

# PLAIN TALK

ABOUT CHILDHOOD  
IMMUNIZATION



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## A MESSAGE TO PARENTS

Dear Parents:

Thank you for your interest in learning more about immunizations. As parents, we make important decisions that affect our children. Immunizing your child is one of these decisions.

We all want to make good choices and do what's best for our children. As a community, we must protect our own health and work together to protect each other's health. Choosing to immunize is one of the most important decisions you can make to protect yourself, your children, your family, and the community from diseases that vaccines prevent. These diseases still occur in our communities. In 2012, Washington State had an epidemic of whooping cough, with more cases than we've had since the 1940s. Washington also had measles outbreaks in 2008, 2014, and 2015, including one death in 2015.

We want parents to make informed health decisions based on accurate information. There is an overwhelming amount of vaccine-related material out there and we know that parents, healthcare professionals, school nurses, child care providers, and others want information that is accurate, trustworthy, and clear. This booklet provides accurate information about how vaccines work, gives balanced information on the benefits and risks of immunization to help you make informed decisions, and discusses the safety and effectiveness of vaccines. It also gives you reliable facts about immunizations and the diseases they prevent and sets the record straight about topics that are often misunderstood or reported inaccurately.

We designed this booklet as an easy-to-use reference for busy parents. Each section can be read independently, so it's easy to review an individual topic as you have time. We present much of the information in a question-and-answer format, although you may have questions that are not addressed in the booklet. We encourage you to share your concerns with your doctor, nurse, clinic, or local health department. The Washington State Department of Health website ([www.doh.wa.gov/immunization](http://www.doh.wa.gov/immunization)) is also full of information that can help you.

I hope this booklet will help as you make informed health decisions for your family. Your child's health, and the health of our community, depends on it.

Sincerely,

**(Signature)**

Kathy Lofy, MD  
State Health Officer

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# 1. Immunizations Save Lives

Immunizations are one of the greatest medical success stories in human history because they have saved millions of lives and prevented illness and lifelong disability for millions more. We can prevent many serious childhood diseases by using vaccines routinely recommended for children. Since the introduction of these vaccines, rates of diseases, such as meningitis (caused by *Haemophilus influenzae* type b), polio, rubella, and diphtheria have declined by 95 to 100 percent. Before we had vaccines, hundreds of thousands of children got infected and thousands died in the U.S. each year from these diseases. Without vaccines, or if not enough people are immunized, serious disease outbreaks can and do happen. The following data from Centers for Disease Control and Prevention (CDC) show dramatic declines in diseases that vaccines prevent since routine childhood vaccination began in the U.S.

Disease	Number of Cases Per Year Before Vaccine Was Widely Used <sup>1</sup>	U.S. Reported Cases in 2016 <sup>2</sup>	Percent Decrease
Smallpox	29,005	0	100%
Diphtheria	21,053	0	100%
Pertussis (whooping cough)	200,752	15,737	92%
Tetanus	580	33	94%
Polio (paralytic)	16,316	0	100%
Measles	530,217	69	> 99%
Mumps	162,344	5,311	97%
Rubella	47,745	5	> 99%
Congenital Rubella Syndrome	152	1	99%
Haemophilus influenzae (invasive)	20,000	22	99%

## Immunizations Are Strong Protection

Immunization is the single most important way parents can protect their children against serious diseases. The decision to immunize your child is an important one. Consider the following when making your decision.

### Immunize to:

- **Prevent common diseases.** Some common diseases in the U.S. are also very serious, like whooping cough, flu, and rotavirus. If you decide not to immunize, there is a risk that your baby won't be protected from serious and sometimes deadly diseases.
- **Prevent diseases that exist at low levels in the U.S. but could easily come back.** Some diseases, like measles and mumps, still occur in our country at low levels. When fewer people get immunized against these diseases, outbreaks can happen.

- **Prevent diseases that exist in other parts of the world.** Some diseases, like polio and diphtheria, are rare in the U.S. but anyone traveling in or from another country can catch and spread these diseases; they are only a plane ride away.
- **Protect others in your family and community.** By immunizing your child, you also protect those who:
  - Have weakened immune systems.
  - Cannot get shots because they are the wrong age for the vaccine, or have certain medical conditions.
  - Are not fully immunized.

### **Immunizations Work with the Immune System**

The immune system is the defense mechanism in each of us that helps the body fight disease. When you get infected with a virus or bacteria, your body responds by producing antibodies. These antibodies fight the invading virus or bacterium (called an antigen) and help you get over the illness. Even after the disease has gone and you are well, your body remembers how to make the right antibodies to protect you if you are exposed to the disease again. This is called immunity. Vaccines are the most effective way to build immunity (protection) without suffering from the harmful effects of the disease. (See also Chapter 3: How Vaccines Work. You can learn more about how the immune system works at [www.cdc.gov/bam/diseases/immune/immunesys.html](http://www.cdc.gov/bam/diseases/immune/immunesys.html).)

Newborn babies often have immunity to some diseases because they have antibodies from their mothers (known as maternal antibodies). Maternal antibodies are temporary and are only passed on to the newborn if the mother has immunity to certain diseases herself. By getting immunized, children can stay immune to many diseases, even after they lose the protection from maternal antibodies.

## **What About Alternatives to Immunizations?**

There is no effective alternative to immunization for protection against serious and sometimes deadly diseases. However, parents sometimes hear about breastfeeding and the use of vitamins or herbs in the context of disease prevention.

### **Breastfeeding**

Without a doubt, breastfeeding has proven benefits, like enhancing the protection of infants against some colds, ear infections, and diarrhea, and helping mother and baby bond. However, breastfeeding does not prevent the diseases that vaccines do prevent. Unlike vaccines, breast milk does not stimulate the infant's own immune system to produce the antibodies needed to fight very specific diseases. Vaccines and breastfeeding do not interfere with each other, and together make an excellent way to keep your child healthy.

### **Vitamins and Herbs**

Vitamins and herbs do not provide specific immunity (protection) against the many viruses and bacteria that cause diseases that vaccines prevent. Although vitamins and herbs either from supplements or a healthy diet may have beneficial effects on your health, they cannot replace the proven protection of vaccines.

## **Immunizations Are a Safe Choice**

Vaccines are held to the highest standards of safety. The U.S. currently has the safest, most effective vaccines in history. Before a vaccine can get licensed for use, U.S. law requires that it go through years of testing. (See Chapter 4: Vaccine Safety.) After a vaccine gets licensed and can be used by the general population, it continues to be monitored for safety and efficacy (how effective it is).

Even with high safety standards and continual monitoring, immunizations are not perfect. First, vaccines are not 100 percent effective. Occasionally, people do not respond to a vaccine and may still get the illness. Second, like any medication, immunizations are not risk-free and can cause side effects:

- In most cases, vaccines either cause no side effects or only mild reactions, such as fever or soreness where the shot was given.
- Very rarely, people experience more serious side effects, such as allergic reactions. Be sure to tell your healthcare provider if you have, or your child has, health problems or severe life-threatening allergies to specific medications or foods.
- Severe reactions to vaccines occur so rarely that the risk is difficult to calculate.

But the decision not to immunize a child also involves risk. Choosing not to immunize puts the child and others at risk of getting a dangerous disease that could be deadly. Consider measles: Children who have not had the measles vaccine are 35 times more likely to get the disease.<sup>3</sup> For every 17 children with measles, one will get pneumonia; for every 1,000 children with measles, one or two may die.<sup>4</sup> Luckily, we have very few cases of measles in the U.S. because of our high vaccination rates. High vaccination rates increase community immunity (also called herd immunity), which keeps the disease from spreading and helps protect people who cannot get vaccinated. Most cases of measles we have in the U.S. start with someone who traveled to another country. (See Chapter 4: Vaccine Safety and Chapter 6: Compare the Risks.)

## Immunizations Prevent the Spread of Disease

It's easy to overlook the benefits of vaccination when we rarely see people sick with the diseases that vaccines prevent. However, diseases spread through communities by infecting people who are not protected, such as those who are not immunized or not fully immunized. Immunizations help to protect a community from diseases that vaccines prevent. The rates of immunization in a community have a direct effect on whether highly contagious diseases are spread and how quickly they spread.

Outbreaks can happen when even just a small number of people remain unimmunized or under-immunized. Compare the following two examples:

- In 2006, the U.S. had a multi-state outbreak of mumps. We had a total of 2,597 cases reported in 11 Midwestern states, many involving college students, and nearly 6,000 cases in 45 states by the end of the year.<sup>5</sup> But thousands of additional cases of mumps were likely prevented because of the high mumps vaccination coverage in the U.S., especially in school-age populations. Many of those who got the mumps were under-immunized because they only had one dose of the vaccine.<sup>6</sup> Then, in 2009, an 11-year-old boy caught the mumps in the United Kingdom and spurred another outbreak. From June 2009 to January 2010, several counties in New York and New Jersey reported 1,521 cases of mumps.<sup>7</sup>
- In the United Kingdom, unfounded concerns about the safety of the mumps-containing vaccine led to a marked drop in mumps vaccination coverage in the late 1990s and early 2000s. Laboratory-confirmed mumps cases in England and Wales show the dramatic correlation between vaccination rates and disease cases.

