The Importance of Vaccinations

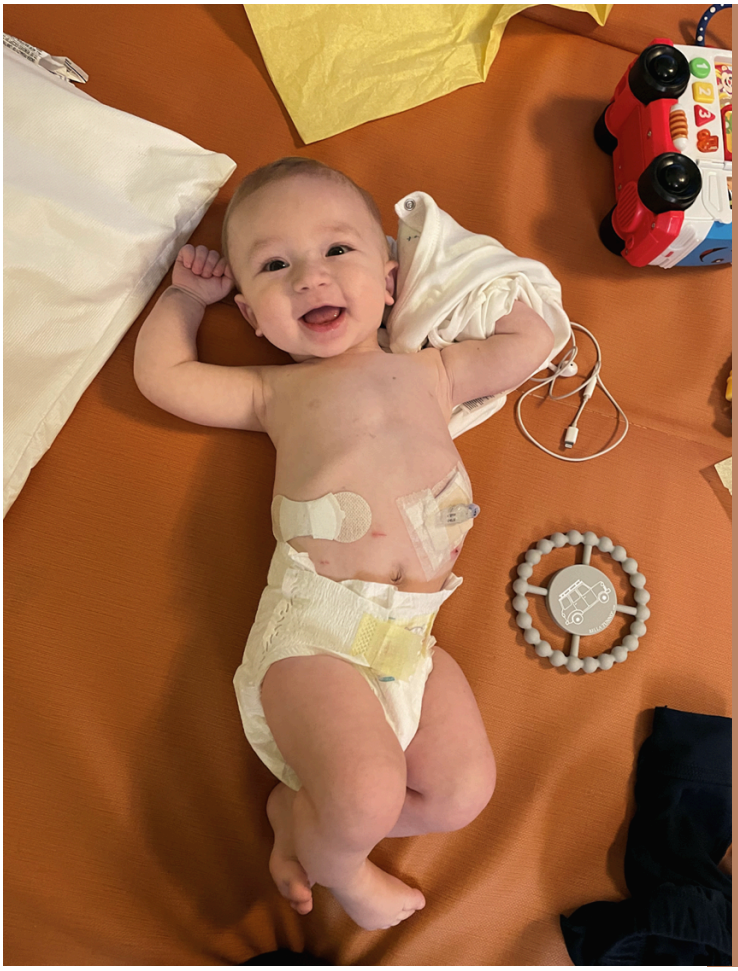
Carson Medical Group

Vaccinations matter.

Immunizations have existed in some form for over 200 years, and are backed by an extensive body of research affirming their safety and effectiveness. At Carson Medical Group, we strongly believe in and advocate for vaccinating children in line with the guidelines established by the Center for Disease Control (CDC). This approach is not only crucial for your child's health, but also for the health of those who cannot receive vaccines due to medical conditions. It is the belief of *all* of our providers at Carson Medical Group that immunizing your child is the right decision.

Unfortunately, misinformation surrounding immunizations is widespread. We understand that as a parent/guardian, your primary concern is the well-being of your child. To support you in making an informed decision, Carson Medical Group has compiled evidence from trusted, reliable sources. Our goal is to offer you the reassurance and knowledge you may need to confidently choose vaccination for your children.

In addition to researching vaccines themselves, it's also very important to understand the conditions they are protecting children from. Vaccines save lives by preventing illnesses that can have severe long-term effects or even be fatal, despite the advancements in modern medicine. Please read on to learn more about these serious diseases, and why preventing them is so important.



We are here to help.

Please rest assured that your child's wellbeing is, and always will be, our top priority. Your pediatrician is eager and willing to address any questions or concerns you may have surrounding vaccinating your child.

If there is anything you would like to discuss with your child's pediatrician before proceeding with immunizations, please call our office at 775-885-2229.

MEASLES

Common signs of measles infection include a high fever and rash. The rash usually appears 3 to 5 days after the first symptoms. It starts on the head and spreads down to the rest of the body.
In addition to a fever and rash, other measles symptoms may include:

- Cough, runny nose, and red, watery eyes
- Small spots in the cheek area inside the mouth, called Koplik spots
- Diarrhea
- Ear infection

Measles can also lead to serious complications, such as pneumonia, encephalitis (swelling of the brain), deafness, intellectual disability and even death.

How contagious is measles?

Measles is one of the most contagious diseases in the world. In fact, 9 out of 10 people exposed to measles will catch it, too, if they are unvaccinated, have not had the disease before or have a problem with their immune system. Even very brief exposure to an infected person in a shared space poses a high risk for unimmunized people.

How long is someone with measles contagious?

People with measles are contagious before they know they are sick. An infected person can spread measles easily to others 4 days before the rash appears, and they are still contagious 4 days after the rash appears.

How does measles spread?

Measles spreads from person to person and through the air from respiratory droplets from a child's cough or sneeze. The virus can live for two hours on surfaces or suspended in the air. Someone who enters a room where someone with measles had been earlier can catch the disease. The virus can also travel along air currents and infect people in another room.

Even brief exposure to the virus poses a high risk of infection to anyone who is not up to date on measles vaccine or has not had measles before. People with conditions that weaken the immune system are also at high risk of infection.

How do you prevent the spread of measles?

Measles is a vaccine-preventable infection. About 95 of every 100 people will be protected after getting one dose of the MMR vaccine. Two doses of MMR vaccine protect 97-99 of every 100 people.

To avoid the disease, immunize according to the recommended schedule — when a child is 12 to 15 months of age and with a second dose at their checkup when they are 4 to 6 years of age. Some children at higher risk may need 3 doses if there is a disease outbreak.

Infants ages 6-12 months old can get a measles vaccine during an outbreak or before international travel to a location with an active measles outbreak.

Source
healthychildren.org

PERTUSSIS (WHOOPING COUGH)

Commonly referred to as whooping cough, pertussis is a very contagious disease that can affect people of all ages. It is caused by a bacterium called Bordetella pertussis that's found in the mouth, nose and throat of infected people. The bacteria are spread through the air when an infected person coughs and sneezes. Pertussis is so contagious that 8 of 10 non-immune people will be infected when exposed to someone with the disease.

Whooping cough usually starts like a common cold and then gets worse after a week or two. Older children might make the "whoop" sound when they cough. This stage can last for two weeks or more. Your child might be short of breath and may have bluish or gray skin around their mouth. They may also tear, drool, or vomit.

