Immunizations

Vaccines and Teens

The Busy Social Years

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Children's Hospital of Philadelphia®
Vaccine Education Center


Teens have
their own
set of
health needs,

You never thought it would get more hectic than when you were changing diapers, arranging play dates and helping with homework, but somehow it has. Adolescents and teens in the home bring a whole new definition to the word "busy." They have their own schedules, deadlines and obligations. They also have their own set of health needs, including immunizations.

As children move into adolescence, they become increasingly susceptible to meningococcus, a disease that can claim a life in hours. They will soon begin exploring their sexuality, thereby increasing the likelihood of exposure to sexually transmitted diseases, such as human papillomavirus. And their immunity from some childhood vaccines, such as pertussis (whooping cough), starts to wane. As a parent, how do you know what they need and when? Is it worth arguing over getting "a shot" and adding yet another appointment to the calendar? And, most importantly, are these vaccines safe?

In this booklet, we will discuss which vaccines are recommended, what diseases they prevent, and whether they are safe. We will also provide information about making your teen comfortable during immunizations and locating vaccine records for colleges and employers. With a better understanding of the unique needs of adolescents and teens, you will see why your doctor feels so strongly about the value of vaccines.

including immunizations.

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Why Do Teens Need Vaccines?

By adolescence, a child's immune system has been introduced to many viruses and bacteria, in some cases through illness or infection, in others through immunization. Either way, a child's immune system is equipped to recognize these "repeat offenders" through its immunological memory.

Immunological memory is maintained in cells known as memory T and B cells. Memory T cells trigger a cascade of immune reactions that speed up the response to an infection, and memory B cells make antibodies to fight specific infections. Working together, these responses either prevent the infection completely or alter its course, leading to an illness that is less severe or of shorter duration.

Invincible Adolescents and Teens

Unfortunately (and contrary to their belief!) teenagers are not invincible. Their immune systems are not prepared to fight every infection. In fact, this age group is particularly susceptible to certain infections. Here's why:

- Fading immunity – Despite being immunized against diphtheria, tetanus and pertussis as young children, older children (and adults) become susceptible again. Unlike most diseases, protection provided by these vaccines is not lifelong.

- No previous exposure – While most vaccine-preventable diseases are spread casually through coughs, sneezes or shared objects, some, such as human papillomavirus (HPV), are only spread through intimate contact. Vaccines work best when they are introduced before an individual's first encounter with the virus so that protective immunity is in place before exposure.

• Social habits – Adolescents and teens are inherently social. Unfortunately, the new experiences they seek — sleepaway camps, college dorms and nightclubs — are often the same ones that increase their risk of infections with bacteria such as meningococcus.

• Changing viruses – Like children 6 months of age and older and most adults, adolescents and teens should get a yearly influenza vaccine. Because the virus changes so rapidly from season to season, the influenza vaccine from the previous year may not provide immunity.

Sending Them Out Into the World

As parents, we want to prepare our kids for whatever they may encounter when we're not around. We give them our values and discuss good decision-making. We teach them how to cross the street safely and to use bike helmets and seat belts. We monitor their friends, grades and eating habits. Vaccines provide one more opportunity for protection.

While all vaccines are made to afford protection without causing illness, various approaches are used to make vaccines against different types of bacteria and viruses:

• Use a piece of the virus or bacteria – HPV and meningococcal vaccines are made this way.

• Use the toxins produced by the bacteria – The bacteria that cause diphtheria, tetanus and whooping cough all produce toxins that cause disease. Therefore, in order to be protective, the vaccines contain inactivated forms of the toxins, known as toxoids.

• Use the whole, killed virus – The hepatitis A vaccine is made using this method.

• Use the live, weakened virus – The MMR and varicella vaccines are made using this method.

• Use genes from the virus – The COVID-19 mRNA and adenovirus-vector vaccines are made using this method.

Which Vaccines Do Teens Need?

All adolescents and teens are recommended to receive the following vaccines:

• **Meningococcus**: Two versions of meningococcal vaccines are licensed, and both are recommended for teens:

- The conjugate meningococcus vaccine protects against 4 of 5 types of meningococcal bacteria (A, C, W and Y). It is recommended for all 11- to 12-year-olds with a booster dose at 16 years of age.
- The meningococcal B vaccine protects against the last type of meningococcal bacteria and is recommended for all 16- to 18-year-olds. It is given as two doses, except in limited situations when a third dose is needed.

Meningococcal B is the type that continues to cause outbreaks on college campuses. Some parents don't realize that two meningococcal vaccines are available, but both are important to protect teens before they go to college.

• **Tdap**: The existing tetanus-diphtheria (Td) vaccine, recommended every 10 years, was modified to include a pertussis or whooping cough component (Tdap) that will protect adolescents and adults from three diseases instead of two. This change was important not only for the recipients of the vaccine who could suffer months of coughing spells and broken ribs from whooping cough, but also for infants not old enough to be protected from the suffering and death caused by pertussis.

Adolescents between 11 and 12 years of age should get a single dose of Tdap vaccine. Teens between 13 and 18 years of age who have not had the vaccine should also get one dose.

Older children and adults were not recommended to receive the infant version of the vaccine, known as DTaP, because 2 or 3 of every 100 recipients experienced significant swelling of the arm or leg in which the vaccine was given. The newer version contains quantities of diphtheria and pertussis that make this side effect much less likely. The lower quantities in the formulation are indicated by the lower case "d" and "p" in the name: Tdap.