**Effect of Immunization Rate on Mumps Cases, UK**

Year	MMR Immunization Rates <sup>8,9</sup>	Confirmed Cases of Mumps <sup>9</sup>
1996	92%	94
1997	91%	182
1998	88%	121
1999	88%	373
2000	87%	730
2001	84%	784
2002	82%	500
2003	80%	1,541
2004	81%	8,129
2005	84%	43,378
2006	85%	4,420
2007	85%	1,476

## Did You Know?

- Even if you don't see a disease in your community currently, the bacteria and viruses that cause it have not gone away. If your community does not have immunity (protection), the disease can come back.
- We cannot effectively treat or cure many of the diseases that vaccines prevent.
- Infants and young children are more likely to get seriously ill, be hospitalized, and suffer complications from many diseases that vaccines prevent.
- The number of recommended immunizations has increased because we are now able to safely protect children from more serious diseases than ever before.
- Studies show that vaccines given in the first two years of life do not overwhelm the immune system. In fact, vaccines only represent a fraction of what an infant's immune system successfully encounters and manages every day. You can also take comfort in the fact that even though kids get more shots today, they actually get fewer antigens (referred to as proteins and polysaccharides in the chart below) than ever before. See the table for comparison.<sup>10</sup>

Year and Vaccines Given with Number of Antigens							
1900		1960		1980		2000	
Vaccine	Proteins	Vaccine	Proteins	Vaccine	Proteins	Vaccine	Proteins/Polysaccharides
Smallpox	~200	Smallpox	~200				
		Diphtheria	1	Diphtheria	1	Diphtheria	1
		Tetanus	1	Tetanus	1	Tetanus	1
		WC Pertussis	~3000	WC Pertussis	~3000	AC Pertussis	2-5
		Polio	15	Polio	15	Polio	15
				Measles	10	Measles	10
				Mumps	9	Mumps	9
				Rubella	5	Rubella	5
						Hib	2
						Varicella	69
						Pneumococcus	8
						Hepatitis B	1
<b>Total</b>	<b>~200</b>	<b>Total</b>	<b>~3,217</b>	<b>Total</b>	<b>~3,041</b>	<b>Total</b>	<b>~123 – 126</b>

\* Under pertussis, WC and AC stand for whole cell and acellular respectively.

- The CDC's 2015 National Immunization Survey shows that Washington is meeting the state and national goals of vaccinating 90 percent of young children against polio, measles, mumps, rubella, chickenpox, and hepatitis B. But, our state is below 90 percent coverage against other diseases including whooping cough, hepatitis A, Hib, and pneumococcal disease.<sup>11</sup>
- In Washington state, all vaccines for children aged birth through 18 years are provided at no cost. Healthcare providers may charge an office visit fee and/or a fee to give the vaccine, called an administration fee. The administration fee can be waived for people who are unable to pay it.



## 2. Facts about Diseases Vaccines Prevent<sup>4</sup>

### CHICKENPOX (Varicella)

Chickenpox spreads by coughing, sneezing, or direct contact with the blisters caused by the disease. It causes an itchy skin rash (with blisters) and fever. Chickenpox can be severe and may lead to meningitis (swelling of the covering of the brain and spinal cord), serious skin infections, and pneumonia. If the mother is not immune, exposure to chickenpox during the first 20 weeks of pregnancy can cause serious problems in the fetus, such as low birth weight, skin scarring, and encephalitis (swelling of the brain). If the mother is infected with chickenpox from five days before to two days after giving birth, it can result in an overwhelming infection in the newborn with a death rate as high as 30 percent.

### DIPHTHERIA

Diphtheria spreads by coughing and sneezing. It causes a sore throat, mild fever, and can completely block a person's airway. Diphtheria can also cause breathing and heart problems, coma, paralysis, and death.

### FLU (Influenza)

Influenza spreads easily by coughing and sneezing. It often causes high fever, cough, headache, and muscle aches. All flu viruses can lead to pneumonia and heart problems. Flu is especially serious for babies younger than six months, who often must be hospitalized if they get flu. Flu is also serious for children with chronic illnesses, such as asthma, heart disease, or diabetes. Parents, pregnant women, and caregivers should get vaccinated to prevent spreading the flu to their babies under six months who are too young to get the vaccine.

### HIB (*Haemophilus Influenzae* Type B)

Hib spreads by coughing and sneezing. It can cause meningitis (swelling of the covering of the brain and spinal cord); infections of the joints, skin, and blood; brain damage; and even death. Hib is most dangerous to children under five years of age.

### HEPATITIS A

Hepatitis A is found in the stool (feces) of infected persons and spreads when a person puts something (food, water, hands, or an object) into his or her mouth that has infected feces on or in it. It causes liver disease. Hepatitis A can pass easily from one person to another in the same household or child care setting through exposure to infected feces by diaper changing and toilet use. It is also a risk when handling food. Hand washing can help prevent the spread of the disease, but it is not 100 percent effective.

### HEPATITIS B

Hepatitis B spreads by contact with infected blood or other body fluids. It can cause serious liver infections and cancer. Most of the time, infected individuals have no symptoms and can spread the virus without knowing it. A mother with hepatitis B can pass the virus to her newborn baby during childbirth. Nine out of ten infants who get infected will develop lifelong (chronic) hepatitis B. Of those, one in four will die of liver problems, such as liver cancer, later in life.

### HUMAN PAPILLOMAVIRUS (HPV)

HPV spreads mainly through sexual contact. It is the most common sexually transmitted infection in the U.S., with 14 million new HPV infections every year. Most people are first infected in their late teens or early twenties. HPV causes almost all cervical cancers and genital warts. It also causes other types of cancer, like vaginal, vulvar, anal, penile, and oropharyngeal (back of the throat, including base of the tongue and tonsils) cancers. These cancers can be fatal. People infected with HPV usually have no symptoms, so they pass the virus without knowing it.

## **MEASLES**

Measles spreads easily by coughing and sneezing. It causes a high fever, cold-like symptoms, and a rash. It can lead to pneumonia, hearing loss, brain damage, and even death. Measles is very contagious and an unimmunized child will most likely get measles if exposed.

## **MENINGOCOCCAL DISEASE**

Meningococcal disease spreads by close contact with infected persons by coughing or sharing anything by mouth, like water bottles, eating utensils, or toothbrushes. It can cause meningitis (swelling of the covering of the brain and spinal cord), pneumonia, and bloodstream infection. Severe disease can cause brain damage, deafness, losing an arm or leg, and death.

## **MUMPS**

Mumps spreads by coughing and sneezing. It can cause headache; fever; and swelling of the cheeks, neck, jaw, ovaries, or testicles. Mumps can lead to hearing loss, meningitis (swelling of the covering of the brain and spinal cord), sterility, and brain damage.

## **PNEUMOCOCCAL DISEASE**

Pneumococcal disease spreads by coughing and sneezing. It is the main cause of bacterial meningitis (swelling of the covering of the brain and spinal cord) in young children. It can also cause serious bloodstream infections, middle ear infections, and pneumonia.

## **POLIO**

Polio is found in the stool (feces) of infected persons and spreads when a person puts something (food, water, hands, or an object) into his or her mouth that has infected feces on or in it. It can cause permanent paralysis or death. There is no treatment for polio. Polio still happens in other countries and is only a plane ride away.

## **ROTAVIRUS**

Rotavirus is found in the stool (feces) of infected persons and spreads when a person puts something (food, water, hands, or an object) into his or her mouth that has infected feces on or in it. It causes high fever and is the leading cause of severe diarrhea in infants and children worldwide. Symptoms are high fever and vomiting, followed by diarrhea. These symptoms can cause the child to lose body fluids and become severely dehydrated, which can lead to hospitalization.

## **RUBELLA**

Rubella spreads by coughing and sneezing. It causes a fever and a rash on the face and neck. Pregnant women who get rubella can miscarry or have babies with birth defects, such as blindness, deafness, or developmental delays.

## **TETANUS**

Tetanus, sometimes called lockjaw, spreads by germs that enter the body through a cut or puncture wound. It can cause muscle spasms, breathing problems, and death. Protection from tetanus will always be needed because the tetanus germ lives in soil and manure and cannot be removed from the environment.

## **WHOOPING COUGH (pertussis)\***

Whooping cough spreads easily by coughing and sneezing. It is most serious for babies under 1 year old, who are at highest risk for being hospitalized and dying from the disease. They may have trouble feeding and breathing, and may turn blue. Babies older than six months and kids with whooping cough often have severe coughing spells that make it hard to eat, drink, breathe, and sleep. Whooping cough can cause pneumonia, seizures, brain damage, and death. Most infants get the disease from their parents and older siblings, so all members of the household who have contact with babies should be up to date on their Tdap (pertussis) vaccine, and all pregnant women should get a Tdap vaccine early in their third trimester.

