

Q&A INFLUENZA: WHAT YOU SHOULD KNOW

Q. How is the influenza vaccine made?

A. Several types of influenza vaccines are available:

Inactivated influenza vaccine – This version is made by taking three different influenza viruses, growing them (individually) in eggs, purifying them, and completely inactivating (killing) them with the chemical formaldehyde. This version, given as a shot, is used most commonly. It can be given to people 6 months and older.

Cell culture-based influenza vaccine – This version, given as a shot, is made in a manner similar to the inactivated vaccine; however, instead of growing the viruses in eggs (avian cells), they are grown in mammalian cells. This vaccine represents an advance in technology because it contains less egg protein than the version grown in eggs. It can be given to those 6 months and older.

Recombinant influenza vaccine – This version contains only one surface protein of influenza virus, known as hemagglutinin. The protein is produced by inserting the gene for hemagglutinin into an insect virus that then produces large quantities of the hemagglutinin protein. The protein is purified and used as the vaccine. This version represents an advance in technology because it is the first influenza vaccine that does not contain any egg protein. It is given as a shot and can be used in people 18 years or older.

Live, weakened influenza vaccine – Given as a nasal spray, this version contains live, weakened influenza viruses that can reproduce in the nose but not in the lungs. This vaccine can be given to people between 2 and 49 years of age. People with certain health conditions may not be able to get this vaccine. Talk to your doctor to learn more.

With the exception of the live, weakened influenza vaccine, some doses of each of the other types are referred to as “high-dose” versions. Adults 65 years and older are recommended to get a high-dose version whenever possible as the higher dose allows the aging immune system to develop stronger immunity, leading to more effective protection for this susceptible population. If high-dose versions are not available, these adults should get the type of vaccine that is available because regular doses will still offer some protection.

Did you know? For many years, influenza vaccines protected against four types of influenza. Two were type A influenza viruses (the kind that can cause pandemics), and two were type B influenza viruses. However, starting with 2024-2025 influenza vaccines, the vaccine will only protect against three types of influenza. This is because since early 2020, one of the types of influenza B virus has stopped spreading. It has not infected anyone around the globe, so we no longer need to protect ourselves against that type. While it is possible that another type B influenza virus will circulate in the future, causing a return to vaccines with four types of influenza, for now, we can decrease the number of types in the annual vaccine.

This information is provided by the Vaccine Education Center at Children's Hospital of Philadelphia. The Center is an educational resource for parents, the public and healthcare professionals and is composed of scientists, physicians, mothers and fathers devoted to the study and prevention of infectious diseases. The Vaccine Education Center is funded by endowed chairs from Children's Hospital of Philadelphia. The Center does not receive support from pharmaceutical companies. ©2024 Children's Hospital of Philadelphia. 24271-05-24.

Q. Can pregnant people get the influenza vaccine?

A. Yes. Pregnant people are urged to get influenza, Tdap and COVID-19 vaccines during pregnancy. Because pregnant people are more likely to experience complications and hospitalization as a result of infection with influenza (and COVID-19), it is important for them to be immunized.

In addition, studies have shown that babies of those immunized with influenza vaccine during pregnancy are less likely to be infected with influenza during the first six months of life before they are old enough to be vaccinated. Similar findings have followed COVID-19 vaccination. Tdap is given later during pregnancy so that newborns have protection against pertussis, which can be severe or fatal, in the months before they can get their own vaccines.

Q. Does the influenza vaccine contain thimerosal?

A. A limited number of multidose preparations of the inactivated influenza vaccine given as a shot still contain a small quantity of the mercury-based preservative known as thimerosal. However, the quantity contained in these vaccines does not cause harm. Influenza infections can cause severe illness and death, so the benefits of receiving the vaccine clearly outweigh the theoretical – and disproven – risks of thimerosal.

Q. Can I avoid getting influenza and the vaccine by washing my hands and staying away from others who are ill?

A. While careful handwashing, covering coughs and sneezes, and staying home when ill can help prevent the spread of disease, we cannot be certain that others will do the same. Further, not everyone infected with influenza realizes they are transmitting it since infected people begin to spread the virus a day or two before they have symptoms, similar to what happens with COVID-19.