In infants, the disease can be particularly severe, even deadly; more than half of infants less than 1 year who get whooping cough end up requiring hospitalization. You can also get pertussis more than once.
Historically, whooping cough was a major problem and led to thousands of deaths in the 1930s and 1940s.
There have been more than 11,000 cases of pertussis in the U.S. as of August 2024 compared with a total of 3,021 cases in the entirety of 2023.

Why is pertussis sometimes called the "100-day cough?"

Severe coughing spells that come with pertussis are the main reason this illness is sometimes called the "100-day cough." Imagine having 15 severe coughing spells in a day — coughing spells that cause vomiting and prevent you from sleeping; coughing spells so severe that you get a nosebleed or crack your rib; coughing spells that last for months. This is pertussis.

Vaccines are very effective at preventing pertussis in young infants when given to pregnant mothers with each pregnancy. This is important because young infants typically have the most severe disease and high rates of hospitalizations with pertussis infections.

Protection from pertussis through vaccination is provided by the DTaP vaccine — which stands for diphtheria, tetanus, and pertussis. This vaccine is usually given to infants at 2, 4, 6, and 15 to 18 months of age, with a booster at 4 to 6 years of age. The acellular pertussis vaccine now recommended produces fewer adverse reactions than the older vaccine.

Because immunity from the childhood pertussis vaccination series declines over time, keeping up to date on booster vaccination (called Tdap) is important in adolescents starting at 11-12 years of age, and adults, particularly to reduce exposure to disease in vulnerable infants.

More information is available:

CDC website

CHOP Vaccine Education Center

Carson Medical Group

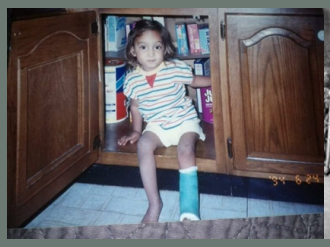
POLIO

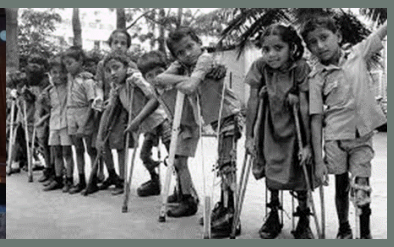
Polio is caused by a virus that affects infants and young children more often than other age groups. Most cases of polio are mild. Rarely, polio infection also can be much more severe and can cause paralysis. Paralytic polio causes muscles to be paralyzed—leaving some people physically impaired for the rest of their lives.

Before the polio vaccine, widespread cases of paralytic polio in the U.S. led many parents to be worried about letting their children swim in public swimming pools or get together at neighborhood movie theaters.

Since the mid-1950s, the polio vaccines have led to a dramatic decline—with over a 99% reduction in polio cases around the world. The "natural" or "wild" type of poliovirus that infected children decades ago is eliminated from the U.S. and much of the rest of the world.

I'm A Polio Survivor. I Don't Want You to Get It.





In July 2022, an unvaccinated 20-year-old in New York was diagnosed with paralytic polio, a disease that's almost wiped out. Many ask, "How did this happen?" To polio survivors like me, it was only a matter of "when," not "how."

In 2020, thousands of people, including politicians, health "experts" and the general public shared misinformation about COVID vaccines. These people do not think of the dangers that their actions pose to the long-term health of themselves and their community.

They forget people like me and others who survived past vaccine-preventable diseases.

I contracted polio in 1992 in India when I was less than a year old. Shortly after, I was adopted and raised in Saint Louis by a phenomenal and supportive family. Despite my family's great insurance and access to world-class medical care, polio is not an easy ride. One in 200 polio infections are paralytic—mine was one of them.

Surprisingly, paralysis and a leg brace are the least annoying side effects. The long-term neurological consequences of post-polio syndrome are arguably worse. Post-polio is the further weakening of muscles that may or may not have been affected during the initial polio infection. It occurs 15 to 40 years later in 25% to 40% of polio survivors. If someone has paralytic polio, they are more likely to be affected with post-polio.

What are the silent side effects of a disease long forgotten? Personally, the constant cold feeling is truly the worst. Poliovirus affects the hypothalamus, which makes it hard to regulate body temperature. Ask any polio survivor and we will tell you that we are always cold; our feet are bluish-purple. We perceive the air temperature to be about 20 degrees cooler. A 70-degree room will feel like 50 degrees. You can always find me with a jacket on or under three blankets.

Chronic fatigue is another hurdle in our lives. I describe polio as living at 20% battery and being easily overexerted. Muscles that are not affected by polio are strained, causing our bodies to become even more exhausted.

People may not realize that polio affects every body system, not just lungs or a paralyzed leg. Families do not realize the day-to-day reality of disability or the logistics and planning involved to keep functioning in a world not made for disabilities

Misinformation is why a 20-year-old was diagnosed with polio in 2022. Misinformation is why hundreds of thousands of people unnecessarily died of COVID instead of being vaccinated. And as long as misinformation goes unchecked, vaccine-preventable diseases like polio will remain prevalent and history may repeat itself.

How does polio spread?

Polio can spread to other people through contact with stool (poop) from an infected person or droplets from a sneeze or cough. It is transmitted from contact with fecal matter (stool or poop) within one to two weeks after a person is infected with polio. A person who gets stool or droplets from an infected person on their hands will get infected if they touch their mouth. Children who are not vaccinated can get infected if they put toys or other objects that have stool or droplets on them into their mouth.

An infected person can spread poliovirus to others before they have symptoms. The virus can live in an infected person's stool for weeks. People can contaminate food and water if they touch it with unwashed hands.

HAEMOPHILUS INFLUENZAE TYPE B (HIB)

Hib can cause many different kinds of infections. These infections usually affect children under 5 years of age, but can also affect adults with certain medical conditions. Hib bacteria can cause mild illness, such as ear infections or bronchitis, or they can cause severe illness, such as infections of the bloodstream. Severe Hib infection, also called invasive Hib disease, requires treatment in a hospital and can sometimes result in death.

Before Hib vaccine, Hib disease was the leading cause of bacterial meningitis among children under 5 years old in the United States. Meningitis is an infection of the lining of the brain and spinal cord. It can lead to brain damage and deafness.