• **Human papillomavirus**: HPV is the most common sexually transmitted disease in the United States and the world. HPV causes cervical and anal cancer and genital warts as well as occasional cancers of the head and neck. Because the vaccine only works before someone is infected and because 11- to 12-year-olds are already recommended to get other vaccines, the HPV vaccine was recommended for this age group as well.

HPV vaccine requires two or three doses. For those younger than 15, two doses are needed. The second dose is given six to 12 months after the first. For those 15 years or older, three doses are necessary. The second dose is given one to two months after the first dose. The third dose is given six months after the first dose. Children as young as 9 and adults up to 45 years of age can receive the HPV vaccine.

• **Influenza**: Everyone 6 months of age and older is recommended to get an influenza vaccine annually.

• **COVID-19**: Most individuals are recommended to get the COVID-19 vaccine.

• First entrance into middle school, high school or college is a great time to catch up on vaccines. Check to make sure your teen is immune to hepatitis A; hepatitis B; polio; measles, mumps, rubella (MMR); and chickenpox.

Giving the HPV vaccine to boys protects them against genital warts and some cancers and decreases transmission of the virus between sexual partners.

Meningococcal Vaccine

What is meningococcus?
Meningococcus is a bacterium that lives on the lining of the nose and throat of about 1 in 10 people. Most people don't have any symptoms of infection.

What is my teen's risk of getting meningococcus?
Before the conjugate meningococcal vaccine, every year approximately 2,500 people in the United States got meningococcus and about 120 died from their infections. Approximately 400 people who survived were left with permanent disabilities, such as seizures, loss of limbs, kidney disease, deafness and intellectual delays. Although children younger than 2 years old are the most likely to catch meningococcus, teens are the most likely to die from it.

People who have recently had a disturbance to the lining of their throat and those who are in close contact with a large group of people are at increased risk of infection with meningococcus. Several groups fall into these categories, including people who had a recent infection of the nose, throat or lungs; college freshmen living in dorms; military recruits living in barracks; people exposed to tobacco smoke or indoor wood stoves; people who go to bars or nightclubs; and people who share drinking glasses or cigarettes.

How do you catch meningococcus?
Meningococcal bacteria are passed from person to person by coughing or sneezing.

What is the meningococcal vaccine?
Two meningococcal vaccines are available and recommended for use in teens. The conjugate meningococcal vaccine is made using purified sugars from the protein coating of four of the five different types of meningococcus bacteria (A, C, W and Y). The vaccine also includes a harmless protein that isn't part of meningococcus but helps improve immunity to the meningococcal sugars in the vaccine. Because the protein is linked to the sugars, this version is called the meningococcal conjugate vaccine.

Because the sugars on the coating of meningococcal type B bacteria resemble a protein found in humans, the same technology could not be employed when developing this vaccine. Therefore, the meningococcal type B vaccine is made using two to four proteins from meningococcal type B bacteria, but not the purified sugars from the protein coat.

Do the meningococcal vaccines prevent all cases of meningitis?
No. Meningitis refers to an infection of the lining of the brain and spinal cord. However, meningococcal bacteria are not the only cause of meningitis, so while preventing meningococcal infections will reduce the number of cases of meningitis,

it will not prevent all cases of meningitis. While vaccines prevent a few causes of meningitis in infancy, such as *Haemophilus influenzae* type b and pneumococcus, other causes are not prevented by vaccination.

Are the meningococcal vaccines safe?
Yes, the meningococcal vaccines are safe:

• Some teens may develop minor side effects, such as pain or redness at the site of injection, fever, headache or tiredness.

• Since some teens are prone to fainting following receipt of vaccines, they should stay seated or lie down at the doctor's office for about 15 minutes after getting any vaccine.

• Some have questioned whether the conjugate meningococcal vaccine causes Guillain-Barré Syndrome (GBS), a disease involving muscle weakness, burning or tingling of the limbs, loss of muscle tone, and paralysis. Studies have shown that the meningococcal vaccine does not cause GBS.

Do the benefits of meningococcal vaccines outweigh their risks?
Every year, people in the United States are severely debilitated or die from infections with meningococcal bacteria. Since neither vaccine causes severe reactions, the benefits clearly outweigh the risks.

Human Papillomavirus (HPV) Vaccine

What is human papillomavirus?
Human papillomavirus (HPV) infects the genital area and the lining of the cervix. There are many types of HPV, and while most people do not even realize they were infected, in some cases, infections last for a long time. Some types of HPV cause genital warts, and other types cause cancers of the cervix, head, neck, anus, vagina, vulva and penis. Often the cancers do not develop until 20 to 25 years after the infection.

What is my teen's risk of getting HPV?
Before the HPV vaccine, every year in the United States 6 million people were newly infected with HPV. Many of these new infections were in individuals in their late teens or early 20s. Because many infections with HPV occur in the first two years of sexual activity, it is important to get the HPV vaccine before the start of sexual exploration.

About 79 million people in the United States are already infected. And every year, about 36,000 people develop cancers caused by HPV.

How do you catch HPV?
HPV is transmitted by genital contact, most often, but not only, during sex. Although condoms are helpful, they are not completely protective.

Some people vaccinated with older versions of the HPV vaccine (HPV-2 or HPV-4) wonder whether they should get the current version, which protects against nine types of HPV. Since HPV-9 (Gardasil 9) protects against additional strains of HPV that cause cancer, it would be reasonable to give this vaccine to those who previously received the HPV vaccine.