So, while these measures can reduce your chance of getting influenza, they can only do so much to prevent it. The reality is that the only way to ensure protection from a specific disease is to have immunity acquired through immunization or previous infection, and vaccination is always the safer, better choice.

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While people often consider “the flu” to be a minor inconvenience, the reality is that each year in the United States, influenza epidemics cause thousands to tens of thousands of deaths and about 200,000 hospitalizations. Even with a vaccine that is not as effective as some others, vaccination is the safest and most effective way to protect individuals, families and communities from the ravages of influenza. As such, most individuals 6 months of age and older can and should receive the influenza vaccine. Communities coming together to follow this recommendation have the potential to save thousands of lives.

Q. What is influenza (flu)?

A. Influenza (flu) is a virus that infects the nose, throat, windpipe and lungs. The virus is highly contagious and is spread from one person to another by coughing, sneezing or talking. Influenza infections typically occur between October and April each year.

Q. What are the symptoms of influenza?

A. Typical symptoms of influenza include fever, chills, muscle aches, congestion, cough, runny nose and difficulty breathing. Other viruses, including the one that causes COVID-19, can cause symptoms similar to influenza.

Influenza virus is a common cause of severe, fatal pneumonia, particularly in adults older than 65. Although most influenza-related deaths are in older adults, sadly, each year about 50 to 150 children also die from influenza. Children younger than 4 years of age often require hospitalization because of high fever, wheezing, croup or pneumonia.

Because influenza is a virus, it can't be successfully treated with antibiotics. While some antiviral medications are available by prescription, not all strains of influenza are susceptible to them, and they work best when used early in the infection.

Q. Who should get the influenza vaccine?

A. The influenza vaccine is recommended for virtually everyone 6 months of age and older. Children under 9 years of age require two doses of influenza vaccine separated by four weeks if they have never received an influenza vaccine or have an uncertain vaccination history.



Q. Does the influenza vaccine work?

A. The influenza vaccine typically prevents about 70 of every 100 people who receive it from developing moderate-to-severe influenza infection. Even though the vaccine might not completely prevent influenza infection, it will still lessen the length and severity of the illness.

Q. When should I get the influenza vaccine?

A. Immunizations should be administered starting in the fall as vaccine supplies become available. Likewise, vaccinations should continue throughout the season because the peak incidence of influenza can often occur as late as February or March.

Q. If I got the influenza vaccine last year, do I need this year's influenza vaccine?

A. Yes. Getting the current vaccine is still of benefit for a few reasons. First, some people are not protected after getting the vaccine, so another dose will increase their chance of being protected. Second, antibody levels wane, particularly in the elderly, so another dose will boost antibody levels before the start of influenza season. Finally, sometimes influenza viruses change significantly from one year to the next, so immunization or natural infection the previous year is not protective.

Q. Are influenza vaccines safe?

A. Yes. Influenza vaccine shots can cause pain, redness or tenderness at the site of injection as well as muscle aches and low-grade fever. Flu shots cannot cause influenza because they contain only parts of the virus (individual proteins) or dead (inactivated) viruses.

The nasal spray version can cause runny nose, congestion or sore throat. Although the viruses in the nasal spray version are live, they have been weakened, so they can reproduce in the nose but not in the lungs. Therefore, this version cannot cause influenza either.

Although most versions of influenza vaccine are made in eggs and some people are severely allergic to eggs, the quantity of egg proteins in the vaccine is less than that necessary to cause a severe allergic response. But just to be safe, people with severe egg allergies should remain at the provider's office for 30 minutes after vaccination.

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VACCINES AND ALLERGIES:

WHAT YOU SHOULD KNOW

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When children are diagnosed with allergies, parents try to identify potential exposures in the hopes of avoiding future reactions. Anything that goes into the child's body may warrant consideration – even vaccines. The good news is that for the majority of children with allergies, vaccines are not the problem.

WHAT HAPPENS DURING AN ALLERGIC RESPONSE?