HIB INFECTION CAN ALSO CAUSE:

- pneumonia
- severe swelling in the throat, making it hard to breathe
- bacteremia, meningitis, epiglottitis, septic arthritis, cellulitis, otitis media, purulent pericarditis, and less commonly, endocarditis, endophthalmitis, osteomyelitis, peritonitis, and gangrene
- infections of the blood, joints, bones, and covering of the heart
- death

PCV PNEUMOCOCCAL

Pneumococcal disease refers to any illness caused by pneumococcal bacteria. These bacteria can cause many types of illnesses, including pneumonia, which is an infection of the lungs. Pneumococcal bacteria are one of the most common causes of pneumonia.

Children with pneumonia develop high fever, cough and rapid, difficult breathing. Sometimes the bacteria cause pus to accumulate not only inside the lung, but between the lung and the chest wall (called empyema). Empyema can compress and collapse the lung. Although the vast majority of children with pneumonia recover, the disease is occasionally fatal.

PNEUMOCOCCAL BACTERIA CAN ALSO CAUSE:

- Ear infections
- Sinus infections
- Meningitis (infection of the tissue covering the brain and spinal cord)
- Bacteremia (infection of the blood)

Anyone can get pneumococcal disease, but children under 2 years of age, people with certain medical conditions or other risk factors, and adults 65 years or older are at the highest risk.

Infants and young children are at greatest risk of serious infection because they are unable to develop immunity to the sugar (or polysaccharide) that coats the bacteria, something that older children can do when they are more than 2 years of age.

Most pneumococcal infections are mild. However, some can result in long-term problems, such as brain damage or hearing loss. Meningitis, bacteremia, and pneumonia caused by pneumococcal disease can be fatal.

The pneumococcal vaccines protect against the different types of pneumococcal bacteria that cause the most common and serious pneumococcal infections in kids and adults. The number at the end of each vaccine's name indicates how many types it protects against: PCV15 protects against 15 types, PCV20 protects against 20 types, and PPSV23 protects against 23 types.

DIPHTHERIA AND TETANUS

What is diptheria?

The dangers associated with diphtheria come from the toxin released by the bacterium, Corynebacterium diphtheriae. The toxin makes it difficult for children to breathe and swallow, but it also attacks the heart, kidneys and nerves.

In the 1920s, diphtheria was a common cause of death in children and adolescents. At its peak, about 150,000 cases of diphtheria occurred in the United States every year. The diphtheria vaccine, first used in the United States in the early 1940s, has virtually eliminated the disease. Now we see fewer than two cases a year. Outbreaks still occur around the world and typically coincide with a drop in immunization rates.

What is tetanus?

Tetanus is another disease caused by a toxin-releasing bacterium, Clostridium tetani. Unlike most vaccine-preventable diseases, tetanus is not a disease that you catch from someone else. The bacteria live in the soil and usually enter the body following punctures or wounds that are not kept clean or include damaged tissues such as from burns, frostbite, or gangrene. Items likely to be contaminated with the tetanus bacteria include nails or pieces of glass that were lying on the ground.

Given the playful, adventurous, and oftentimes injury-prone nature of children, it's important to immunize them against tetanus. Hand washing and bathing do little once the bacteria actually get under the skin.

Once under the skin, the bacteria make a toxin that causes muscle spasms. If these spasms affect the throat and jaw (lockjaw), they can interfere with breathing, causing suffocation. The tetanus toxin can also damage the heart.

Because of its presence in the environment and the noninfectious nature of this disease, eradication will not be possible through vaccination. Further, people cannot be protected from this disease because everyone around them has had a vaccine; that is, there is no protection from herd immunity.

Two populations most affected by tetanus

In developed countries, tetanus is typically thought of as infecting wounds in adults who have injured themselves; however, in the developing world many infants suffer from neonatal tetanus. Infections in newborns result from poor sanitation either during or after delivery. Efforts to eliminate infant deaths from tetanus are making progress, but work remains to be done.

HEPATITIS B

What is hepatitis B virus?

Hepatitis B virus attacks the liver. Hepatitis B virus infections are known as the "silent epidemic" because many infected people don't experience symptoms until decades later when they develop hepatitis (inflammation of the liver), cirrhosis (severe liver disease), or cancer of the liver (hepatocellular carcinoma). Every year in the United States about 22,000 new hepatitis B infections occur and about 2,000 people die from their infections.

How do you catch hepatitis B virus?

Blood from a person infected with hepatitis B virus is heavily contaminated with the virus. As a result, contact with blood is the most likely way to catch hepatitis B. Even casual contact with the blood of someone who is infected (sharing of washcloths, toothbrushes, or razors) can cause infection.

Healthcare workers are at high risk of catching the disease and newborns of mothers infected with the virus. Sexual contact can also expose people to infection. The virus is also present in low levels in saliva.

Because the disease can be transmitted by casual contact, and because about three-quarters of a million to 2 million people are chronically infected with hepatitis B virus (many of whom don't know that they have it), it has been hard to control hepatitis B virus infections in the United States. The original strategy (started in the early 1980s) was to vaccinate only those at highest risk (for example, healthcare workers, patients on dialysis, and intravenous drug users). But because the disease can be transmitted to those who are not in high-risk groups, this vaccine strategy didn't work. The incidence of hepatitis B virus disease in the United States was unchanged 10 years after the vaccine was first used! For this reason, the vaccine strategy changed.

Starting in 1991, all infants and young children were recommended to receive the hepatitis B vaccine. As a result, the incidence of hepatitis B virus infections in the United States has started to decline. Indeed, this strategy has virtually eliminated the disease in children less than 19 years of age. If we stick with it, we have a chance to finally eliminate this devastating disease within one or two generations.

Are hepatitis B virus infections easily avoided?

Large quantities of hepatitis B virus are present in the blood of people with hepatitis B; in fact, as many as one billion infectious viruses can be found in a milliliter (one-fifth of a teaspoon) of blood from an infected individual. It is possible to catch hepatitis B virus through more casual contact, such as sharing washcloths, toothbrushes or razors. In each of these cases, unseen amounts of blood can contain enough viral particles to cause infection. In addition, because many people who are infected don't know that they are infected, it is very hard to avoid the chance of getting infected with hepatitis B virus.

Facts about hepatitis B

- Two billion people, or one in three, have been infected with hepatitis B worldwide. Of these, almost 300 million live with chronic hepatitis B. This means about 1 of every 26 people throughout the world are living with a chronic hepatitis B infection.
- Each year about 900,000 people die from hepatitis B worldwide, and about 2,000 of these deaths occur in the United States.
- Hepatitis B is transmitted through blood and is 100 times more infectious than HIV. An estimated one billion infectious viruses are in one-fifth of a teaspoon of blood of an infected person, so exposure to even a very small amount, such as on a shared toothbrush, can cause infection.
- Hepatitis B is sometimes referred to as the “silent epidemic” because most people who are infected do not experience any symptoms.
- Liver cancer accounted for about 5% of cancer deaths in the U.S. during 2020.
- Almost half of liver cancers are caused by chronic infection with hepatitis B.
- The World Health Organization (WHO) recommends the inclusion of hepatitis B vaccine in immunization programs of all countries; in 2019, more than 8 of 10 infants born throughout the world received three doses of hepatitis B vaccine.