What is the HPV vaccine?
The HPV vaccine is made using a protein from the surface of HPV. Known as Gardasil® 9, the HPV vaccine protects against two strains that cause anal and genital warts as well as seven strains that cause cervical, anal, genital, and head and neck cancers.

Because initial exposure to HPV does not typically include exposure to all types of HPV in the vaccines, young people who have begun sexual exploration may still benefit from receiving HPV vaccine.

Does the HPV vaccine work?
Yes. An 11-year study of 1.7 million women in Sweden confirmed that those who were vaccinated were less likely to be diagnosed with cervical cancer compared with unvaccinated women. The vaccine was particularly effective when women were vaccinated by 17 years of age.

Is the HPV vaccine safe?
Yes. Side effects following receipt of the HPV vaccine can include pain, swelling or redness at the injection site. Since some teenagers faint after receiving vaccines, it's recommended that they stay seated or lie down at the doctor's office for about 15 minutes after getting vaccinated.

Some people have attributed blood clots, strokes, heart attacks, chronic fatigue syndrome and even deaths to the HPV vaccine. However, studies have shown that the HPV vaccine does not cause any of these conditions.

Do girls and women who get the HPV vaccine still need to get Pap tests?
Yes. Because HPV vaccine does not protect against all types of HPV that cause cervical cancer, women can still be infected and later develop this disease. So, they should continue to use this important preventive measure.

Do those who get HPV vaccine still need to worry about sexually transmitted diseases?
Yes. HPV vaccine does not protect against all types of HPV, nor does it prevent other types of sexually transmitted infections, such as syphilis, gonorrhea, chlamydia and herpes.

Do the benefits of the HPV vaccine outweigh its risks?
Every year, thousands of people are infected with HPV, and some die from their infections. Since the vaccine does not cause any serious reactions, the benefits of the vaccine clearly outweigh the risks.

Tetanus-Diphtheria-Acellular Pertussis (Tdap) Vaccine

Tetanus

What is tetanus?
Tetanus is a bacterium that typically infects older adults. Tetanus makes a toxin that causes severe and painful spasms of the muscles, including muscles of the jaw. For this reason, tetanus is sometimes referred to as lockjaw. Muscle spasms of the throat can block the windpipe and cause instant death from suffocation. The tetanus toxin can also cause severe and permanent damage to the heart. About 3 of every 10 people who get tetanus die from the disease.

What is my teen's risk of getting tetanus?
Each year about 30 people in the United States get tetanus and several die.

How do you get tetanus?
Tetanus bacteria live in the soil and can enter the skin after a cut or puncture wound. Because tetanus bacteria will always be present in the soil, the risk of getting infected will never go away. Further, because the disease is not passed from person to person, it doesn't matter how many other people in the community are immunized, an individual's risk of getting tetanus will remain the same.

Diphtheria

What is diphtheria?
Diphtheria is caused by a bacterium that typically infects children and adolescents. However, recent outbreaks in other countries have occurred primarily among adults due to fading immunity.

The diphtheria bacterium causes a thick coating on the back of the throat that makes it difficult to swallow and breathe. Also, the bacterium makes a harmful protein, called a toxin, which can invade the heart, kidneys and nervous system.

What is my teen's risk of getting diphtheria?
In the United States, the risk of getting diphtheria is low, but because cases occur in other parts of the world and travel is common, individuals still benefit from vaccination.

How do you catch diphtheria?
Diphtheria is very contagious and is spread by coughing and sneezing.

Pertussis

What is pertussis?
Pertussis is a type of bacteria that infects people of all ages. The bacterium makes several toxins that cause a thick, sticky mucus that clogs the windpipe and causes painful coughing spasms. When a person breathes in against the narrowed windpipe, it causes a whooping sound. This is why pertussis is often

called whooping cough. In young infants, this struggle to breathe can be deadly. In adults, coughing spasms can lead to broken ribs, seizures and hernias. Pertussis can also cause pneumonia, seizures and permanent brain damage.

What is my teen's risk of getting pertussis?
Pertussis is quite common, but often is underdiagnosed. Estimates are that hundreds of thousands of cases occur each year in the United States, with about 15 to 20 deaths.

How do you catch pertussis?
Pertussis is spread through coughing and direct contact with respiratory secretions.

Tdap Vaccine

What is the Tdap vaccine?
Tdap vaccine protects against three different bacteria. The vaccine is made by taking the toxins produced by each of these bacteria and inactivating them with a chemical. The chemical is then washed away, leaving the purified, inactivated toxins (called toxoids).

Tdap vaccine is different from Td vaccine because it includes the whooping cough component. Tdap vaccine is different from DTaP vaccine given to infants and young children because it contains lesser quantities of diphtheria and pertussis vaccines.

Does the Tdap vaccine prevent pertussis?
Yes. In medical studies, Tdap vaccine was shown to prevent pertussis in 9 of every 10 recipients.

Is the Tdap vaccine safe?
A small number of people who receive the Tdap vaccine will experience pain, redness or swelling at the injection site; slight fever; headache; fatigue or upset stomach. Less often, and particularly in adults, an exaggerated local reaction occurs that involves swelling from the shoulder to the elbow.

Do the benefits of the Tdap vaccine outweigh its risks?
Every year, people are infected with these three diseases, and some die from them. Although side effects sometimes occur, these reactions do not result in permanent harm or death, so the benefits of the vaccine outweigh the risks.