Allergic responses can vary in intensity from minor symptoms, such as hives, to major reactions, such as a sudden drop in blood pressure, difficulty breathing and shock. Because an allergic reaction can be severe and is typically immediate, patients are asked to wait around the doctor's office for about 15-30 minutes after receiving a vaccine.

CAN PEOPLE HAVE ALLERGIC RESPONSES TO VACCINES?

Yes. On rare occasions people can have allergic reactions after getting vaccines. In these cases, the reaction is to one or more vaccine ingredients; however, anyone who has had a severe allergic reaction to a particular vaccine should not get additional doses of that vaccine. Severe allergic reactions are those considered to be life-threatening, such as difficulty breathing, sudden drop in blood pressure or shock.

People who may have allergies to particular vaccine components, but which are not considered life-threatening, should discuss the relative risks of the vaccine and the disease with their healthcare provider. In some cases, these patients may be recommended to consult with an allergist for further evaluation or to administer the vaccination using established safety protocols.

WHAT VACCINE INGREDIENTS MIGHT CAUSE AN ALLERGIC REACTION?

A limited number of vaccine ingredients including eggs, gelatin, antibiotics, latex, yeast and aluminum warrant attention as they relate to allergies.

Eggs – Historically, two vaccines were of concern for those allergic to egg proteins: influenza and yellow fever vaccines. Because these vaccines were made in eggs, they contained small amounts of egg proteins. In recent years, the influenza vaccine has been shown not to be problematic for those with egg allergies because the amount of egg protein is one hundred-fold less than that required to induce allergic symptoms in those with even severe egg allergies. For these reasons, egg allergic people can now get the influenza vaccine.

The yellow fever vaccine still contains enough egg proteins that it could cause a severe reaction in egg allergic people. Those who require the vaccine for travel should undergo a procedure known as desensitization in which an allergist introduces increasing quantities of the vaccine over time until the person is able to be immunized. Desensitization for vaccination needs to be repeated during subsequent dosing if the person requires additional doses.

Gelatin – A small number of vaccines contain gelatin as a stabilizer. Stabilizers are used in some viral vaccines to allow for the vaccine virus to be equally distributed throughout the vial. The type of gelatin used in vaccines comes from pigs. Although allergic reactions to gelatin-containing vaccines are rare (about one severe allergic reaction per 1.2 million doses administered), these reactions are the most frequent allergic-type reactions to vaccination. Of interest, the gelatin used in foods (like jello) is obtained from cows, not pigs.

The vaccines that contain gelatin include MMR, MMRV, one version of shingles (Zostavax®), chickenpox, yellow fever, and some versions of the influenza and rabies vaccines. In addition, the capsule used for the oral typhoid vaccine is made of gelatin.

Antibiotics – Although some people are allergic to antibiotics, the types contained in vaccines are not typically the ones to which people are allergic; in addition, the quantities contained in vaccines are minimal. Antibiotics used in vaccines include neomycin, polymyxin B, kanamycin, gentamicin, streptomycin, chlorotetracycline and amphotericin B.

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Latex – Some vaccine packaging contains latex; therefore, people with severe allergies to latex should discuss this condition with their healthcare provider before getting vaccinated. In some cases the benefits of vaccination will still outweigh the potential risks; however, healthcare providers aware of this allergy can try to select products that do not have latex in the packaging. Vaccine packaging invariably states whether the product does or does not contain rubber latex.

Yeast – A few vaccines are produced using yeast cells, including hepatitis B and hepatitis B-containing vaccines and the human papillomavirus (HPV) vaccine. Although a small number of people have had allergic reactions following receipt of the hepatitis B vaccine, the allergic response does not appear to be caused by the yeast proteins so it likely represents a temporal, not causal, association.

Aluminum – Although some people may have contact sensitivity to aluminum-containing products that touch the skin, such as deodorants, people do not suffer life-threatening allergic reactions to aluminum that would preclude receiving vaccines that contain aluminum.

HOW DO I FIGURE OUT IF MY CHILD IS ALLERGIC TO ANY VACCINE INGREDIENTS THAT COULD CAUSE A REACTION?