VARICELLA (CHICKENPOX)

In 1998, an 8-year-old girl was seen in the Emergency Department of a hospital. For several days she had low-grade fever and blisters appearing over her entire body. The girl had chickenpox. At first her mother was relieved at the diagnosis. Chickenpox is, after all, a mild infection. But then the child had progressive difficulty breathing. Her breathing became rapid, shallow and difficult. A chest X-ray showed that she had pus between her lungs and chest wall (called an "empyema"). The pus caused one lung to be constricted. The child was admitted to the intensive care unit, but it was too late. She died the next day.

Before the chickenpox vaccine, one or two children in this country would die every week from chickenpox — most of these children were previously healthy.

What is chickenpox?

Chickenpox is an infection caused by the varicella virus, and it is highly contagious. It can spread in one of three ways: by coughing or sneezing, physical contact with broken blisters, or by virus particles from the blisters that are sprayed in the air. The rash of chickenpox begins as red bumps that turn into blisters that cover the entire body. As many as 300-500 blisters can occur during a single infection.

Chickenpox is usually a relatively benign infection. However, chickenpox infections can have severe complications. About 1 of every 1,000 children infected with varicella will develop severe pneumonia (infection of the lungs) or encephalitis (infection of the brain). In addition, about 1 of every 50 women infected with varicella during their pregnancy will deliver children with birth defects. These birth defects include developmental delay and shortened or atrophied limbs. Finally, a bacterium called Group A streptococcus, commonly known as "flesh-eating" bacteria, can enter through the skin during a varicella infection and cause severe, and sometimes fatal, disease.

How contagious is chickenpox?

Chickenpox is very contagious. If 100 people are sitting in a room together for several hours talking and one of them has chickenpox and the other 99 have never been infected with chickenpox or vaccinated with the chickenpox vaccine, about 85 of the remaining 99 will get chickenpox.

There are long term effects, too.

Varicella is harmful beyond childhood. Even those who fully recover from chickenpox still have the varicella virus dormant in their body. Later in life, in can reactivate in the form of shingles, another very painful rash. While shingles is fairly common in adults, it can have significant long-term effects, including severe pain after healing due to damaged nerve fibers, inflammation of the brain resulting in neurological complications, and rashes in or near the eye that can lead to permanent vision loss. Those with a compromised immune system are at greater risk of developing complications.

HUMAN PAPILLOMAVIRUS (HPV)

Human papillomavirus (HPV) is a virus that can infect the skin, genital and anal areas and lining of the cervix. There are many different types of papillomaviruses (about 100). Some types of papillomaviruses cause warts on the skin; some types cause warts in the anal and genital areas, and some types cause cervical cancer.

Many different HPV types cause cervical cancer. Two types (16 and 18) are the most common, accounting for about 7 of every 10 cases of cervical cancer. Similarly, many types of HPV cause anal and genital warts, but only two types (6 and 11) account for about 9 of every 10 cases.

The HPV vaccine, known as GARDASIL, protects against nine types of HPV that cause disease in people. The types in the vaccine are 6, 11, 16, 18, 31, 33, 45, 52, and 58.

Cervical cancer is unique in that almost all cases are caused by HPV. In some instances, HPV is not identified. Some of these cases are likely still caused by HPV, but the virus is not detected due to test sensitivity or inaccurate results. In other cases, the cancer could be misdiagnosed (i.e., metastasized or of a nearby tissue type) or a type of cancer, called adenocarcinoma, that is associated with local glands, rather than the squamous epithelial cells that line the cervix.

How common is HPV?

HPV is the most common sexually transmitted disease in the United States and in the world. Twenty million Americans are currently infected with HPV and about 13 million Americans are infected every year. Half of those newly infected with HPV are between 15 and 24 years of age.

Is HPV dangerous?

Yes. Although most HPV infections typically resolve on their own, some persist. Every year in the United States:

- About 34,000 HPV-associated cancers occur:
  - More than 20,000 of these are in females
  - Almost 14,000 are in males
- The most common types of cancer caused by HPV infections are cervical cancer and head and neck cancers:
  - About 10,800 cases of cervical cancer and 4,000 deaths occur annually
  - About 10,700 males and 2,200 females are diagnosed with cancers of the head and neck

Babies can also be infected when they pass through the birth canal of a mother infected with HPV. Some of these children go on to develop a long-term infection of their windpipe that is occasionally fatal. This disease is called recurrent respiratory papillomatosis.

