pregnancy because influenza poses a danger to the pregnant person and the infant, and influenza vaccination during pregnancy helps prevent illness in both of them.

How safe are influenza vaccines?

Influenza vaccines are very safe. The most common side effects of the injectable influenza vaccines include soreness, redness, or swelling at the site of the injection. These reactions are temporary and occur in 15%–20% of recipients. Less than 1% of vaccine recipients develop symptoms such as fever, chills, and muscle aches for 1 to 2 days following the vaccination.

Healthy children ages 2 through 4 years who receive the nasal spray live attenuated influenza vaccine (LAIV) during clinical trials appeared to have an increased chance of wheezing. LAIV is not recommended for children aged 2 through 4 years who have received a diagnosis of asthma or whose parents or caregivers report that a healthcare provider has told them during the past 12 months that their child had wheezing or asthma or whose medical record indicates a wheezing episode occurring during the preceding 12 months.

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Healthy adults receiving the live influenza vaccine may experience a runny nose, headache, or cough.

Serious adverse reactions to influenza vaccines are very rare. Such reactions are most likely the result of an allergy to a vaccine component. In 1976, the swine influenza vaccine was associated with a severe illness called Guillain-Barré syndrome (GBS), a nerve condition that can result in temporary paralysis that occurred in about 1 per 100,000 people. Injectable influenza vaccines since then have not been clearly linked with GBS, but if there is a risk of GBS after influenza vaccination, it is small, on the order of about 1–2 cases per million people vaccinated. However, as a precaution, any person without a high-risk medical condition who previously experienced GBS within 6 weeks of an influenza vaccination should generally not be vaccinated. Instead, their physician may consider using influenza antiviral drugs to prevent or treat infection. About 80 to 160 people get GBS each week in the United States, regardless of vaccination.

What can you tell me about the preservative thimerosal that is in some injectable influenza vaccines and the claim that it might be associated with the development of autism?

Thimerosal is a very effective preservative that has been used to prevent bacterial contamination in vaccines for more than 50 years. It contains a type of mercury known as ethylmercury. Ethylmercury is different from methylmercury, which is the form that is in some fish and other seafood. At very high levels, methylmercury can be toxic to people, especially to the neurological development of infants.

Several large scientific studies have determined that thimerosal in vaccines does not lead to neurologic problems, including autism. However, because we generally try to reduce people's exposure to mercury if at all possible, vaccine manufacturers have voluntarily changed their production methods to produce vaccines that are now free of thimerosal or have only trace amounts. They have done this because it is possible to do, not because there was any evidence that the thimerosal was harmful. For information on the ethylmercury contained in thimerosal that is in several influenza vaccines produced in multi-dose vials, see www.immunize.org/catg.d/p4072.pdf.

Does CDC still recommend use of influenza vaccine in multidose vials (MDVs)?

In June 2025, experienced ACIP members were replaced with all new members. The new members voted to no longer recommend use of influenza vaccine in the MDV presentation that contains thimerosal as a preservative. Less than 5% of influenza vaccine doses administered in 2024–25 were in MDVs. Their decision was made in the absence of any credible scientific evidence of harm caused by thimerosal in vaccines. According to CDC's website (as of 8/28/25), there is no evidence of harm caused by the low doses of thimerosal in vaccines, except for minor reactions like redness and swelling at the injection site. See www.cdc.gov/vaccine-safety/about/thimerosal.html.

How effective are influenza vaccines?

Protection after influenza vaccination varies by the similarity of the vaccine strain(s) to the circulating strains, and the age and health of the recipient. Healthy people younger than age 65 years are more likely to have protection from influenza after influenza

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vaccination than are older, frail individuals. Although influenza vaccination is not as effective in preventing influenza among older adults, vaccination can reduce the risk of complications, including hospitalization, ICU admission, COPD exacerbations, influenza-related cardiovascular events, and death.

When the "match" between vaccine and circulating strains is close, the injectable vaccine prevents influenza in about 40%–60% of people. Influenza vaccination during pregnancy has been shown to reduce the risk of influenza illness and hospitalizations in both pregnant people and their infants. Among elderly nursing home residents, the vaccine is most effective in reducing the risk of severe illness, secondary complications, and death related to influenza. CDC has summarized influenza vaccine benefits at www.cdc.gov/flu-vaccines-work/benefits/index.html.