The primary concerns for allergic reactions as they relate to vaccines are egg proteins, gelatin and latex.

Because egg proteins are only a concern for yellow fever vaccine and that vaccine is only recommended in limited scenarios, such as travel, most people will have consumed eggs and be aware of any allergies prior to getting a yellow fever vaccine.

While gelatin is contained in several vaccines, in most cases the vaccines that contain it, such as MMR and chickenpox, are not given before 1 year of age. If children have eaten desserts or candies that contain gelatin without reaction, they are likely not to react following vaccination either. However, because food-based gelatin is derived from cows and not pigs, it is possible that, in some instances, a small number of people might still be allergic to the gelatin contained in vaccines even though they aren't allergic to the gelatin contained in food.

Latex is found in many commonly used items, including some that babies come into contact with, such as pacifiers, bottles and toys. In most cases, latex allergies develop after frequent, long-term exposure and reactions are not typically severe. So, allergies related to latex are more of a concern in older children or adults who will likely already be aware of their allergy.

DO CHILDREN WITH PEANUT OR CORN ALLERGIES HAVE TO FOREGO ANY VACCINES?

No. Parents of children with food allergies spend a significant amount of time, by necessity, making sure their children do not accidentally ingest foods that will cause an allergic reaction. However, peanut and corn allergies are not reasons to forego any vaccines.

DO VACCINES CAUSE CHILDREN TO BE ALLERGIC TO SUBSTANCES NOT CONTAINED IN VACCINES?

No. For example, children who had received a pertussis vaccine did not have a greater frequency of allergies compared with those who had not. Interestingly, children who had pertussis disease were more likely to have allergies than children who did not.

REFERENCES

- Anderson HR, Poloniecki JD, Strachan DP, et al. Immunization and symptoms of atopic disease in children: results from the International Study of Asthma and Allergies in Children. *Am J Public Health*. 2001;91:1126-1129.
- Barbaud A, Tréchet P, Reichert-Pénétrat S, et al. Allergic mechanisms and urticaria, angioedema after hepatitis B immunization. *Br J Dermatol*. 1998;139:925-926.
- Brightman CA, Scadding GK, Dumbreck LA, et al. Yeast-derived hepatitis B vaccine and yeast sensitivity. *Lancet*. 1989;i:903.
- Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Wolfe S, Hamborsky J, eds. 12th ed. Washington DC: Public Health Foundation, 2012.
- Goh CL. Anaphylaxis from topical neomycin and bacitracin. *Australas J Dermatol*. 1986;27:125-126.
- Grohskopf LA, Olsen SJ, Sokolow LZ, et al. Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP) – United States, 2014-15 influenza season. *MMWR*. 2014;63(32):691-697.
- Hudson TJ, Newkirk M, Gervais F, Shuster J. Adverse reaction to the recombinant hepatitis B vaccine. *J Allergy Clin Immunol*. 1991;88:821-822.
- Kwittken PL, Rosen S, Sweinberg SK. MMR vaccine and neomycin allergy. *Am J Dis Child*. 1993;147:128-129.
- Lear JT, English JS. Anaphylaxis after hepatitis B vaccination. *Lancet*. 1995;345:1249.
- Nakayama T, Aizawa C. Change in gelatin content of vaccines associated with reduction in reports of allergic reactions. *J Allergy Clin Immunol*. 2000;106:591-592.
- Nilsson L, Kjellman N, Björkstén B. A randomized controlled trial of the effect of pertussis vaccines on atopic disease. *Arch Pediatr Adolesc Med*. 1998;152:734-738.
- Sakaguchi M, Nakayama T, Fujita H, et al. Minimum estimated incidence in Japan of anaphylaxis to live virus vaccines including gelatin. *Vaccine*. 2000;19:431-436.
- Sakaguchi M, Nakayama T, Inouye S. Food allergy to gelatin in children with systemic immediate-type reactions, including anaphylaxis, to vaccines. *J Allergy Clin Immunol*. 1996;98:1058-1061.
- Sakaguchi M, Yamanaka T, Ikeda K, et al. IgE-mediated systemic reactions to gelatin included in the varicella vaccine. *J Allergy Clin Immunol*. 1997;99:263-264.
- Staples JE, Gershman M, Fischer M; Centers for Disease Control and Prevention. Yellow fever vaccine: recommendations of the Advisory Committee on Immunization Practices. *MMWR Recomm Rep*. 2010;59(RR-7):1-27.
- Wiederman G, Scheiner O, Ambrosch F, et al. Lack of induction of IgE and IgG antibodies to yeast in humans immunized with recombinant hepatitis B vaccines. *Int Arch Allergy Appl Immunol*. 1988;85:130-132.