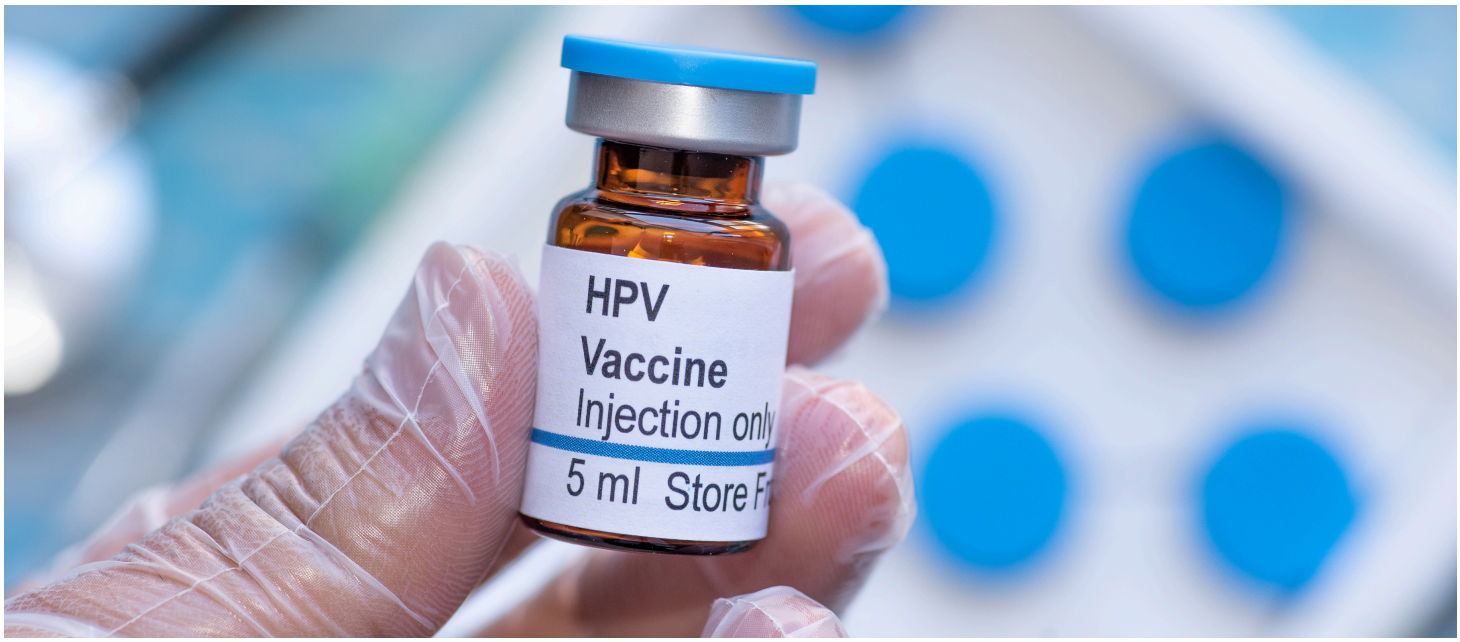
How do you catch HPV?

HPV is transmitted from one person to another by genital contact.

Most people never know they were infected. Unlike a cold in which symptoms develop a few days after exposure to the virus, HPV infections are typically not symptomatic.

HPV infections can last for long periods of time. The average length of infection is about eight months; however, for about 1 of every 10 women, the infection lasts longer than two years. It is in this group of women that there is an increased risk of developing cervical cancer.

HUMAN PAPILLOMAVIRUS (HPV) - CONTINUED



How can you avoid getting HPV?

Sometimes people can be infected with HPV and not know it, so HPV can be difficult to avoid. The best way to avoid genital infection with HPV is abstinence. You can also decrease your chance of getting HPV by having sex with only one other person who isn't infected with HPV. While condoms may also decrease the chance of getting HPV, they do not always work to prevent the spread of the infection. Because other than abstinence, none of these measures can completely protect someone from becoming infected or prevent the spread of this infection, the development of a vaccine was an important tool for preventing future generations from experiencing the devastation caused by HPV.

Can't I avoid cervical cancer by simply getting routine Pap testing?

No. At one time cervical cancer was the most common cause of cancer in the United States. One test changed that: the Papanicolaou (Pap) test. The Pap test is performed by scraping cells from the opening of the cervix and examining them under the microscope to see whether they have begun to show changes consistent with the early development of cancer (called pre-cancerous changes). Typically, the length of time from infection with HPV to development of cervical cancer is about 15-20 years. For this reason, although most HPV infections occur in teenagers and young adults, cervical cancer is more common in women in their 40s and 50s.

The Pap test is one of the most effective cancer screening tests available and has dramatically reduced the incidence of cervical cancer in the United States. But the test isn't perfect and not all women get tested as often as they should.

On the flip side, even if you have been vaccinated against HPV, you are still recommended to get the Pap test.

Can genital HPV infections be treated?

HPV infections cannot be treated; however, the symptoms of HPV can be treated, at least to some extent. For example, genital warts can be treated with medications or surgically removed; however, they may return, and the patient may still be infected with HPV and could, therefore, still transmit the infection.

MENINGOCOCCUS

Meningococcus is one of the most rapid and overwhelming infectious diseases known to man. About 10 to 15 people in 100 with meningitis caused by meningococcus will die from the infection. When infected people get a bloodstream infection (i.e., sepsis), the number of deaths rises to about 4 in 10. Death from sepsis can occur within 12 hours of the beginning of the illness.

- Meningitis (inflammation of the lining of the brain). Symptoms can include stiff neck, headache, fever and drowsiness
- Sepsis (infection of the bloodstream). Symptoms can include fever, shock and coma
- Survivors can suffer limb amputation, skin grafting, hearing loss, seizures, kidney disease and intellectual disability (20 of 100 people)
- Disease can be fatal (10 to 15 of 100 people)

What is meningococcus?

The bacterium, Neisseria meningitidis, primarily targets children younger than 1 year of age. Because meningococcus is contagious, outbreaks can occur in childcare centers and schools. Cases also occur in high schools and on college campuses.

Meningococcus usually causes meningitis (inflammation of the lining of the brain) or sepsis (an infection of the bloodstream). Symptoms of meningitis include stiff neck, headache, fever and drowsiness. Symptoms of sepsis caused by meningococcus include fever, shock and coma. The disease is so rapid that a child can be perfectly well and, in a matter of only a few hours, be in a coma. For these reasons, meningococcal infections that occur in childcare centers, elementary schools or high schools often cause panic in the community. Every year, about 350 people in the United States are infected with meningococcus and about 50 die. Meningococcus can also cause pneumonia and arthritis.

Consequences of meningococcal infection occur in about 20 of every 100 survivors and can include:

- Limb amputation
- Skin grafting
- Hearing loss
- Seizures
- Kidney disease
- Intellectual disability

Immunization is the most effective way to reduce the incidence of death and permanent sequelae caused by meningococcus.

How do you catch meningococcal infection?

Usually meningococcal infection is acquired after intimate contact with an infected person. Intimate contact includes kissing, sharing food or beverages, or staying in the same house or room (including a classroom) for more than four hours a day.

Because smoking disrupts the lining of the throat, people who smoke are at increased risk of some infections, including pneumococcus and meningococcus. Both of these vaccine-preventable diseases can cause meningitis.

Stay in the know.

To refer to our immunization policy or this research at any time, or to access links to other helpful information, visit our website at CarsonMedicalGroup.com/pediatric-information

MENINGOCOCCUS - CONTINUED

How are the meningococcal vaccines made?

Two types of meningococcal vaccines are available. One has been available for several years and protects against four of the five types of meningococcus (A, C, Y, and W-135). The other version is newer and protects against the fifth type of meningococcus, type B.

Meningococcus A, C, Y and W-135 vaccine

This meningococcal vaccine is similar to those for pneumococcus and Haemophilus influenzae type B (Hib) in that protection against disease occurs when one develops antibodies to the sugar (or polysaccharide) that coats the bacterium.