### 3. How Vaccines Work

Vaccines work by creating immunity (protection) against certain diseases. Vaccines give your body a practice run at defending against real-world germs.\* The immune system is the defense mechanism in each of us that helps your body fight disease. When you get infected with a virus or bacteria, your body responds by producing antibodies. These antibodies fight the invading virus or bacterium (called an antigen) and help you get over the illness. Even after the disease has gone and you are well, your body remembers how to make the right antibodies to protect you if you are exposed to the disease again. This is called immunity. Vaccines are the most effective way to build immunity without suffering from the harmful effects of the disease. Learn more about how the immune system works at [www.cdc.gov/bam/diseases/immune/immunesys.html](http://www.cdc.gov/bam/diseases/immune/immunesys.html).

Vaccines work in the same way (they mimic a natural infection and create immunity) but they do this without making you sick from the disease. Vaccines are the safest way to teach your baby's body how to defend itself against serious diseases. If a vaccinated child is exposed to the disease in the future, he or she has protection from the disease and will have a much better chance of fighting off the germs.

We also create protective antibodies when we get infected with the actual disease. But, when you or your child gets infected with a disease naturally, there is no way to know beforehand how harmful it will be. This is risky, because many diseases can cause serious, long-term health problems. (See Chapter 2: Facts About Diseases that Vaccines Prevent.)

Vaccines are made with viruses and bacteria that are either "live" (but weakened) or "killed" (inactivated). The number of doses needed for protection against a particular disease depends on whether the vaccine is live or killed. Live vaccines, such as MMR (measles, mumps, and rubella), are very effective and usually provide lifelong protection. However, killed vaccines (like polio vaccine) usually require more doses to build enough immunity. "Boosters" of some vaccines, such as tetanus, diphtheria, and whooping cough (pertussis), are needed to maintain protection throughout the lifetime.

**QUESTION:** What is community immunity?

**ANSWER:** Community immunity (also known as herd immunity) helps slow down and stop the spread of disease among people. Community immunity works when the large majority of the population has immunity to the disease (by getting vaccinated or by having had the disease). For some diseases, like whooping cough (pertussis) and measles, at least 9 out of 10 of us must have immunity to keep the diseases from spreading and to protect people who can't get vaccinated.

#### **WATCH:** **Community Immunity**

Find a YouTube video called "How Safe Are We? The Role of Vaccines in Protecting your Community" that explores how vaccines protect communities at [https://youtu.be/xHOhqw8TC\\_Y](https://youtu.be/xHOhqw8TC_Y). For more information about community immunity, watch an animation at [www.historyofvaccines.org/content/herd-immunity-0](http://www.historyofvaccines.org/content/herd-immunity-0).

\* Find a helpful video called "How Vaccines Work" from the Colorado Children's Immunization Coalition at [www.immunizeforgood.com/vaccines/how-vaccines-work](http://www.immunizeforgood.com/vaccines/how-vaccines-work).

**QUESTION:** Do vaccines decrease the immune system's natural ability to fight disease?

**ANSWER:** No. Vaccines actually strengthen the immune system by preparing it to defend against serious disease-causing bacteria and viruses before we are exposed to them. We gain immunity from vaccination without the risk of getting the disease, so it is the safest way to protect ourselves from diseases that vaccines prevent. Indeed, vaccinated children suffer fewer infections overall than unvaccinated children. A study of 496 vaccinated and unvaccinated children published in the *Journal of Infection* found that "... children who received immunizations against diphtheria, pertussis, tetanus, Hib, and polio within the first 3 months of life had fewer infections with vaccine-related and -unrelated [bacteria and viruses] than the non-vaccinated group."<sup>12</sup>

In addition, a 2002 report published by the Immunization Safety Review Committee of the U.S. government's Institute of Medicine found that "... multiple vaccinations do not increase the risk of young children developing various infections, ranging from colds and ear infections to pneumonia and meningitis."<sup>13</sup>

**QUESTION:** I heard that giving several vaccines at the same time "overloads" the immune system, so it's better to give them one at a time. Is this true?

**ANSWER:** No. Getting more than one immunization at the same time does not harm or overload a child's immune system. A 2002 review of clinical studies by the Institute of Medicine revealed no association between childhood immunizations and immune system problems.<sup>13</sup> While there is clearly much more to learn about the immune system, some things we do know. Scientific data show that giving a child several vaccines at the same time has no adverse effect on a healthy immune system. The immune system of a newborn can recognize and respond to hundreds of thousands, if not millions, of different organisms. According to a study published in the January 2002 issue of *Pediatrics*, scientists estimate that a child could receive up to 10,000 vaccines in one day and still not "use up" his or her immune response.

**QUESTION:** Is the method of injecting vaccines harmful for the body?

**ANSWER:** No. Injecting vaccines is a safe way to get the vaccine into the body. Vaccines are not injected directly into the bloodstream. Most vaccines are injected into the muscle or into the fat layer just below the skin. The syringe and needle are sterile, used only once, and disposed of in a safe manner, so there is no possibility for spreading infection through an injection.

Some vaccines are given orally (by mouth) or intranasally (sprayed into the nose). The method used to give a vaccine is determined by the manufacturer based on extensive testing for safety and effectiveness. This testing takes several years to complete and is required before the vaccine can be used in the general population.

**QUESTION:** I have heard that some people get diseases that they have been vaccinated against. Is this true?

**ANSWER:** Yes. Even though vaccines are extremely effective, they are not perfect. For example, a vaccine that is 90 percent effective means that 1 vaccinated person in every ten (10 percent) does not get fully protected from the disease. When a disease spreads in a community, unprotected people are more likely to be infected. This includes those who did not get vaccinated and the 10 percent of people who got vaccinated but did not get full protection from the vaccine. This 10 percent will often have partial immunity and so may experience a milder form of the disease. Because most diseases that vaccines prevent are passed from person to person, the more immunized people there are in a community, the less likely that disease will be transmitted and "find" those who are unprotected. This is why community immunity is so important (see the first question in this section for a definition of community immunity and to watch videos of how it works).

**QUESTION:** Isn't it true that because of better hygiene and sanitation, diseases that vaccines prevent began to disappear before the vaccines were introduced?

**ANSWER:** No. While many infectious diseases became better controlled as living conditions and hygiene improved, they remained serious threats due to periodic outbreaks in vulnerable populations. It wasn't until the introduction of vaccines that there was a dramatic drop in the number of people who got sick from diseases that vaccines prevent, and a drop in the number of people who died. Disease outbreaks still occur because of peoples' lack of immunity or immunization.

Many diseases, such as measles and whooping cough (pertussis), spread very easily no matter what type of hygiene and living conditions exist. According to Dr. Jeff Duchin of Public Health – Seattle & King County, "Immunizations have led to a dramatic decrease in serious childhood infections, such as Hib disease, that could not have been accomplished through improvement in sanitary conditions alone."

**Two examples of this include:**

1. The number of cases of Hib, measles, and other diseases that vaccines prevent has decreased dramatically due to immunizations. The Hib vaccine was directly responsible for decreasing the rate of Hib disease and Hib meningitis (swelling of the covering of the brain and spinal cord). Once the leading cause of death among young children, Hib disease has dropped more than 95 percent since the vaccine was introduced in 1987.\*

2. Before the measles vaccine was licensed in 1963, there were 500,000 cases and 500 deaths from measles in the U.S. every year. Measles was declared eliminated from the U.S. in 2000. Though we continue to have outbreaks from people bringing measles into the country, it's far below the amount of measles cases we used to have. According to CDC, the largest outbreaks of measles since 1996 have occurred in populations that refuse vaccination for religious or philosophical reasons.<sup>14</sup> (See Chapter 6: Compare the Risks.)

**QUESTION:** Is it better to become immune from natural infections rather than through vaccination?

**ANSWER:** No. Vaccines offer protection against infection without the risk of disease, which can be serious and possibly deadly. Diseases can cause permanent disabilities, like brain damage from measles or whooping cough (pertussis), and cancer from hepatitis B or HPV infections. Some vaccines, such as tetanus, HPV, and Hib, are better at creating immunity than natural infection is.

**QUESTION:** Does my baby need vaccinations if I am breastfeeding?

**ANSWER:** Yes. Breastfed babies need vaccinations. Although it enhances infants' protection against some colds, ear infections, and diarrhea, breastfeeding does not prevent the diseases that vaccines do prevent. Unlike vaccines, breastfeeding does not stimulate the infant's own immune system to produce the antibodies needed to fight very specific diseases.

Moms do pass on their antibodies to their newborn babies, which give babies what is called "passive" immunity, but they can only pass on the antibodies they have. For example, if a mom has never had chickenpox disease or vaccine, she will not pass on any chickenpox antibodies to her baby. Passive immunity also is only temporary, so babies need their own protection that lasts after their passive immunity is gone.