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Q&A PROTECTING BABIES FROM RSV: WHAT YOU SHOULD KNOW

Q. Is the RSV vaccine safe?

A. Yes. During clinical trials, some people experienced pain, redness and swelling at the injection site. Some also experienced short-lived tiredness, fever*, headache, nausea, diarrhea and muscle or joint pain.

The RSV vaccine given during pregnancy is also being monitored to determine whether it causes early labor. In the clinical trials, more vaccinated than unvaccinated people gave birth prematurely, but the numbers were too small to tell if they were caused by the vaccine. At present, the maternal vaccine is not associated with premature births; however, this continues to be monitored.

**If a pregnant person gets a fever, they should take acetaminophen because fever during pregnancy can harm the developing baby.*

Q. Should I get an RSV vaccine during each pregnancy?

A. No. At this time, only a single RSV vaccine is recommended; so, if someone got an RSV vaccine during one pregnancy, their future babies should get the monoclonal antibody. This recommendation may change in the future as this vaccine is available longer, but for now, only a single lifetime dose is recommended.

MONOCLONAL ANTIBODY DURING INFANCY

Q. What is the monoclonal antibody?

A. Nirsevimab is an antibody that binds to the same protein targeted by the vaccine (F protein on the surface of RSV). It is made by adding the gene to cells in the lab; as the cells reproduce, they also make the antibody, which is then purified for use in infants. About 7 or 8 of every 10 babies who get nirsevimab will be protected against RSV in their first season.

Q. Is the monoclonal antibody safe?

A. Yes. Babies who get nirsevimab may have redness, pain and swelling at the injection site. A small number may also develop a rash, but this occurs rarely (about 1 of 100 babies).

Q. When should my baby get the monoclonal antibody?

A. If a baby is born during RSV season and their mom did not get the RSV vaccine at least two weeks before delivery, they should get nirsevimab within the first week of life. Some birthing hospitals are giving nirsevimab before the baby goes home; other infants get it from their healthcare provider during the first visit.

If a baby was born after RSV season ended but is not yet 8 months of age, they should get nirsevimab before the start of RSV season (usually by October).

Q. Can the monoclonal antibody be given at the same time as recommended vaccines on the infant immunization schedule?

A. Yes. Nirsevimab will not interfere with the immune response to vaccines, nor will vaccines interfere with the protection against RSV offered by nirsevimab.

Q. Does my baby need the monoclonal antibody each year?

A. No. Most babies only need a dose during their first RSV season. To see which babies might need a dose during their second RSV season, check the answer to "Who is at risk from RSV?" or talk to your child's healthcare provider.

OTHER QUESTIONS

Q. If I was vaccinated during pregnancy, should my baby still get the monoclonal antibody?

A. Most often, a baby born to someone who was vaccinated during pregnancy does not need to also get a dose of nirsevimab. The exception would be if delivery occurred less than two weeks after receipt of the vaccine.

Q. If I am breastfeeding, does my baby still need to be protected against RSV?

A. RSV antibodies are transferred across the placenta and in breast milk. And, while infants can benefit from antibodies in breast milk, protection can vary based on the antibody levels present in breast milk and the relative quantities of breast milk or formula consumed if they are not exclusively breastfed. For these reasons, even infants being exclusively breastfed are recommended to receive nirsevimab if their mother was not vaccinated during pregnancy.