Can influenza vaccines cause influenza?

No. Neither injectable (inactivated or recombinant) vaccine nor live attenuated (nasal spray) vaccine can cause influenza. The inactivated injectable influenza vaccine contains only killed virus fragments and the recombinant vaccine contains only a part of the influenza virus so neither type of vaccine can cause influenza. The nasal spray influenza vaccine contains live attenuated (weakened) viruses that can produce mild symptoms similar to a cold. While the viruses are able to grow in the nose and throat tissue and produce protective immunity, they are weakened and do not grow effectively in the lung. Consequently, they cannot produce influenza disease.

Who should NOT receive an influenza vaccine?

In general, influenza vaccination of any person age 6 months or older is recommended. A person who has had a previous severe allergic reaction to an influenza vaccine, regardless of the component suspected to be responsible for the reaction, should not receive that vaccine again. In other words, it is contraindicated. For a complete list of vaccine components (including excipients and culture media) used in the production of the vaccine, see the package insert (available at www.immunize.org/official-guidance/fda/pkg-inserts/) or go to www.fda.gov/vaccines-blood-biologics/vaccines/vaccines-licensed-use-united-states/.

People who are not at an elevated risk of influenza complications typically should not be vaccinated if they have a history of Guillain-Barré syndrome within 6 weeks of receipt of influenza vaccine. People who are moderately or severely ill at the time of their influenza vaccination appointment should usually wait until their symptoms are improved before getting the vaccine.

Who should NOT receive the live attenuated influenza vaccine (LAIV) nasal spray?

The live attenuated influenza vaccine (LAIV) nasal spray is licensed for use only in healthy, non-pregnant individuals ages 2 through 49 years.

Contraindications to LAIV (it should not be given) are:

- History of a severe allergic reaction to a previous dose of any influenza vaccine or to a component of the LAIV vaccine (except egg, because egg allergy alone is not a contraindication or precaution to any influenza vaccine)
- Ongoing aspirin- or salicylate-containing therapy in children and adolescents because of the risk of Reye syndrome
- Children ages 2 through 4 years who have received a diagnosis of asthma or whose parents or

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caregivers report that a healthcare provider has told them during the preceding 12 months that their child had wheezing or asthma or whose medical record indicates a wheezing episode in the preceding 12 months

- Immunosuppression due to any cause, including medications or HIV infection
- Cerebral spinal fluid (CSF) leaks, cochlear implant, anatomic asplenia, or functional asplenia (e.g., due to sickle cell anemia)
- Close contacts and caregivers of severely immunosuppressed people who require a protected environment (e.g., reverse isolation in a hospital)
- Pregnancy
- Receipt of influenza antiviral medication before scheduled vaccination (zanamivir or oseltamivir within 48 hours; peramivir within 5 days; baloxavir within 17 days)

Precautions to LAIV are:

- Moderate or severe acute illness with or without fever
- History of Guillain-Barré syndrome within 6 weeks of receipt of influenza vaccine
- Asthma in a person age 5 years or older
- Underlying medical conditions that might predispose to complications after influenza virus infection, such as chronic pulmonary, cardiovascular (except isolated hypertension), renal, hepatic, neurologic, hematologic, or metabolic disorders, including diabetes mellitus

As a general rule, people with a precaution should not receive LAIV, but there may be situations when the clinician may decide to administer it.

Healthcare workers, household members, and others who have close contact with severely immunocompromised individuals during the periods in which the immunosuppressed person requires care in protective isolation should receive an injectable influenza vaccine rather than LAIV.

People who are moderately or severely ill at the time of their influenza vaccination appointment should usually wait until their symptoms are improved before getting the vaccine.

What are the recommendations for influenza vaccination of people who have an egg allergy?

CDC recommends that everyone age 6 months or older with egg allergy of any severity can and should get an influenza vaccine. Any influenza vaccine (egg-based or non-egg based) appropriate for the person's age and health status can be used. All vaccines should be administered in settings where people and materials necessary to respond to acute allergic reactions are available.

Can influenza vaccines be given at the same time as other vaccines, including COVID-19 and RSV vaccines?

Yes. Injectable influenza vaccines can be given on the same day or any other day before or after other live or inactivated vaccines. Injectable vaccines should be given in separate anatomic sites when given on the same day. For more information on coadministration, go to: www.cdc.gov/flu/vaccines/coadministration.html

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