Vaccines and breastfeeding work well together and do not interfere with each other's effectiveness. In fact, breastfeeding may actually extend or improve immunity to Hib in immunized infants, though this is not the case for all other vaccines and the diseases they prevent. Following the recommended immunization schedule gives your breastfed baby the best protection against serious diseases.

\* See [www.historyofvaccines.org/content/articles/haemophilus-influenzae-type-b-hib](http://www.historyofvaccines.org/content/articles/haemophilus-influenzae-type-b-hib).

**QUESTION:** If I'm pregnant, what vaccines do I need to get to protect my baby?

**ANSWER:** Pregnant women should get the flu and Tdap vaccines to protect themselves and their babies from flu and whooping cough (pertussis).<sup>15, 16, 17, 18</sup> Getting vaccinated during pregnancy protects you and your baby at the time you deliver and for the first several weeks of your baby's life. This is important because pregnant women are at an increased risk of serious illness, hospitalization, and death. Getting the flu while pregnant also can cause preterm delivery. The infection-fighting antibodies that you get from the flu and Tdap vaccines get passed on to your baby for some protection, and also help prevent you from becoming infected and spreading these serious illnesses to your newborn when he or she is too young to get vaccinated. According to studies, infants of mothers vaccinated against flu were half as likely to be hospitalized for flu than infants of unvaccinated mothers. Pregnant women should not get the nasal spray vaccine. Pregnant women are recommended to get the whooping cough vaccine (Tdap) at every pregnancy, as early as possible between 27 and 36 weeks of gestation.<sup>19, 20</sup> This is when the vaccine works best to protect you and your newborn from pertussis. It's also important to check your immunity against chickenpox when pregnant. Ask your healthcare provider.

Family members, caregivers, and anyone in close contact with your baby also should make sure they're up to date on Tdap vaccine in an effort to surround or "cocoon" the baby with protection. Because babies can get seriously ill from some diseases that vaccines prevent, cocooning babies can help protect them until they can get vaccinated themselves.

**QUESTION:** Can my premature baby get vaccines?

**ANSWER:** Yes. Vaccine schedules for preterm infants should be based on the infant's chronological age. By age one to two months, all preterm infants respond as well to vaccines as a baby born full term. The one exception is hepatitis B. The baby's healthcare provider will decide the best schedule if the baby weighs less than 2,000 grams at birth and the mother has hepatitis B. Premature babies should not get reduced or divided vaccine doses.

**QUESTION:** Do vaccines cause chronic diseases, like diabetes and cancer?

**ANSWER:** No. We have not found any scientific evidence linking vaccines with chronic illnesses, even after decades of vaccine use and research in the U.S. Still, to ensure that the public is getting the safest possible vaccines, research on vaccine safety, including research into theories linking vaccines to chronic diseases, is ongoing in the U.S. and overseas.<sup>21</sup>

Medical conclusions about vaccine safety and the causes of disease must be judged on the quality of the scientific research and evidence. The test of good research is whether or not a study can be repeated and reach the same conclusions. To date, researchers have not duplicated studies supporting theories about a link between vaccines and chronic illnesses. Like any medication, no vaccine is risk free. When medical and public health professionals recommend vaccines for infants and children, they must balance the scientific evidence of benefits, risks, and costs. This balance may change as diseases are controlled or eliminated. (See Chapter 4: Vaccine Safety.)

## 4. Vaccine Safety

All parents want to do what's best for their kids and vaccine safety is a concern for many. Parents get a lot of conflicting information online, in the media, and in books and magazines. Learning about how a vaccine gets licensed may help you understand more about the safety measures that are in place for vaccines before they can be used.<sup>22, 23</sup>

The federal agency responsible for licensing vaccines in the U.S. is the Food and Drug Administration (FDA). FDA has developed scientific criteria for approving vaccines and, once approved, for monitoring side effects. Read more about the process and vaccine safety at [www.fda.gov](http://www.fda.gov). See a visual of how a new vaccine is created, approved, and monitored at [www.cdc.gov/vaccines/parents/infographics/journey-of-child-vaccine.html](http://www.cdc.gov/vaccines/parents/infographics/journey-of-child-vaccine.html).

### Licensing Vaccines

For a vaccine to be licensed, it needs to go through a federal regulation process, which can take 8 to 17 years. Before a vaccine is ready for licensing, it undergoes a research phase, where scientists try to determine how the vaccine might work, as well as extensive tests in animals. Then, the vaccine goes through a total of four clinical trial phases where it is tested on increasingly larger groups of humans. The fourth phase occurs after the vaccine is licensed. The clinical trial phases include:

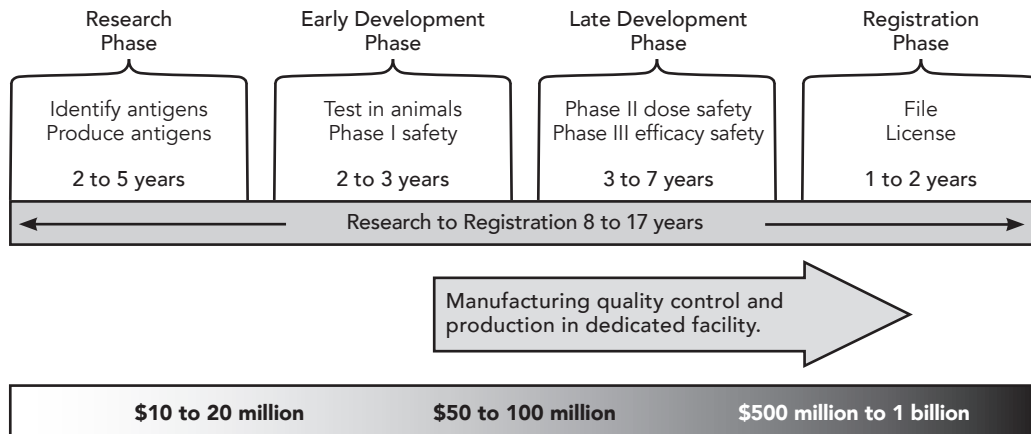
- Phase 1:** Consists of studies to learn more about the safety of the vaccine. This phase typically involves less than one hundred participants.
- Phase 2:** Consists of studies to demonstrate the ability of a vaccine to induce immunity, as well as to further evaluate side effects and risks. This phase is usually longer and can involve a few hundred participants.
- Phase 3:** Consists of studies to verify that the vaccine is effective in preventing the disease and to gather information on its risks versus its benefits. This phase involves several thousand participants and continues for several years.

After completing these three phases, the manufacturer must submit the vaccine's safety and effectiveness data to FDA as part of its license application. FDA reviews the data from the clinical studies as well as the safety and effectiveness of the manufacturing facilities and their methods for producing the vaccine. On average, it takes five years for FDA to approve a vaccine license after an application is submitted.

Before FDA approval, a third-party committee of non-FDA-related experts also reviews the vaccine's safety and effectiveness data. The Advisory Committee on Immunization Practices (ACIP) also evaluates all available data. If the vaccine is approved, ACIP presents its findings at public meetings and makes final recommendations for use of the vaccine.

- Phase 4:** Consists of evaluating the vaccine as it is used in the general population, which has a greater range of medical and social conditions. Very rarely, risk for a certain adverse effect is seen that might not have been found in the previous trials. Also, studies after licensure allow researchers to see if there are any rare side effects that may occur with multiple doses over time.

The graphic below shows each part of the vaccine licensing process along with estimated costs to vaccine manufacturers.<sup>22</sup>



## Monitoring Vaccine Safety

After a product is approved to be licensed (and therefore used), FDA continues to monitor vaccine safety and effectiveness through:

- On-site inspection of the manufacturing facility.
- Review of manufacturers' safety, potency, and purity testing.
- Possible duplication of the manufacturers' testing, as a protective measure.

Other national systems in place to monitor vaccine safety include CDC's Vaccine Safety Datalink Project (VSD) and the Vaccine Adverse Events Reporting System (VAERS).

Established in 1990, VSD uses large, linked databases to study rare side effects associated with vaccines. Eight managed care organizations, like Kaiser Permanente Northwest, supply CDC with medical and vaccination records of over 8.8 million people (all identifying information is removed to protect patient confidentiality).<sup>24</sup> This large amount of medical data that has been collected for more than 30 years enables researchers to conduct vaccine safety studies and examine potential relationships between specific vaccines and adverse events. The VSD has published more than 75 scientific articles addressing immunization safety concerns.<sup>25</sup>

Operated by FDA and CDC, VAERS is a national reporting system that tracks any adverse reactions that people may report following immunizations. The system gets reports from healthcare providers, patients, parents, or anyone who witnessed or even just heard of a possible adverse reaction that occurred after getting any vaccine. Since 1988, vaccine manufacturers and healthcare providers who give vaccines are required by law to report certain serious adverse events, but they may report any reaction or event.

There are limits to the system. Importantly, a VAERS report does not mean the vaccine caused the reaction or outcome. It only means that the vaccination happened first. VAERS is set up to help scientists notice trends or reasons they should investigate a possible problem. Both FDA and CDC continually monitor VAERS reports.