Influenza Vaccine

What is influenza?
Influenza is a virus that infects the respiratory system, attacking the lining of the nose, windpipe, large breathing tubes, small breathing tubes and lungs.

What is my teen's risk of getting influenza?
Each year in the United States approximately 200,000 people are hospitalized and thousands to tens of thousands die from influenza. Unfortunately, some of those who are hospitalized and die are previously healthy children and teens.

How do you catch influenza?
Influenza is transmitted by coughing and sneezing as well as by direct contact with infected respiratory secretions.

What is the influenza vaccine?
There are several different influenza vaccines:

- The inactivated influenza vaccine is made by taking influenza viruses, growing them in eggs, purifying them and chemically inactivating them so they cannot cause disease. This version is given as a shot.
- One newer version is grown in mammalian cells and not eggs; therefore, decreasing the amount of egg protein. This version, given as a shot, is currently licensed in those 2 years of age and older.
- Another newer version is made using just one protein from the influenza virus and can also be given to patients with egg allergies. It is given as a shot to those 18 years of age and older.
- The live, weakened influenza vaccine, given as a nasal spray, is made by growing and purifying influenza viruses. The weakened viruses are not inactivated. In this manner, the vaccine viruses can reproduce in the recipient's nose to generate immunity. People 2 to 49 years of age can get this version.

Does the influenza vaccine work?
Yes. Because the strains of influenza in the vaccine are based on those circulating in other parts of the world, some years the vaccine is a better match (and more effective) than others. However, the influenza vaccine typically prevents about 70 of every 100 recipients from developing a severe influenza infection.

Is the influenza vaccine safe?
People who get the influenza vaccine may experience pain, redness and swelling at the injection site. In rare cases, people experience an allergic reaction such as hives, most likely caused by egg proteins in the vaccine. However, although most influenza vaccines are made in eggs and some people are severely allergic to eggs, the quantity of egg proteins is insufficient to cause a severe allergic response. Just to be sure, people with severe egg allergies should remain at the provider's office for 15 minutes after receiving the influenza vaccine.

Do the benefits of the influenza vaccine outweigh its risks?
Influenza virus kills thousands to tens of thousands of people every year, some of whom were previously healthy. In addition, about 200,000 people are hospitalized each year with fever, croup, bronchitis, bronchiolitis or pneumonia caused by influenza. Because the vaccine does not cause serious reactions, the benefits of the vaccine clearly outweigh the risks.

Because other viruses cause respiratory illnesses and colds, it is important to remember the influenza vaccine will only protect against influenza viruses.

COVID-19 Vaccine

What is COVID-19?
COVID-19 is caused by the SARS-CoV-2 virus. It infects the respiratory system but can also attack other organs of the body due to the common appearance of a receptor called ACE-2 on many cell types.

What is my teen's risk of getting COVID-19?
While teens are less likely than older adults to suffer severe COVID-19 infections, they can become sick enough to require hospitalization or possibly die. Scientists are also still working to understand the long-term effects of COVID-19.

How do you catch COVID-19?
COVID-19 is primarily transmitted by coughing and sneezing.

What is the COVID-19 vaccine?
A few different COVID-19 vaccines are available:

- mRNA vaccines deliver mRNA that serves as a blueprint for production of the SARS-CoV-2 spike protein.
- Adenovirus-based vaccines deliver DNA that is used to produce mRNA, which in turn serves as a blueprint for production of the SARS-CoV-2 spike protein.

Is the COVID-19 vaccine safe?
People who get the COVID-19 vaccine may experience pain, redness and swelling at the injection site; fever; chills; tiredness or achiness. A small number of people experience a severe allergic reaction, called anaphylaxis, so people should remain at the location of vaccination for 15 to 30 minutes after receiving the vaccine, depending on their history of allergic reactions.

mRNA vaccines: A rare inflammation of the heart, called myocarditis, has been described after receipt of mRNA vaccines in a very small number of teens and young adults, particularly males. Symptoms such as chest pain and shortness of breath tend to develop in the four days after vaccination, most often after the second dose. The condition appears to resolve on its own and does not currently appear to cause any long-lasting damage to the heart.

Adenovirus-based vaccines:
Although most teens will not get the adenovirus-based vaccine, older teens and young adults may, so it is important to be aware that this type of COVID-19 vaccine has very rarely been associated with two potentially severe side effects:

• Thrombosis with thrombocytopenia syndrome, or TTS. This blood-clotting condition has most often occurred in females between 30 and 49 years of age, but it has been identified in those as young as 18 years of age and in those over 60 years of age. The condition tends to occur within three weeks of vaccination and causes severe or unexplained pain in the area of the blood clot, such as headache, leg or abdomen. It can also cause shortness of breath, easy bruising, or small red spots on the skin. People should seek medical care if they develop these symptoms in the first few weeks after receipt of the adenovirus vaccine.

• Guillain-Barre Syndrome (GBS). GBS, which normally affects about 3,000 to 6,000 people every year in the United States, causes generally short-lived, self-resolving muscle weakness. However, the disease can be severe. GBS appears to occur in about 1 of every 130,000 people who receive the COVID-19 adenovirus-based vaccine.

Does the COVID-19 vaccine work?
Yes. The COVID-19 vaccines prevent about 90 of every 100 recipients from developing COVID-19.

Do the benefits of COVID-19 vaccine outweigh its risks?
While COVID-19 is mild for most people, that is not the case for some who are hospitalized or die, and we don't know who will be more severely affected. Likewise, some people experience lingering effects of illness, which are yet to be understood. On the other hand, the vaccine does not commonly cause serious or long-term effects; therefore, the benefits of the vaccine clearly outweigh the risks.