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Q&A PROTECTING BABIES FROM RSV: WHAT YOU SHOULD KNOW

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Each year, respiratory syncytial virus (RSV) kills about 10,000 people in the United States. Most are elderly, but a few hundred are young children. RSV can infect anyone, but it is most dangerous for the very young and old among us. The Centers for Disease Control and Prevention (CDC) estimates that, without protection, about 1 or 2 of every 100 infants will be hospitalized with RSV in the first six months of life.

Q. What is RSV?

A. RSV is a virus that infects the lining of the nose, breathing tubes and lungs. It can also infect the voice box. The damage caused by viral replication leads to excess mucus and inflammation in the affected person's breathing tubes.

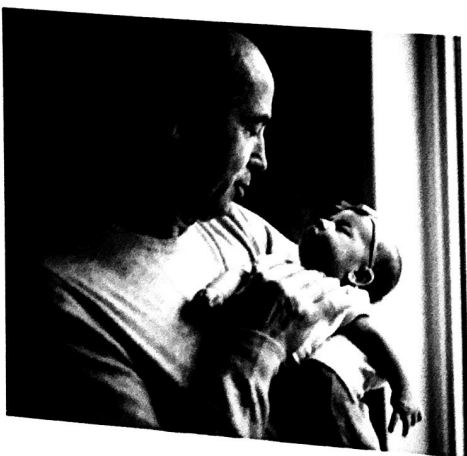
Q. What are the symptoms of RSV?

A. People with RSV can experience coughing, sneezing, runny nose, wheezing and breathing problems. For people with chronic conditions of the lungs, like asthma, an RSV infection can cause a worsening of their existing condition. For young infants with narrow airways, an RSV infection can cause them to become apneic, meaning they stop breathing for short periods of time. RSV can also cause generalized symptoms like tiredness, fever, or loss of appetite.

People with severe disease can experience complications, like pneumonia, bronchitis, bronchiolitis and croup.

Q. Who is at risk from RSV?

A. While anyone can get RSV, a few groups are at greater risk for more severe disease. These include infants in the first eight months of life, adults 75 years of age and older, and adults 60 years and older with chronic conditions that increase their risk of infection, such as diabetes, obesity, and chronic lung and heart disease. Some babies between 8 and 19 months of age remain at increased risk if they have chronic lung disease due to premature birth, are severely immune compromised, have cystic fibrosis with lung disease, or are of American Indian or Alaskan Native descent.



Q. How can I protect my baby from RSV?

A. We now have two ways to protect infants from RSV. Both involve what is known as "passive immunity," meaning the baby benefits from antibodies that are introduced to them from elsewhere rather than generated by their own immune system (i.e., active immunity).

The two ways to protect babies include:

1. **Maternal vaccination** – If an infant will be born during RSV season, vaccination of the mom at least two weeks before delivery will provide the baby with maternal antibodies transferred from the placenta that can protect them against RSV.
2. **Monoclonal antibody during infancy** – If infants will not be born during RSV season or if a maternal vaccination is not given at least two weeks before delivery, babies can get a monoclonal antibody called nirsevimab that will protect them against RSV for that season.

During their first RSV season, antibodies provided in the form of nirsevimab or by maternal immunization will protect infants from RSV circulating in the community. Even though these infants will be unlikely to become ill, they will develop immunity to protect them by their second RSV season. This is why only a small group of babies between 8 and 19 months of age who are at highest risk need to get a monoclonal antibody product during their second RSV season.

MATERNAL VACCINATION

Q. What is the RSV vaccine?

A. One of two available protein-based RSV vaccines can be given during pregnancy. It is called Abrysvo. The vaccine contains a surface protein from RSV called F protein. The vaccine does not contain any preservatives or adjuvants. About 5 or 6 of every 10 infants whose mothers were vaccinated during pregnancy will be protected against RSV during their first season.

Q. When during pregnancy should I get the RSV vaccine?

A. Pregnant people should be vaccinated between September and January if they are between 32 and 36 weeks of gestation. In a few areas of the U.S., RSV season varies a bit, so talk to your healthcare provider to confirm the appropriate timing in your area.

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