Information about VAERS can be found on every Vaccine Information Statement (VIS) that you get from your doctor, nurse, or pharmacist before you get a vaccination.

**To get a VAERS form:** Call 1-800-822-7967.  
Visit <https://vaers.hhs.gov/esub/>.  
Contact your clinic or health department.

**QUESTION:** Do we know VAERS works?

**ANSWER:** Yes. We know VAERS works because of the events in 1999 following licensure of the Rotashield rotavirus vaccine. Rotavirus is the most common cause of severe diarrhea in infants and children in the U.S. Through VAERS reporting, CDC saw an increased risk for intussusception (a type of bowel obstruction) following vaccination with Rotashield. This rare side effect occurred in about 1 in 10,000 children, and the vaccine was voluntarily recalled as a direct result of the VAERS data.

In February 2006, RotaTeq, a new rotavirus vaccine, was licensed and ACIP recommended its routine use. No evidence of an association between RotaTeq and intussusception was noted in the pre-licensure trial of 70,000 infants. However, based on its experience with Rotashield, FDA issued a Public Health Notification in February 2007 to encourage people to report any cases of intussusception following vaccination. An outside panel of medical experts concluded that the number of intussusception cases occurring after receiving RotaTeq was no greater than the number of cases of intussusception in infants who did not receive the vaccine.

**QUESTION:** What are vaccine “lots”?

**ANSWER:** Manufacturers produce and distribute vaccines in quantities known as “lots.” Lot sizes vary widely between different types of vaccines and different manufacturers. Samples of each lot are sent to FDA for tests of safety, potency, and purity before the lot can be given to patients.

**QUESTION:** I’ve heard that there are certain vaccine lots or batches associated with more adverse events. What does this mean?

**ANSWER:** Vaccine lots range in size from several hundred thousand doses to several million, and some are in distribution much longer than others. Naturally, a larger lot or one in distribution for a longer period of time will be associated with more adverse events, simply by chance.

We can use VAERS data to monitor the number of adverse events reports for each vaccine lot approved for use. However, because vaccine lots are not the same size, differences in the numbers of adverse events reported between various lots must be interpreted with great caution. Some people have misinterpreted VAERS data, leading to unsubstantiated media reports about “unsafe lots” of vaccine. If the number and type of adverse event reports for a particular vaccine lot suggested that it was associated with more serious adverse events or deaths than are expected by chance, FDA would immediately recall it for further investigation.

The Washington State Immunization Information System, our statewide immunization registry, also tracks the lot numbers of vaccines, so healthcare providers and pharmacists who use this registry will know the lot number of each vaccine they administer.

## 5. Vaccine Ingredients

**QUESTION:** Are there additives in vaccines?

**ANSWER:** Yes, and you should know about them. Additives make sure vaccines are sterile, effective, and safe. Vaccines contain the active ingredients that your body responds to by building immunity (protection). Some vaccines also use tiny amounts of inactive ingredients to make sure the vaccine stays effective (potent) and germ free (uncontaminated). The list below shows the additives and why they are used. None of the following ingredients have been proven harmful to animals or humans:<sup>26</sup>

**Preservatives:** Prevent germs (like bacteria and fungus) from contaminating the vaccine, which could cause serious infections in the person getting the vaccine. Examples: 2-phenoxyethanol and phenol.

**Adjuvants:** Increase the vaccine's ability to stimulate the body's immune system to fight off disease (to improve vaccine effectiveness). Examples: Aluminum salts and squalene (a naturally-occurring substance present in our bodies and many foods). For more information about adjuvants, visit [www.chop.edu/centers-programs/vaccine-education-center/vaccine-ingredients](http://www.chop.edu/centers-programs/vaccine-education-center/vaccine-ingredients).

**Stabilizers:** Help maintain the vaccine's effectiveness even when it is exposed to dramatic changes in the environment, such as temperature, light, and humidity. Examples: Gelatin, albumin, sucrose, lactose, MSG (monosodium glutamate), and glycine.

**Residuals:** Trace remains from the vaccine production process. Examples: Formaldehyde, antibiotics (Neomycin), egg protein, and yeast protein.

If you want specific information on the additives used in a particular vaccine, ask your doctor or nurse for a copy of the vaccine's package insert. Each vaccine comes with an insert listing every ingredient as well as every known reaction ever reported, regardless of how minor. You can also look on [www.Baby411.com](http://www.Baby411.com) and click on "Bonus" for a list of ingredients in routine childhood vaccinations.

**QUESTION:** I've heard a mercury-based preservative called thimerosal is in vaccines. Is this true?

**ANSWER:** Only one childhood vaccine still uses a mercury-based preservative. A chemical called thimerosal was a popular preservative used in vaccines since the 1940s. Thimerosal has trace amounts of ethylmercury (a type of mercury) and was used to prevent vaccines from becoming contaminated with bacteria or fungi. Thimerosal is only necessary as a preservative for some vaccines that come in multi-dose vials, which contain more than one dose of vaccine. Preservatives are not needed for vaccines in single-dose vials. All vaccines provided by Washington state for children 6 years and under are free of thimerosal except for flu vaccine in multi-dose vials, and a thimerosal-free single-dose flu vaccine option is available for those who prefer it.

**QUESTION:** Why was a recommendation made to remove thimerosal from childhood vaccines?

**ANSWER:** The recommendation to remove thimerosal from childhood vaccines was made as a precautionary measure in July 1999 by the U.S. Public Health Service, the American Academy of Pediatrics (AAP), and vaccine manufacturers. This decision was influenced by the public health goal to reduce exposure to all sources of mercury in biological products for infants, children, and pregnant women.

It's helpful to know that there are different types of mercury (in this case ethylmercury and methylmercury). Dr. Ari Brown explains the differences between them in an easy-to-understand way. Dr. Brown is a board-certified pediatrician and the co-author of the "411" parenting book series. She writes:

"A quick chemistry lesson: Certain compounds have completely different properties even though they may be related. For instance, take the alcohol family. Methanol is anti-freeze; ethanol is Bud Light [beer]. Keep this in mind when we discuss mercury. We are all exposed to small amounts of mercury. The type of mercury that has raised health concerns is called methylmercury. High concentrations of methylmercury can be found in tuna, swordfish, and shark from contaminated waters.

Methylmercury is a small molecule that can get into the brain — it takes almost two months to break down in the body. Ethylmercury (the type of mercury that was previously used as a vaccine preservative) is a large molecule that cannot enter the brain and is rapidly eliminated from the body within a week."<sup>27</sup>

**QUESTION:** Is thimerosal still in the vaccines that my child gets?

**ANSWER:** No. Since 2001, thimerosal has not been used as a preservative in childhood vaccines, with the exception of some flu vaccines where the vials contain more than one dose, and Td (tetanus and diphtheria) vaccines for kids seven years and older. The flu vaccines can be given to children older than three years in Washington state, although parents can request single-dose vials without thimerosal. Also, thimerosal has never been used in live vaccines (MMR, varicella, and nasal spray flu vaccine).

**QUESTION:** Is there evidence that thimerosal in vaccines causes autism?

**ANSWER:** No. The Institute of Medicine (IOM) reached this conclusion in 2004.

Even though thimerosal was removed from vaccines in 2001 in the U.S. and in other countries soon after, the number of new cases of autism is on the rise.<sup>28</sup> If autism was caused by infants' exposure to thimerosal, then its removal from vaccines would have led to an obvious decrease by now, particularly because autism is usually diagnosed by three years of age.

The state of California has done a thorough job of tracking autism spectrum disorders both when thimerosal was still used in vaccines and after it was removed. Researchers reviewed trends in autism diagnoses between January 1995 and March 2007 in children born between the years 1989 and 2003. They found that even after thimerosal was removed from vaccines, the numbers of children with autism continued to rise.<sup>29</sup>

In October 2001, the IOM concluded that the scientific evidence does not support the argument that neurodevelopmental disorders could be caused by a child's thimerosal exposure through vaccines given according to the recommended childhood immunization schedule.<sup>30</sup> In 2004, the IOM Immunization Safety Review Committee reviewed a large number of scientific studies, including a study in Denmark involving nearly 500,000 children. The IOM concluded that: (1) there is no association between autism and vaccines that contain thimerosal as a preservative and (2) there is no evidence for the hypothesis regarding a link between autism and vaccines that contain thimerosal. Visit [nationalacademies.org/hmd/Reports/2004/Immunization-Safety-Review-Vaccines-and-Autism.aspx](http://nationalacademies.org/hmd/Reports/2004/Immunization-Safety-Review-Vaccines-and-Autism.aspx) for more information and to access the full report.<sup>31</sup>

In addition, the Centers for Disease Control and Prevention's (CDC) Vaccine Safety Datalink (VSD) project monitors vaccine safety by analyzing medical data from millions of patients in managed care organizations. CDC has not found any evidence that neurodevelopmental disabilities like autism are caused by vaccines containing thimerosal. This finding is consistent with scientific evidence to date. Another study was published in 2007. It examined previously found associations between thimerosal exposure and neuropsychological outcomes, like speech and language skills, attention, fine motor coordination, tics, and academic and intellectual functioning. The evidence did not support a causal association between thimerosal-containing vaccines and neuropsychological functioning at ages seven to ten years.