A Word About Catch-up Vaccines

Hepatitis A

Hepatitis A is a virus that infects the liver. While most people who get it don't have any symptoms, for some, infection with hepatitis A causes loss of appetite, vomiting, nausea, fatigue and jaundice (yellowing of the eyes and skin). In rare cases, hepatitis A causes an overwhelming infection of the liver resulting in death. Hepatitis A can spread either from one person to another or through contaminated food or water.

The hepatitis A vaccine is made by purifying hepatitis A virus and inactivating it with a chemical. The vaccine, recommended for all children at age 1, is given as a shot in two doses separated by six months.

Side effects are minor and can include pain, warmth or swelling at the injection site or headache.

Hepatitis B

Hepatitis B is a virus that infects the liver. Many people who get hepatitis B do not know they have it, but some have long-term, silent infections that lead to cirrhosis or liver cancer. Symptoms of hepatitis B infection include loss of appetite, vomiting, nausea, fatigue and jaundice. Hepatitis B can spread through sexual contact, from infected mothers to their babies during birth, and by sharing items that may contain small quantities of blood or saliva, such as toothbrushes, razors or nail clippers.

The blood of an infected person can contain so much hepatitis B virus that it can be transmitted in quantities of blood that cannot be viewed with the naked eye.

The hepatitis B vaccine is made from the protein coat that surrounds the virus, called the hepatitis B surface protein. The vaccine is given as a shot in two or three doses. Because the vaccine was recommended at birth beginning in 1992, many adolescents and teens have already had it; however, those who have not should get it.

Side effects are typically minor, such as pain, redness and tenderness at the injection site; fever; headache; fatigue and irritability. Rarely, recipients have a severe allergic reaction, with hives, rash or a drop in blood pressure. This type of reaction only occurs in about 1 of every 1 million recipients and usually within 30 minutes of getting the vaccine.

Polio

Most adolescents and teens have received the polio vaccine, but if they did not receive the recommended number of doses, they need to catch up. Polio is caused by a virus that in most cases causes a mild intestinal infection. However, in about 1 of every 200 people, the virus also infects the brain and spinal cord, leading to paralysis. Polio is spread when contaminated food, hands or objects are put in the mouth; it is quite contagious.

The polio vaccine is made from the three different types of polio that infect people. These viruses are purified and inactivated with a chemical, so they cannot cause disease. The vaccine is given as a shot. Adolescents and teens not previously immunized need three doses. Those who received some doses previously may require fewer doses.

The polio vaccine may cause pain, redness or tenderness at the injection site.

Measles, Mumps and Rubella (MMR)

Measles, mumps and rubella are three viruses that cause distinct illnesses. Measles is extremely contagious and can be transmitted through viral particles that remain in the air for as long as two hours after an infected person leaves. Mumps and rubella are both transmitted through respiratory secretions, such as coughs and sneezes. All three infections are extremely dangerous for pregnant women; therefore, it is important for women to be immunized before they decide to start having children.

Measles, mumps and rubella vaccines are made from weakened, live viruses that can no longer cause disease. Vaccine viruses are combined to form the MMR vaccine. MMR vaccine is given as a shot and requires two doses. In adolescents and teens the doses are separated by four weeks. Since some in this age group already had one dose at a younger age, they may only require one additional dose.

The MMR vaccine may cause mild side effects, such as pain, redness or tenderness at the injection site; fever or rash. About 1 of every 24,000 people who get the vaccine may have a temporary decrease in platelets, which are cells in the bloodstream that help blood to clot. Temporary arthritis or swelling of the joints may also occur in a small number of vaccine recipients, mostly adolescent girls and women.

Varicella (Chickenpox)

Varicella, also known as chickenpox, is a virus that causes fever and about 300 to 500 blisters over the entire body. In severe cases, the virus can also cause pneumonia, encephalitis (swelling of the brain) or skin infections resulting from "flesh-eating" bacteria. Teens and adults tend to experience more complications. Infection during pregnancy can lead to birth defects or spontaneous abortion and fetal death. Chickenpox is spread by coughing and sneezing and is quite contagious.

The chickenpox vaccine is made from a live, weakened form of the virus. The vaccine is given as a shot at 1 year of age and again between 4 and 6 years of age.

The chickenpox vaccine causes pain, redness or tenderness at the injection site, and a small number of recipients will develop a few blisters.

Vaccines for Special Situations

As teens have new opportunities and develop into young adults, new encounters may present health risks.

Vaccines for Special Work Environments

If your teen is employed in a healthcare setting or in a position in which they may come into contact with blood, it is important to be up to date on all vaccines, particularly those that prevent diseases transmitted by blood or body fluids from an infected person, such as hepatitis B.

If your teen is employed in a setting in which they are coming into contact with large groups of people, it is important to be up to date on vaccines that prevent highly contagious diseases, such as pertussis, measles, influenza and chickenpox.

If your teen is employed in an outdoor setting, such as lawn care, farming or landscaping, they should have recently received a tetanus-containing vaccine since tetanus bacteria live in the soil and can cause an infection after entering the body through a wound.

Vaccines for Teens With Chronic Diseases

Unfortunately, even young people are sometimes diagnosed with illnesses that compromise their immune systems or require them to take medications that can make them more susceptible to vaccine-preventable diseases. For example, people with asthma are more susceptible to diseases that infect the lungs, such as influenza and pneumococcus.