In each of these vaccines, the polysaccharides from the surface of four of the five different types of meningococcal bacteria that cause disease were isolated individually and linked to a harmless protein. The four conjugated polysaccharides were then combined into a single shot, referred to by all four types – A, C, Y, and W-135.

Meningococcus B vaccine

Current pneumococcal vaccines contain 13 to 20 types of polysaccharides — each linked to a harmless protein.
Although there are only five different types of meningococcus that commonly cause disease (types A, B, C, Y and W-135),

Two vaccines to prevent meningococcus type B were licensed for use in adolescents in 2015 — Bexsero® and Trumenba®. Both of these vaccines were made using proteins, not polysaccharides, that reside on the surface of the bacteria. Trumenba contains two proteins, and Bexsero contains four.

A HISTORY OF OUTBREAKS

1918

The “Spanish flu” influenza pandemic was responsible for at least 50 million deaths worldwide, with about 675,000 deaths in the United States. This virus was unusual because it spread so quickly, was so deadly, and exacted its worst toll on the young and healthy. About one-third of the world’s population (~500 million people) were infected.

1950s

- Polio caused 32,000 cases of paralysis and 1,800 deaths
- Measles caused 5,000 cases and 500 cases of encephalitis
- Mumps was the primary cause of deafness

1964

A rubella epidemic swept the United States resulting in 12.5 million cases of rubella infection, an estimated 20,000 newborns with congenital rubella syndrome (CRS), and excess fetal and neonatal deaths in the thousands. Rubella when contracted in 1st trimester of pregnancy caused 85% cases of permanent deafness, blindness and heart defects in infants.

2015

An unvaccinated boy developed measles following a visit to Disneyland. By March, more than 130 people had been infected —virtually all in southern California. The California outbreak spread to six other states; then it spread to Canada, Mexico, and the Philippines. In response to the outbreak a state senator introduced Senate Bill 277 which eliminated California’s personal belief exemption to vaccination. During committee hearings for Senate Bill 277, a 7-year-old boy named Rhett Krawitt with acute lymphoblastic leukemia stood on a chair to reach the microphone and explained that, because he was receiving chemotherapy, he couldn’t respond to vaccines. “I depend on you to protect me,” he said. “Don’t I count?”

2023

5,000 cases of pertussis (whopping cough)

2024

- 16 outbreaks that caused 280 cases of Measles
- 32,000 cases of pertussis (whopping cough)