To access the complete study, visit [www.cdc.gov/vaccinesafety/vsd/thimerosal\\_outcomes](http://www.cdc.gov/vaccinesafety/vsd/thimerosal_outcomes).<sup>32</sup>

For more information on thimerosal, visit CDC's National Immunization Program website at [www.cdc.gov/vaccines](http://www.cdc.gov/vaccines) or call its hotline at 1-800-232-4636 (English and Spanish) or 1-888-232-6348 (TTY). (For more information about MMR and autism, see Chapter 7: Q&A About Specific Vaccines.)

**QUESTION: Is aluminum used in vaccines?**

**ANSWER: Yes.** Trace amounts of aluminum salts are used in some childhood vaccines. It's important to know:<sup>27</sup>

- Aluminum is everywhere. It is naturally present in our water, soil, and even air. Nuts, fruits, vegetables, flour, cereal, even baby formula and breast milk all have some aluminum. In fact, there is less aluminum in vaccines than in the amount babies drink in breast milk or formula. By six months old, your baby will have been exposed to about four to six milligrams (mg) of aluminum by getting all the routinely recommended vaccines. By the same age, your baby will have been exposed to 10 mg of aluminum if breastfed, 40 mg if fed cow's milk-based formula, or 120 mg if fed soy formula.
- Aluminum has been safely used in vaccines for several decades.
- Aluminum increases the immune system's response to the vaccine. We need fewer booster doses of some inactivated vaccines (those that have a weakened form of the disease) because of the aluminum salts.

**QUESTION: Why is formaldehyde in vaccines?**

**ANSWER: Small amounts of formaldehyde in vaccines keep them clean (sterile) so that they don't become contaminated.** Formaldehyde occurs naturally in our environment and our bodies. It is also present in many foods and household goods. The formaldehyde in vaccines does not pose a health concern.<sup>34</sup>

**QUESTION: Do vaccines have antifreeze in them?**

**ANSWER: No.** Some vaccines use a chemical called polyethylene glycol, which is used to purify (decontaminate) vaccines. Although this chemical can be found in antifreeze, it is also used in toothpaste, eye drops, and skin care creams.

**QUESTION: My child has a peanut allergy and I heard that vaccines are suspended in peanut oil. Is this true?**

**ANSWER: No.** No vaccines are made with, or suspended in, peanut oil. Vaccines do not pose a risk to children with peanut allergies.

**QUESTION:** I heard the family of Hannah Poling was awarded money in a vaccine injury case. Didn't the government agree that vaccines caused this child's autism?

**ANSWER:** No. The government did NOT agree that vaccines cause autism in the Poling case. This case was similar to a class action lawsuit (called the "Omnibus Autism Proceedings"). Here's what happened, as described by Dr. Ari Brown. During this case:

"...one child, Hannah Poling, got a monetary settlement. The court did not hear her case. Hannah's case was being reviewed to serve as one of the test cases for a suit to represent 5,000 families who believe vaccines caused their child's autism.

During the review process, it was determined that Poling did not represent a test case because she had a rare, underlying genetic mitochondrial disorder that caused her deterioration and autism. For rare kids like her, any stress could have caused her to deteriorate. This is the equivalent of being born with an aneurysm, a ticking time bomb that could go off at any moment."<sup>27</sup>

There is no established link between vaccines, mitochondrial disorders, or autism. Experts still recommend that even children with known mitochondrial disorders be vaccinated.

The federal Vaccine Injury Compensation Program (VICP) started in 1988 as a way to petition for compensation for injuries from vaccines. Cases are heard in what is called Vaccine Court, an alternative to the traditional tort system for resolving vaccine injury claims. For more information about VICP, visit [www.hrsa.gov/vaccinecompensation](http://www.hrsa.gov/vaccinecompensation).

## 6. Compare the Risks

We designed this chapter to give you a snapshot comparing the risk of a particular disease to the risk of reactions from the vaccine that prevents it. The likelihood of a serious vaccine reaction is extremely low: “A one in a million risk means that of the 4.1 million children born in the U.S. every year, four of those children across the country could be affected. The risk of ‘one in a million’ is actually so low that scientists may not be able to tell whether the event was, in fact, caused by the vaccine or not.”<sup>35</sup> And the risk of serious reaction to a vaccine is even less than one in one million.

Unless otherwise noted, the data in this table are specific to the U.S. and come from the Centers for Disease Control and Prevention’s (CDC’s) book *Epidemiology and Prevention of Vaccine-Preventable Diseases*, 13th edition<sup>4</sup> and the CDC webpage on side effects ([www.cdc.gov/vaccines/vac-gen/side-effects.htm](http://www.cdc.gov/vaccines/vac-gen/side-effects.htm)).<sup>36</sup> We have alphabetized these diseases for ease of use, even though the Recommended Immunization Schedule lists them in the order your child will get them. Before your child gets immunized, your healthcare provider will give you a Vaccine Information Statement (VIS) for each vaccine that outlines its benefits and risks in detail. Most people who get a vaccine do not have any problems with it.

Risk of Disease and of Serious Complications	Risk of Serious Reaction from Vaccine
<p><b>Chickenpox (varicella)</b></p> <p>Before the vaccine was available, we had 3–4 million cases and 11,000 hospitalizations every year. Nine out of ten people in a household who have not already had chickenpox or the vaccine will catch the virus if exposed to an infected household member. The disease is more severe and complications more frequent in adolescents, adults, and those with weakened immune systems. Complications include skin infections, scarring, pneumonia, swelling of the brain, and reactivation of the varicella virus as shingles (herpes zoster) in later life. In some areas, cases have decreased as much as 90 percent over pre-vaccination numbers.<sup>37</sup></p> <ul style="list-style-type: none"> <li>• Hospitalization: three in 1,000 childhood cases</li> <li>• Death: one in 60,000 cases</li> </ul>	<p><b>Varicella Vaccine</b></p> <p>Mild or moderate reactions:</p> <ul style="list-style-type: none"> <li>• Soreness, swelling where shot was given: about one child in five</li> <li>• Fever: one person in ten, or less</li> <li>• Seizure (jerking or staring): very rare</li> </ul> <p>Severe reactions:</p> <ul style="list-style-type: none"> <li>• Pneumonia: very rare</li> </ul>
<p><b>Diphtheria</b></p> <p>Before the vaccine was available, about 15,000 people died each year in the U.S. From 1980-2011, 55 cases were reported in the U.S. Diphtheria is still seen in other parts of the world; more than 5,000 deaths were reported in the early 1990s in the former Soviet Union.</p> <ul style="list-style-type: none"> <li>• Death: about 1 in 10 cases, but about 2 in 10 cases for children younger than 5 years.</li> </ul>	<p><b>DTaP Vaccine, Diphtheria Component</b></p> <p>Mild or moderate reactions:</p> <ul style="list-style-type: none"> <li>• Soreness, swelling, redness where shot was given: up to about one child in four</li> <li>• Non-stop crying for three hours or more: up to about one child in one thousand</li> <li>• High fever over 105°F: about one child in 16,000</li> </ul> <p>Severe reactions:</p> <ul style="list-style-type: none"> <li>• Serious allergic reaction: less than one in one million doses</li> </ul>

## Risk of Disease and of Serious Complications

### **Haemophilus influenzae type b (Hib)**

Before the vaccine was available, Hib was the leading cause of bacterial meningitis (swelling of the covering of the brain and spinal cord), among U.S. children under 5 years of age, and 60% of cases struck children younger than 12 months of age. 20,000 children in the U.S. under age 5 got severe Hib disease each year. In 2011 (after the vaccine was widely used), only an estimated 14 cases occurred in the U.S. among children younger than 5 years.

- Hearing impairment and neurological damage: up to 1 in 3 children with invasive Hib disease
- Death: 1 in 20 children with invasive Hib disease

## Risk of Serious Reaction from Vaccine

### **Hib Vaccine**

Adverse reactions from Hib vaccine are uncommon.

Mild reactions:

- Swelling, redness or warmth where shot was given: up to one child in four
- Fever over 101°F: infrequent

Severe reactions:

- Serious reactions are rare

### **Hepatitis A**

Before the vaccine was available, children 2–18 years of age had the highest rates of infection each year (15–20 cases per 100,000). In 2010, there were 1,670 cases of acute hepatitis A infection. After hepatitis A became a recommended childhood vaccination, rates among children began declining and are now similar to other age groups.