If your teen is being treated for diseases such as diabetes, asthma, chronic lung disease, kidney disease, heart disease, sickle cell disease, cancer, or immune diseases such as HIV or AIDS, you should check with their healthcare provider to determine whether they need any vaccines and whether there are vaccines that they shouldn't get during treatment. For example, some people treated with steroids should not get live, weakened viral vaccines, such as chickenpox or MMR vaccines.

Vaccines for Behaviors That Increase Risk

Because teens often believe they are invincible, they do not always take care of themselves. When they get run down and fail to eat a well-balanced diet, they may be more susceptible to certain illnesses. In addition, activities such as smoking, sharing drinks, getting tattoos or piercings, sharing personal care items (such as toothbrushes, razors or nail clippers), or sharing illegal drug paraphernalia can make young adults more likely to catch vaccine-preventable diseases, such as pneumococcus, meningococcus and hepatitis B.

Vaccines Before Sexual Exploration

Although parents do not like to think about teens and their sexual exploration, the reality is that they will be involved in sexual encounters eventually. Parents can make sure their teens are protected from certain situations by having them vaccinated before these encounters begin:

- Girls should have received rubella (the "R" in MMR) and chickenpox vaccines before they become pregnant because if infected with these diseases during pregnancy, unborn babies can be harmed or die.

- If a teenager is pregnant during influenza season, she should have the influenza vaccine since she will be more susceptible to complications of influenza if infected. Also, she will transfer the antibodies that she has made against influenza through the placenta to protect her baby.

- Both boys and girls should receive human papillomavirus (HPV) and hepatitis B vaccines. HPV and hepatitis B can be spread through sexual contact.

Vaccines for Sleepaway Camps, College and Traveling Abroad

When your teens begin adventures that take them away from home, it is possible they will come in contact with viruses and bacteria to which they have not been exposed. For example, because meningococcal bacteria live harmlessly in the noses and throats of about 1 of every 10 people, your teen may be exposed to a type that they are susceptible to when sharing living quarters with others.

If your teen has the opportunity to travel abroad, they may require additional vaccines or medications. The best way to determine this is to take your teen to a travel medicine clinic a few months before the trip. Factors such as where your teen is going, where they will stay, and what activities they will participate in will determine any health needs. You can find more information about travel resources, including how to find a travel clinic near you, in the travel-information-related resources section of this booklet (*page 33*).

Studies have shown that college freshmen living in dorms are five times more likely to get a meningococcal infection compared with peers not living in a dorm.

Comforting Your Teen or Young Adult

As difficult as it might have been to watch your infant and young child get vaccines, taking your older child or teen for vaccines can be worse if they are scared of needles. You can no longer hold them on your lap and comfort them — even getting them to the appointment may be difficult. However, here are some things you may try:

For You:

• As with other issues, if your teen sees that vaccines are important to you, they will be more accepting of them. Before the appointment, discuss getting vaccines with your teen, answer any questions and provide reassurance.

• During the appointment, bring the immunization record, read materials provided by the office staff, ask questions, and check about the use of pain medication following the appointment.

• After the appointment, provide lots of fluids; realize that your teen's appetite may decrease over the next 24 hours; use a cool, wet cloth on a red or swollen injection site; have your teen take a cool bath or shower for fever; provide pain medication as instructed by your doctor; and call the office if an unusual reaction occurs.

For Your Teen:

• Take something or someone to the appointment that will serve as a distraction. Talking to a parent, sibling or friend, listening to music, texting or playing games on a cell phone, or reading a book may take your teen's mind off of the impending shot(s).

• Tell your teen to try to relax their muscles and not to look while the needle is being given. Taking a few short, deep breaths and then a few longer breaths during the procedure will also help.

• Since the sensation of cold usually overpowers that of pain, ask for an alcohol pad. Right before the vaccine is given, have your teen rub it on their wrist and blow on the spot while the shot is given.

• Finally, remind your teen that the pain of a needle is nothing compared with the diseases that vaccines prevent.

Adolescents and teens must be comfortable getting vaccines without the use of physical constraint.

Common Questions and Concerns About Vaccines

Are vaccines safe?
To best answer this question, we must first define what we mean when we say "safe." If by "safe" we mean completely risk-free, then vaccines aren't 100% safe. Like all medicines, vaccines have mild side effects, such as pain, tenderness or redness at the site of injection. And some vaccines have very rare, but more serious, side effects.

But nothing is harmless. Anything that we put into our bodies (like vitamins or antibiotics) can have side effects. Even the most routine activities can be associated with hidden dangers. For example, consider seat belts. It's possible that in an accident a seat belt could cause a minor injury, like a bruise. But if you measure the risk of wearing a seat belt against the risk of not wearing one, the decision to wear a seat belt is an easy one. Similarly, for each of the recommended vaccines, the benefits far outweigh the risks.

Do we still need vaccines?
Yes. Vaccines are still given for three reasons:

• For common diseases (like chickenpox or pertussis), a choice not to get a vaccine is a choice to risk natural infection. For example, every year hundreds of thousands of people are infected with pertussis, and some die from the disease. Therefore, it's still important to get the vaccines.

• Some diseases (like measles or mumps) still occur in the United States at low levels. If immunization rates drop further, these diseases will come roaring back.

• While some diseases (like polio, rubella or diphtheria) have been either completely or virtually eliminated from the United States, they still occur in other parts of the world. Because international travel is common, these diseases are only a plane ride away from coming back into the United States.