A HISTORY OF VACCINATIONS

1796	1st smallpox vaccination created by Edward Jenner
1879	Louis Pasteur created the first live attenuated bacterial vaccine (chicken cholera)
1881	Louis Pasteur and George Miller Sternberg almost simultaneously isolated and grew the pneumococcus organism
1882	Robert Koch identified the tubercle bacillus as the cause of tuberculosis, subsequently called Koch's bacillus
1884	The first live attenuated viral vaccine (rabies) was developed by Louis Pasteur, using desiccated brain tissue inactivated with formaldehyde
1885	Louis Pasteur first used rabies vaccine in humans
1896	Cholera and typhoid vaccines were first developed
1897	The plague vaccine was introduced, following the preparation of anti-plague horse serum at the Pasteur Institute by Alexandre Yersin. After demonstrating protection from disease in immunized animals, Yersin went to China with the vaccine to protect humans during a plague epidemic
1914	The typhoid vaccine and the rabies vaccine were first licensed in the United States Tetanus toxoid was introduced following the development of an effective therapeutic serum against tetanus by Emil Von Behring and Shibasaburo Kitasato
1915	The pertussis vaccine, a suspension of inactivated Bordetella pertussis cells, was licensed. Inactivated vaccines were prepared with a microorganism or virus that had been killed, usually with a chemical such as formaldehyde
1927	BCG (Bacille Calmette-Guérin) vaccine was first used in newborns, having been developed by Albert Calmette and Camille Guérin in 1921. BCG (live-attenuated Mycobacterium bovis BCG) represented the only vaccine against tuberculosis. It has become the most widely administered of all vaccines in the WHO Expanded Programme for Immunization, but has been estimated to prevent only 5% of all potentially vaccine-preventable deaths due to tuberculosis
1928	The first iron lung was used to preserve breathing function in patients with acute polio
1935	A live yellow fever vaccine (17D) was first licensed. The development of the chorioallantoic membrane for culturing viruses led to its development
1938	President Franklin D. Roosevelt, a victim of polio, founded the National Foundation for Infantile Paralysis, later known as the March of Dimes
1942	The influenza A/B vaccine was introduced to the Armed Forces Epidemiological Board. The influenza vaccine was licensed in 1945 and, following the war, was also used for civilians Hepatitis A and hepatitis B viruses were first differentiated
1945	The inactivated influenza vaccine was first licensed in the United States Karl Habel and John Enders isolated the mumps virus
1947	The combination of diphtheria and tetanus toxoids for pediatric use was first licensed in the United States
1949	Diphtheria and tetanus toxoids and pertussis (DTP) were licensed The last case of smallpox in the United States was reported; however, it took another two decades before the disease was eradicated globally
1952	Heat-phenol inactivated typhoid vaccine by Wyeth was licensed The worst recorded polio epidemic in U.S. history occurred with 57,628 reported cases
1953	Tetanus and diphtheria toxoids (adult formulation) were first licensed in the United States after the concentration of diphtheria toxoids was reduced
1955	The Polio Vaccination Assistance Act was enacted by Congress, the first federal involvement in immunization activities. It allowed Congress to allocate funds to the Communicable Disease Center (later the Centers for Disease Control and Prevention) to help states and local communities acquire and administer vaccines The first polio vaccine was licensed—an inactivated poliovirus vaccine (IPV) pioneered by Dr. Jonas Salk
1961	Oral polio vaccine types 1 and 2, developed by Dr. Albert Sabin and grown in monkey kidney cell culture, were licensed for use in the United States
1962	President John F. Kennedy signed the Vaccination Assistance Act into law. It allowed the CDC to support mass immunization campaigns and to initiate maintenance programs Oral polio vaccine type 3 was licensed in the United States, as well as the trivalent product
1963	The trivalent oral polio vaccine was licensed. The vaccine development began in 1957 by Albert Sabin to improve upon the killed Salk vaccine The Federal Immunization Grant Program was established. The grants, authorized under section 317 of the Public Health Service Act, were made to states to provide funds to purchase vaccines and to support the basic functions of an immunization program. The only vaccines available at the time were DTP, polio, and smallpox The first live virus measles vaccine (Rubeovax by Merck) was licensed Other live virus measles vaccines were eventually licensed (M-Vac by Lederle, Pfizer-vax Measles-L by Pfizer, and generic vaccines by Lilly, Parke Davis, and Philips Roxane) The inactivated measles vaccine (Pfizer-vax Measles-K by Pfizer and a generic vaccine by Lilly) was licensed in the United States. These vaccines were eventually withdrawn from the U.S. market in 1967
1965	Bifurcated needles for the smallpox vaccine were introduced live, further attenuated measles virus vaccine (Lirugen by Pitman Moore-Dow based on the Schwarz strain, derived from the Edmonston strain) was licensed in the United States. The recommended age for routine administration was changed from 9 months to 12 months old
1966	The rubella virus was attenuated by Paul Parkman and Harry Meyer Jr.
1967	Mumps virus vaccine live (MumpsVax by Merck) was licensed. The vaccine was developed by Maurice Hilleman who isolated a wild-type virus from his daughter, Jeryl Lynn, who was recovering from mumps. It became known as the Jeryl Lynn strain of mumps virus
1968	A second live, further attenuated measles virus vaccine (Attenuvax by Merck, based on the Moraten strain, derived from the Edmonston strain) was licensed
1971	The combined measles, mumps, and rubella vaccine (MMR by Merck), as well as the combined measles and rubella vaccine (M-R-Vax by Merck), were licensed; the vaccine was developed by Maurice Hilleman and colleagues at Merck CDC recommended the discontinuation of routine vaccination for smallpox in the United States following a greatly reduced risk of disease
1973	The measles and mumps virus vaccine, live (M-M-Vax by Merck) was licensed
1974	The first monovalent (group C) meningococcal polysaccharide vaccine (Merck) was licensed The Expanded Programme on Immunization was created by WHO in response to poor immunization levels in developing countries (less than 5% of children in 1974) The following vaccines are used by the program: BCG, polio, DTP, measles (often MMR), yellow fever (in endemic countries), and hepatitis B
1977	The first pneumococcal vaccine was licensed, containing 14 serotypes (of the 83 known serological groups) that comprised 80% of all bacteremic pneumococcal infections in the United States
1979	The RA 27/3 (human diploid fibroblast) strain of the rubella vaccine (Meruvax II by Merck) was licensed; all other strains were discontinued The last cases of wild type 1 poliovirus occurred in the United States among unvaccinated Amish persons and members of other religious groups who did not accept vaccination. The source of the outbreak was determined to have been brought over to the United States from the Netherlands by members of an unvaccinated religious group
1981	The first hepatitis B viral vaccines, developed by Merck and the Pasteur Institute, were licensed. Both had independently developed plasma-based hepatitis B viral vaccines Quadrivalent groups A, C, Y, and W-135 (Menomune A/C/Y/W-135 by Connaught) meningococcal vaccine was licensed. Because of the finding that this and other polysaccharide meningococcal vaccines can induce a relatively poor immune response in children younger than 2 years old and unable to elicit long-term immunologic memory, use had to be limited to individuals 2 years old and older
1983	Two enhanced pneumococcal polysaccharide vaccines were licensed (Pneumovax 23 by Merck on July 11 and Pnu-Imune 23 by Lederle on July 21
1985	Hib (Haemophilus influenzae type b) polysaccharide vaccines (b-CAPSA 1 by Praxis Biologics, Hib-VAX by Connaught, and Hib-IMUNE by Lederle) were licensed
1986	The recombinant hepatitis B vaccine (Recombivax HB by Merck) was licensed. Using recombinant DNA technology, Merck scientists developed a hepatitis B surface antigen subunit vaccine Congress created the National Vaccine Program (NVP) to coordinate the vaccine research and development programs of AID (Agency for International Development, now known as USAID), NIH, CDC, the DOD, and the FDA The National Childhood Vaccine Injury Act of 1986 was enacted by Congress. The HHS established the Vaccine Adverse Event Reporting System (VAERS), co-administered by the FDA and CDC, to accept all reports of suspected adverse events in all age groups after administration of any U.S.-licensed vaccine. The Act requires healthcare providers and vaccine manufacturers to report specific adverse events following the administration of measles, mumps, rubella, polio, pertussis, diphtheria, or tetanus vaccines, and any combinations thereof to the HHS
1987	Protein-conjugated Haemophilus influenzae type b vaccine (PRP-D, ProHibit by Connaught) was licensed
1988	Conjugated Haemophilus influenzae type b vaccine (HibTITER by Wyeth-Lederle) was licensed ACIP recommendations to administer Hib conjugate vaccine in all children at 18 months old are published in MMWR