- Death: About 100 per year

### **Hepatitis A Vaccine**

Mild or moderate reactions:

- Soreness where shot was given: up to half of children
- Fever: Less than one child in ten

Severe reactions:

- No serious reactions reported

### **Hepatitis B**

Between 2 million and 4 million Americans are living with chronic hepatitis B infections. About 25,000 hepatitis B-infected mothers give birth each year in the U.S. and 95% of those babies will become infected too without immediate intervention. For infants, nine of ten with the disease were infected at birth and will become lifelong (chronic) carriers; one in four of those infants will die of liver problems later in life. Up to half of children infected between one and five years of age will have lifelong infection.

- Death: Between 4,000 and 5,000 each year from hepatitis B-related liver diseases<sup>38</sup>

### **Hepatitis B Vaccine**

Mild reactions:

- Soreness where shot was given
- Fever of 99.9°F or higher

If these reactions happen, they last 1 to 2 days

Severe reactions:

- Severe allergic reactions: about 1 in 1.1 million doses

### **Human Papillomavirus (HPV)**

As of 2013, an estimated 79 million people were infected. Most of these first infections are among 15- to 24-year-olds. Every year, the U.S. reports about 14 million new infections.

- Genital warts: no specific data are available because healthcare providers aren't required to report this infection
- Cancer: more than 12,000 women get cervical cancer; 6,000 men and women get anal cancer; and 16,400 men and women get oropharyngeal cancer from HPV every year
- Death: about 4,000 women die of cervical cancer, and over 700 people die of anal cancer every year<sup>39</sup>
- HPV causes nearly all cervical cancer; 90% of anal cancer; and numerous other cancers

### **HPV Vaccine**

Mild or moderate reactions:

- Soreness where shot was given: about eight or nine people in ten
- Swelling or redness: about one person in three
- Headache: about one person in three

Severe reactions:

- No serious reactions reported

## Risk of Disease and of Serious Complications

### Influenza (flu)

Flu viruses change every year and can spread widely. Four flu pandemics occurred in the 20th century. The 1918–1919 pandemic killed an estimated 21 million people worldwide. In 2009, the H1N1 pandemic killed 12,500 Americans and made 60 million of them sick. Worldwide, up to a half million people died. Complications of flu include pneumonia (most common), myocarditis (inflammation of the heart), and death.

- Hospitalization: approximately 1 in 200 children 0 – 4 years old
- Death: depends on flu type, but on average more than 23,000 per year in the U.S.

### Measles

Before the vaccine was available, the U.S. had 500,000 reported cases and 500 deaths every year from measles. During the 1989 to 1991 measles epidemic, there were 55,622 cases due to large numbers of unimmunized children, and 45 percent were less than 5 years old. The epidemic caused 123 deaths (90 percent were unimmunized). If people stopped using the measles vaccine, the few cases the U.S. sees every year would become epidemics.<sup>37</sup>

- Pneumonia: about 1 in 20 cases
- Encephalitis (swelling of the brain): one in 1,000 cases
- Seizures: six to seven in 1,000 cases
- Death: one to three in 1,000 cases

### Meningococcal Disease

Before the year 2000, the U.S. had about 1,400 to 3,500 cases reported each year. Children under 4 years and 18- to 21-year-olds have the highest rates of infection, especially college students living in dormitories.

- Pneumonia: about one in seven cases
- Sepsis (bloodstream infection): up to one in five cases
- Permanent disability (hearing loss, brain damage, loss of limb): one in five cases
- Death: one in ten cases

## Risk of Serious Reaction from Vaccine

### LAIV\* or IIV\* Vaccines

(These are common to several flu vaccines. See the VIS for more detail): Certain flu vaccines are recommended for people with egg allergies.

Mild, moderate reactions:

- Fever, headache, cough, aches lasting 1 to 2 days

Severe reactions:

- Severe reactions are very rare

\* Live, attenuated influenza vaccine

\*\* Inactivated influenza vaccine

### MMR Vaccine

Mild or moderate reactions:

- Fever: up to one person in six
- Rash: about one person in 20
- Temporary low blood platelet count: about one in 30,000 doses

Severe reactions:

- Serious allergic reactions: less than one in one million doses
- Other severe reactions: very rare

### MCV\*/MPSV\*\*/MenB\*\*\* Vaccines

Mild, moderate reactions: (These reactions are more common after MCV4 and MenB than after MPSV4.)

- Pain, redness for 1 to 2 days: up to half of all people

Severe reactions:

- Serious allergic reactions: very rare

\* Meningococcal conjugate vaccine

\*\* Meningococcal polysaccharide vaccine

\*\*\* Serogroup B meningococcal vaccine



## Risk of Disease and of Serious Complications

### Mumps

Before the vaccine was available, the U.S. had 200,000 cases per year. In 2006, we had a multi-state outbreak of more than 6,500 cases and in 2009 to 2010 another outbreak in two states had over 3,400 cases. In 2016, 5,748 cases were reported, 155 of them in Washington.

- Encephalitis (swelling of the brain): up to one in 300 cases
- Testicular swelling: 2 in 3 male cases pre-vaccine; less than 1 in 10 in post-vaccine era
- Deafness: one in 20,000 cases
- Death: about one per year

### Pneumococcal Disease

*Streptococcus pneumoniae* is the leading cause of bacterial meningitis in the U.S., including among children under 5 years old. Pneumococcal disease can cause meningitis (swelling of the covering of the brain and spinal cord), bacteremia (blood infection), ear infections, pneumonia, brain damage, and death. Before the vaccine was available, pneumococcal infection in children under 5 years of age caused:

- Meningitis: 700 cases every year
- Bacteremia (blood infection): 13,000 cases every year
- Ear infections: 5 million every year
- Deaths: 200 every year

### Polio

Before the vaccine was available, 38,000 people got polio every year, of whom 13,000 to 20,000 became paralyzed. During the 1970s, the U.S. had several outbreaks in unimmunized populations, but we have had none since 1979.

- Permanent paralysis: one in 100 cases
- Death: one in 20 children and one in four adults with paralytic polio

### Rotavirus

Before the vaccine was available, rotavirus was the most common cause of severe diarrhea in infants and young children. Almost all children will get infected with rotavirus by 5 years of age. The vaccine helps protect against severe diarrhea leading to hospitalization. Each year:

- Emergency room visits: 200,000
- Hospitalization: 55,000 to 70,000
- Death: 20 to 60 cases

## Risk of Serious Reaction from Vaccine

### MMR Vaccine

Mild or moderate reactions:

- Fever: up to one person in six
- Rash: about one person in 20
- Temporary low blood platelet count: about one in 30,000 doses

Severe reactions:

- Serious allergic reactions: less than one in one million doses
- Other severe reactions: very rare

### PCV Vaccine

Mild or moderate reactions:

- Swelling where shot was given: about one person in three
- Fever, over 102.2° F: about one person in 20
- Fussiness or irritability: up to eight in ten

Severe reactions:

- Severe allergic reactions: very rare

### PPSV Vaccine

Mild or moderate reactions:

- Pain, redness where shot was given: up to half of people
- Fever, muscle aches: less than 1 percent of people

Severe reactions:

- Severe allergic reactions: very rare

### Inactivated Polio Vaccine (IPV)

Mild reactions:

- Soreness where shot was given

Severe reactions:

- No serious reactions reported

### Rotavirus Vaccine

Mild or moderate reactions:

- Babies might become irritable or have mild diarrhea or vomiting

Severe reactions (very rare):

- Intussusception (a type of bowel obstruction) within a week after the first dose: about 1 child in 100,000

## Risk of Disease and of Serious Complications

### Rubella

Between 1964 and 1965, we had 12.5 million cases, which led to 2,100 infant deaths, 11,000 miscarriages, and 20,000 babies born with congenital rubella syndrome (CRS). In 2012, after the vaccine was widely used, we only had nine cases of CRS (see last bullet).<sup>37</sup>

- Arthritis (usually temporary): 7 in 10 cases of adult women
- Low blood platelet count (more common in children): 1 in 3,000 cases
- Encephalitis (swelling of the brain): 1 in 6,000 cases
- CRS (e.g., deafness, eye defects, mental retardation): 4 in 5 newborns whose mothers were infected early in pregnancy

### Tetanus

Before the vaccine was available, we had 500 to 600 cases of tetanus and approximately 180 deaths every year. Currently the U.S. has 50 to 100 cases of tetanus reported every year. However, in 2010, 58,000 newborns died worldwide from neonatal tetanus.

- Death: more than one in ten cases

### Whooping Cough (pertussis)

Before the vaccine was available, the U.S. had 150,000 to 260,000 cases reported each year with about 8,000 deaths. Over 4,800 cases in Washington State occurred in 2012, which is more than we've had since the 1940s. Sadly, one infant died. The highest incidence rate was in infants under one year of age. The U.S. that year saw more than 48,000 cases and 13 infant deaths, the highest incidence rate since 1955.