Why do adolescents and teens need vaccines?

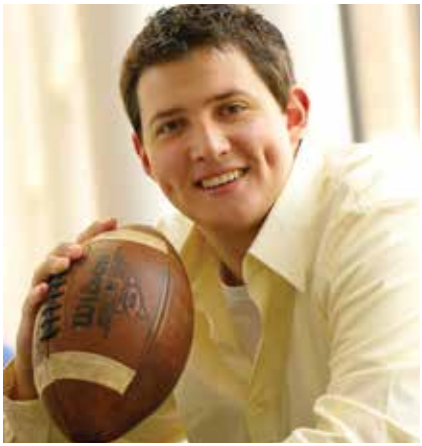
Older children and teens need vaccines for several reasons:

• To boost immunity – Some vaccines do not provide enough immunity to last a lifetime, so additional doses are necessary as children (and adults) get older. The Tdap vaccine is one example.

• To protect against diseases that have not been encountered – Some vaccines protect against viruses the person hasn't seen before. The HPV vaccine is an example.

• To protect against viruses that change – Some viruses adapt to their environment in a "survival of the fittest" manner, so previous versions of the vaccine are no longer effective in protecting against the disease. Influenza vaccine is an example.

• To protect against diseases that tend to infect particular age groups – For example, the meningococcal vaccine is important because the chance of getting this disease decreases after age 2, but begins to increase again around adolescence.



Do vaccines weaken the immune system?

No. In fact, vaccines prevent infections that weaken the immune system. Because bacteria and viruses contained in vaccines are highly weakened versions of natural bacteria and viruses, they do not weaken the immune system.

On the contrary, infections with natural viruses can weaken the immune system. For example, people infected with influenza virus are at risk of developing severe bacterial pneumonia. Also, people infected with chickenpox virus are at risk of developing severe infections of the skin caused by "flesh-eating" bacteria.

Can vaccines cause long-term diseases like multiple sclerosis, diabetes or asthma?

Studies have shown that vaccines don't cause autism, diabetes, multiple sclerosis, allergies, asthma or permanent brain damage.

When one event precedes another, we often wonder whether they are related. For example, some people who smoke a lot of cigarettes get lung cancer. But when scientists wanted to know whether cigarette smoking caused lung cancer, several studies performed in the 1950s and 1960s compared the likelihood of lung cancer in people who smoked cigarettes with that in people who didn't smoke. The best studies matched these two groups of people with regard to age, general health, medications and so on. By matching these groups, they made sure the only difference between them was cigarette smoking. The result was clear: Cigarette smoking caused lung cancer.

Similarly, some people who use cell phones get brain cancer. To answer the question of whether cell phones caused brain cancer, the occurrence of brain cancer in people who used cell phones was compared with that in people who didn't. Again, these groups were matched to make sure the only difference between them was cell phone use. The result was also clear: Cell phones didn't cause brain cancer.

Because vaccines are given to nearly everyone, many people with chronic diseases will have received vaccines. And some of these people will have received vaccines close in time to the appearance of the chronic condition. The question is: "Did the vaccine cause the disease?" The best way to answer this question is to do studies similar to those described for smoking and cell phones. Although not all potential associations have been studied, many have; therefore, we know that vaccines don't cause autism, diabetes, multiple sclerosis, allergies, asthma or permanent brain damage.

Vaccine Schedule

Vaccine	Ages 11-12	Ages 13-18
Meningococcus • Conjugate version	1st dose at 11-12yo* 2nd dose at 16-18yo	13-15yo: 1 dose, followed by a booster at 16-18yo 16-18yo: 1 dose
• Type B		16-18yo: 2 doses
Tdap	1 dose	1 dose if not previously received
HPV	2nd dose 6-12 months after first	13-14yo: 2 doses 6 to 12 months apart 15-18yo: 3 doses if not previously received Remaining doses if immunization was started

	Ages 11-18
Influenza	1 dose annually
Hepatitis A†	2 doses
Hepatitis B†	2 or 3 doses
Polio†	3 doses
Measles, mumps, rubella (MMR)†	1 or 2 doses
Chickenpox†	1 or 2 doses
COVID-19	1 or 2 doses (for approved age groups)

**yo=years old*

†*Catch-up shots may be required depending on the teen's vaccination history.*

We Need What? Locating Vaccine Records

As your teen's world expands to include sleepaway camps, first jobs and college, you may find that you are being asked for vaccine records.

While some parents have a copy of their teen's immunization record, many do not. So, what should you do if you can't find your teen's record?

• Check with your teen's most recent healthcare provider. If your teen has switched doctors, you may need to check with previous providers, especially those who cared for your teen before they entered school.

• Check with your teen's previous schools since they sometimes keep copies.

• If your state health department has an immunization registry, you may be able to get a copy from them.

• Check baby books and old health records as you may have a copy of immunization records in a place you hadn't thought about.

• Old school or camp forms may also have the information.

While many parents are concerned that getting vaccines will be harmful if their child had already been vaccinated, they can be reassured that extra doses of vaccine, like an exposure to the disease, will serve to strengthen immunity to that disease.

What if I can't find my teen's immunization record?

If you are unable to locate your teen's immunization record, they may need to:

• Have a blood test – A blood test can help determine immunity to some vaccine-preventable diseases, such as chickenpox, measles, mumps, rubella, hepatitis A, hepatitis B, tetanus, diphtheria and polio. However, if the blood test reveals that your teen is not immune to one or more of these diseases, they will need to be vaccinated. Since an extra dose of vaccine will not cause harm, some parents opt to get the vaccines in question without getting the blood test.