1989	Conjugated Hib (Haemophilus influenzae type b) vaccine (PedvaxHIB by Merck) was licensed A live, oral typhoid vaccine (Ty21a, Vivotif Berna by Swiss Serum Institute) was licensed A recombinant hepatitis B vaccine (Engerix-B by SmithKline Beecham) was licensed Recommendations for routine second doses of measles-containing vaccine were issued by both ACIP and the AAP. During the mid-to-late-1980s, a high proportion of reported measles cases were found in school-aged children (5-19 years old) who had been appropriately vaccinated. These vaccine failures led to national recommendations for a second dose of measles-containing vaccine
1991	Diphtheria and tetanus toxoids and acellular pertussis vaccine (Acel-Imune by Lederle) are licensed for use as the fourth and fifth doses in the series ACIP recommendations for routine hepatitis B vaccination for all infants are published in MMWR
1993	The Vaccines for Children Program was established after the passage of the Omnibus Budget Reconciliation Act of 1993. Federally purchased vaccines under this program are made available to children from birth through 18 years old who meet one of the following requirements: Medicaid-enrolled, without health insurance, and American Indian or Alaskan native. Also, children with health insurance that does not cover the costs of immunization are eligible to receive vaccines at a federally qualified health center or a rural health clinic. All ACIP-recommended vaccines receive funding, which includes new vaccines, new vaccine combinations, and revised recommendations for vaccine use
1994	The Global Programme for Vaccines and Immunization was created, merging two WHO programs—the Expanded Programme for Immunization and the former Programme for Vaccine Development and adding a new unit for Vaccine Supply and Quality The entire Western Hemisphere was certified as polio-free by the International Commission for the Certification of Polio Eradication, WHO
1995	The first inactivated hepatitis A vaccine (Havrix by SmithKline Beecham) was licensed Varicella virus vaccine, live (Varivax by Merck), was licensed for the active immunization of persons 12 months and older ACIP, the American Academy of Pediatrics, and the American Association of Family Physicians issued the first “harmonized” childhood immunization schedule, combining the recommendations of all three national groups
1996	Diphtheria and tetanus toxoids and acellular pertussis vaccine (Acel-Imune by Lederle) are licensed for use as the first through fifth doses in the series A combined Haemophilus influenzae type b conjugate and hepatitis B vaccine (Comvax by Merck) was licensed A combination DTaP and Hib vaccine (TriHIBit by Aventis Pasteur) was licensed for the fourth dose in the DTaP and Hib series Diphtheria and tetanus toxoids and acellular pertussis vaccine adsorbed (Tripedia by Aventis Pasteur) were licensed for primary and booster immunization of infants A second inactivated hepatitis A vaccine (Vaqta by Merck) was licensed
1998	ACIP recommended DTaP vaccines for all five doses in the vaccination schedule, because local reactions, fever, and other systemic events are found to occur substantially less often after DTaP administration than after administration of whole-cell DTP The Children's Vaccine Program was established at WHO's Program for Appropriate Technology in Health (PATH) with a $125 million gift from the Bill and Melinda Gates Foundation. The program's goal was to provide vaccines to children in the developing world and to accelerate the research and development of new vaccines. The first vaccines purchased were Hib, hepatitis B, rotavirus, and pneumococcal, which are not commonly used in the developing world Lyme Disease Vaccine (Recombinant OspA), (LYMErix by SmithKline Beecham) was licensed for persons 15-70 years old. ACIP recommended that decisions on the use of the vaccine be made based on an assessment of individual risk, which includes the extent of both person-tick contact and geographic risk. Just 3+ years later, on February 25, 2002, GlaxoSmithKline announced they would no longer manufacture or distribute LYMErix because of insufficient sales. Rotavirus vaccine, live, oral, tetravalent (RotaShield by Wyeth) was licensed for infants at 2, 4, and 6 months old
1999	Diphtheria and tetanus toxoids and acellular pertussis vaccine (Tripedia by Connaught) were licensed ACIP voted to withdraw its recommendation for the rotavirus vaccine after investigating reports of intussusception (a type of bowel obstruction that occurs when one part of the intestine folds into an immediately adjoining part) in infants within the first two weeks of receipt of the vaccine. Intussusception was found to occur at a rate of approximately one case for every 5,000 children vaccinated Wyeth Lederle Vaccines voluntarily withdrew Rotashield (rotavirus) from the market A meningococcal group C conjugate vaccine was introduced into the routine schedule in the U.K. for infants, adolescents (15-17 years old), and college entrants. A second phase was planned to begin in January 2000, subject to the availability of the vaccine FDA approved a 2-dose schedule of hepatitis B vaccination for adolescents 11-15 years old using Recombivax HB (Merck) with the 10 µg (adult) dose at 0 and 4-6 months later ACIP recommended exclusive use of inactivated poliovirus vaccine (IPV) for infants and children
2000	A 7-valent pneumococcal conjugate vaccine (Prevnar by Wyeth Pharmaceuticals) was licensed for infants at 2, 4, 6, and 12-15 months of age to prevent invasive pneumococcal disease Measles was declared no longer endemic in the United States following eradication campaigns that began in 1967
2002	A vaccine that combines diphtheria, tetanus, acellular pertussis, inactivated polio, and hepatitis B antigens (Pediarix by GlaxoSmithKline) was licensed The European Region of the world was certified as polio-free
2003	ACIP voted to recommend that children 6–23 months old be vaccinated annually against influenza, with implementation scheduled for the fall of 2004
2005	CDC announced that rubella was no longer endemic in the United States The first meningococcal polysaccharide (Serogroups A, C, Y, and W-135) diphtheria toxoid conjugate vaccine (Menactra by Sanofi Pasteur) was licensed. This marked the first meningococcal vaccine that was immunogenic and indicated for children younger than 2 years old A vaccine that combined the measles, mumps, rubella, and varicella (chickenpox) antigens (Proquad by Merck) was licensed. The vaccine was indicated for children 12 months to 12 years old FDA approved lowering the age limit to 12 months old for the remaining U.S.-licensed hepatitis A vaccines in the United States (Havrix by GlaxoSmithKline)
2006	ACIP recommended a second dose of varicella (chickenpox) vaccine for children FDA licensed the first vaccine developed to prevent cervical cancer (Gardasil by Merck & Co.), precancerous genital lesions, and genital warts due to human papillomavirus (HPV) types 6, 11, 16, and 18 FDA licensed a new vaccine to reduce the risk of shingles (herpes zoster) in the elderly. The vaccine (Zostavax by Merck & Co.) was approved for people 60 and older VariZIG, a new immune globulin product for postexposure prophylaxis of varicella (chickenpox), was available under an Investigational New Drug Application Expanded Access Protocol The rotavirus vaccine, live, oral, pentavalent (RotaTeq by Merck) was licensed for infants 6–32 weeks old
2008	FDA approved a new DTaP-IPV vaccine (Kinrix) for children 4-6 years old FDA approved Pentacel (Sanofi Pasteur), a new combination DTaP-IPV-Hib vaccine for children 6 weeks to 4 years old FDA approved Sanofi Pasteur's Tenivac tetanus and diphtheria toxoids adsorbed for adults 60 and older. In the original licensure, the age indication was for persons 7-59 years old FDA approved a new rotavirus vaccine (Rotarix) in the United States. Rotarix was a liquid given in a two-dose series to infants at 6–24 weeks old CDC issued a Health Advisory in response to widespread measles outbreaks in the United States CDC updated its recommendations for administering a combination MMRV vaccine
2009	FDA approved the new HPV vaccine (Cervarix, GlaxoSmithKline) for the prevention of cervical cancer FDA approved a new indication for Gardasil to prevent genital warts in men and boys Vaccine Court ruled that the MMR vaccine, when administered with thimerosal-containing vaccines, does not cause autism
2010	ACIP recommended universal influenza vaccination for those 6 months and older FDA approved the pneumococcal 13-valent conjugate vaccine (Prevnar 13), which offers broader protection against Streptococcus pneumoniae There are 10 million people in this country that can’t be vaccinated due to receiving cancer treatments or having a disease that prevents them from getting immunizations as they are already immune-suppressed

References

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