• Be vaccinated – Some vaccines may be necessary either because there is not a blood test to determine immunity or because the blood test reveals vaccines that are needed.

There may be costs associated with the blood test and extra copays for visits to make up vaccines. Each vaccine has its own set of requirements regarding how soon after the initial dose subsequent doses can be administered.

Once you and your healthcare provider decide how to proceed, you can set up a schedule to be sure the vaccine series is completed. In addition to the records the doctor keeps, ask them to complete a record that you take each time you go for additional doses.

I Need More Information: Resources for Parents and Teens

Vaccine-related Information

Internet Resources

• Vaccine Education Center (VEC) at Children's Hospital of Philadelphia *vaccine.chop.edu*

  ◦ The VEC hosts a Q&A page about HPV at *prevent-HPV.org* and one about COVID-19 at *COVIDVaccineAnswers.org.*

• Centers for Disease Control and Prevention (CDC), *cdc.gov/vaccines/parents/by-age/index.html*

• Vaccine Information for the Public and Health Professionals (a program of Immunization Action Coalition – IAC), *vaccineinformation.org*

• Vaccinate Your Family, *vaccinateyourfamily.org*

Pamphlets and Information Sheets

• Vaccine Information Statements (VIS) on all vaccines are offered by the CDC. *cdc.gov/vaccines/hcp/vis*

• Various informational tear sheets are available for download from the VEC. *vaccine.chop.edu/resources*

Family Groups

• Parents PACK (Possessing, Accessing and Communicating Knowledge about Vaccines) – A program directed by the VEC. Offers a free monthly email newsletter about vaccines. Vaccine information is provided for all age groups. *vaccine.chop.edu/parents*

• Vaccinate Your Family – An immunization awareness campaign; includes information about vaccines and their safety. *vaccinateyourfamily.org*

• Autism Science Foundation (ASF) – A nonprofit organization that funds scientific research into the causes of autism and the development of better treatments. The group also provides information to the public about autism and supports the needs of individuals with autism and their families. *autismsciencefoundation.org*

• Families Fighting Flu – A nonprofit public organization composed of families and pediatricians who have experienced firsthand what it is like to lose a child to flu or to have a child experience severe medical complications from flu. *familiesfightingflu.org*

• Meningitis Angels – A nonprofit organization composed of families affected by meningitis and dedicated to the support of other victims of bacterial meningitis and their families. *meningitis-angels.org*

• National Meningitis Association – A nonprofit organization founded by parents whose children have died or live with permanent disabilities from meningococcal disease. *nmaus.org*

• PKIDS – A national nonprofit organization that supports families whose children are living with hepatitis, HIV/AIDS or other chronic, viral infectious diseases and educates the public about infectious diseases. *pkids.org*

• Cervivor – An organization dedicated to breaking down the stigma that surrounds cervical cancer and helping connect survivors. *cervivor.org*

• The Yellow Umbrella Organization – An organization that "is about working together, under the same umbrella, toward a common goal ... It's about cervical cancer prevention." *theyellowumbrella.org*

• Voices for Vaccines – A parent-driven, science-based organization that provides vaccine information. *voicesforvaccines.org*

Adolescent and Teen Resources

• Vaccine Makers Project – A program of the VEC that offers free classroom resources related to the immune system, infectious diseases and vaccines. *vaccinemakers.org*

• Vax Pack Hero – An online game in which vaccine heroes help players beat the germs in a body, offered by the VEC. *vaxpackhero.org*

• Hilleman Essay Contest – An annual writing competition for students in grades 6 to 12. Essays are submitted in the spring and winners named in the fall. *hillemanfilm.com*

Mobile Apps

Vaccines on the Go: What You Should Know was developed by the VEC and is available for Android and iPhone. The free app contains information about vaccines and the diseases they prevent, as well as links to VEC and Vaccine Makers Project resources and places for saving notes or submitting questions.

Learn more or download at *vaccine.chop.edu/mobileapp*.

Travel Information

• CDC Travelers' Website – Includes information specific to destinations, vaccines and diseases. *cdc.gov/travel*

• Find a travel clinic – Both the International Society of Travel Medicine (ISTM) and the American Society of Tropical Medicine and Hygiene (ASTMH) provide clinic locators on their websites:

- *ISTM: istm.org/AF_CstmClinicDirectory.asp*
- *ASTMH: astmh.org/for-astmh-members/clinical-consultants-directory*

Immunization Record

Below is a list of the recommended vaccines for adolescents and teens. Please have your teen's physician or other healthcare professional fill in the date that they receive a vaccine.

Teen's name _____ Date of birth _____

Vaccine	Number of Doses		
Tdap			
Meningococcus ACWY			
Meningococcus B			
Human Papillomavirus			
Influenza			
COVID-19			

Are there any vaccines to catch up on?

Check that your teen had the appropriate number of doses of the following vaccines by having your healthcare provider add the information from their chart here:

Hepatitis A _____ _____

Hepatitis B _____ _____ _____

Polio _____ _____ _____ _____

MMR _____ _____

Varicella _____ _____

Children's Hospital of Philadelphia®
Vaccine Education Center

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For more information about vaccines, visit the Vaccine Education Center websites at
vaccine.chop.edu
and
vaccine.chop.edu/parents

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