- Pneumonia: 1 in 20 cases
- Seizures: 1 in 80 cases
- Death: From 2008 to 2011, 78 deaths were reported nationwide and 60 of them (over 80 percent) were three months of age or younger.<sup>41</sup>

## Risk of Serious Reaction from Vaccine

### MMR Vaccine

Mild, moderate reactions:

- Fever: up to one person in six
- Rash: about one person in 20
- Temporary low blood platelet count: about one out of 30,000 doses

Severe reactions:

- Serious allergic reactions: less than one in one million doses
- Other severe reactions: very rare

### DTaP Vaccine, Tetanus Component

Mild, moderate reactions:\*

- Redness or swelling where the shot was given (this is also common from Tdap and Td vaccines): about 1 person in four
- Fever, up to one child in four

Severe reactions:

- Serious allergic reaction: less than one in one million doses

\* Mild reactions occur more often after the 4th and 5th doses of DTaP than after earlier doses.

### DTaP Vaccine, Pertussis Component

Mild, moderate reactions:

- Soreness, swelling, redness where shot was given: up to about one child in four
- Non-stop crying for three hours or more: up to about one child in one thousand
- Fever over 102°F: about 1 child in 16,000

Severe reactions:

- Serious allergic reaction: less than one in one million doses

**Note:** The Institute of Medicine concluded that there is no evidence that pertussis vaccine causes sudden infant death syndrome (SIDS).<sup>40</sup>

## 7. Q & A About Specific Vaccines

### CHICKENPOX (Varicella)

**QUESTION:** Chickenpox doesn't seem very serious. Why should I vaccinate against it?

**ANSWER:** While chickenpox may be mild or moderate for many, it can lead to life-threatening complications for some, even if they were previously healthy. Pneumonia and encephalitis (disorder or disease of the brain), "flesh-eating" bacterial infection, shingles later in life, and death can and do occur in children and adults as a consequence of chickenpox disease. Before varicella vaccine became available in 1995 in the U.S., 7,200 children were hospitalized and 100 children died each year from chickenpox. Most of the hospitalizations and deaths occurred in previously healthy children. Since 1996, hospitalizations and deaths from chickenpox disease have decreased more than 90 percent. Vaccinating against chickenpox during childhood helps reduce the chance of getting the disease in later years.

**QUESTION:** Does my child need a second dose of varicella vaccine?

**ANSWER:** Yes. For the best protection, a two-dose series of varicella vaccine is recommended for all healthy children starting at 12 to 15 months. Immunity appears to be long lasting after receiving two doses. It is 70 to 90 percent effective against any chickenpox disease and 95 to 100 percent effective against severe disease. If a vaccinated child becomes infected with chickenpox, he or she will be sick for a shorter amount of time with a much milder case (fewer than 50 blisters) than if he or she had not been vaccinated. Unvaccinated children who get chickenpox typically have 200 to 500 blisters.

### DIPHTHERIA, TETANUS, AND ACELLULAR PERTUSSIS (DTaP)

**QUESTION:** What is the difference between DTaP and DTP vaccines?

**ANSWER:** The U.S. stopped using the older DTP (also known as DPT) vaccine when the newer DTaP vaccine was introduced in 1997. The "a" in DTaP refers to "acellular," which means that the vaccine contains only the parts of the pertussis bacterium that induce immunity, not the whole cell, like DTP vaccine.

Studies showed that the older, whole cell DTP version of this vaccine had a higher frequency of mild and moderate reactions, such as redness, swelling, pain at the injection site, fever, and febrile seizures. (See also Chapter 6: Compare the Risks.)

**QUESTION:** What are the side effects of the DTaP vaccine?

**ANSWER:** Most children who get the DTaP vaccine have only minor discomfort. The most common reactions are soreness, swelling, and redness at the injection site. These reactions are more common following the fourth and fifth doses of the vaccine, usually last one to two days, and happen about two to four times for every ten doses (20 to 40 percent). Another common reaction is fever over 101°F, which happens less than one time for every ten doses (3 to 5 percent). Serious reactions from the DTaP vaccine are rare (less than one in one million doses).

**QUESTION:** How effective is the DTaP vaccine?

**ANSWER:** Children get protection from four DTaP shots by age 18 months and fullest protection after the fifth dose given between 4 to 6 years of age. A full series of shots protects about 80 out of 100 children from getting severe whooping cough (pertussis), about 95 out of 100 children from getting diphtheria, and virtually 100 percent of children from getting tetanus. Children vaccinated with DTaP who do become ill with whooping cough almost always have a milder illness compared to unvaccinated children. Consider these DTaP facts:

- Whooping cough is so contagious that almost everyone who is not immune will get sick if exposed to it.
- Children who catch whooping cough (especially young infants) often become seriously ill.
- Children who are not fully immunized often get and spread whooping cough to others in their communities.
- Most kids who have had a full series of DTaP vaccine are protected from diphtheria, tetanus, and severe pertussis for several years. But, we do know that protection wanes. Everyone 11 years and older should get a pertussis booster called Tdap once, then a booster of the Td vaccine every 10 years to continue protection against tetanus and diphtheria Tdap protects against the same diseases, but has a different amount of vaccine in it that's better suited to older children and adults..

## HEPATITIS B (HepB)

**QUESTION:** I know that most people who get hepatitis B are adults. Why is it recommended that the hepatitis B vaccine series be given to infants?

**ANSWER:** National immunization recommendations call for the routine immunization of all infants against hepatitis B because:

- A mother with hepatitis B can pass the virus to her newborn baby during childbirth. Nine out of ten infants who get infected this way will develop lifelong (chronic) hepatitis B. Of those, one in four will die of liver problems later in life.
- It is impossible to predict who will be exposed to hepatitis B in the future. About 30 percent of those who get hepatitis B do not have symptoms and do not know how they got the disease. Infection can occur as a result of bites, scratches, or contact with blood from an infected playmate or family member.
- Infants and very young children are much more likely to develop a severe case of hepatitis B, often leading to death later in life.
- The earlier in life a child is exposed to the disease, the more likely he or she will become a chronic (lifelong) carrier.
- Prevention is best. Getting hepatitis B vaccine early in life helps ensure people are protected before they are exposed to the virus.

**QUESTION:** Does hepatitis B vaccine cause multiple sclerosis (MS)?

**ANSWER:** No. Studies by the World Health Organization (WHO), Institute of Medicine (IOM), and the Medical Advisory Board of the National Multiple Sclerosis Society have concluded that there is no evidence that the hepatitis B vaccine causes MS or other neurological diseases in otherwise healthy individuals.

MS is an autoimmune disorder in which a person's antibodies attack the body's own myelin (a sheath that covers the nerves). MS is a lifelong illness that fluctuates through periods of exacerbation (symptoms worsen) and remission (symptoms get better). The cause of MS is unknown, but most medical experts believe that patients are genetically at risk for the disease and environmental factors can "trigger" its onset.

In May 2002, the Safety Review Committee of the IOM published a report of its findings on the possible connection between hepatitis B vaccine and MS and related neurologic disorders.<sup>42</sup> After thoroughly analyzing the studies of people who got hepatitis B vaccine compared to unvaccinated patients with MS, the committee concluded that the evidence did not show that hepatitis B vaccine causes MS.\*

**QUESTION:** Does hepatitis B vaccine cause sudden infant death syndrome (SIDS)?

**ANSWER:** No. Since 1991, infants have received hepatitis B vaccine starting as early as the first day of life. If SIDS were somehow related to hepatitis B vaccination, we would expect to see an increase in SIDS deaths since that time. However, this is not the case. In fact, there has been a steady decrease in the number of newborn deaths, even as the number of hepatitis B vaccinations has increased.

## HUMAN PAPILLOMAVIRUS (HPV)

**QUESTION:** Why is HPV vaccine given so young, at age 11 or 12?

**ANSWER:** The HPV vaccine is most effective at this age because it produces the most infection-fighting cells, or antibodies, during the preteen years. This is important because the vaccine protects against many types of cancer. Getting the vaccine before the teen years also ensures immunity is in place before they are exposed to the virus. And since it works better at this age, someone getting the vaccine between ages 9 and 14 usually only has to have two doses instead of three. Starting the series at age 9 makes it easy for your child to all the doses they need by their age-11 well child visit.

**QUESTION:** I know HPV is needed for girls, but does my son need it too?

**ANSWER:** Yes. Both boys and girls need to be immunized against HPV. Warts and HPV-related cancers occur in people of all genders, and the virus can be passed between people. The HPV vaccine is recommended for everyone starting at age 9.

**QUESTION:** Does the HPV vaccine protect my child against all HPV diseases and cancers?

**ANSWER:** Most, but not all. There are approximately 100 different types of HPV. Of those, at least 40 types can cause genital warts and several kinds of cancer, especially cancers of the cervix, throat, anus, mouth, and penis. The vaccine protects against nine of the most common cancer-causing strains of HPV.

## INFLUENZA (Flu) (IIV, LAIV)

**QUESTION:** Does my baby need flu vaccine?

**ANSWER:** Yes. The Advisory Committee on Immunization Practices (ACIP) recommends everyone six months and older get a yearly flu vaccine. Infants and children younger than five years old are more likely to have serious illness and complications and be hospitalized from the flu than older kids. Household contacts and caregivers of babies and children should also get flu vaccine each year. Your infant or child may need two doses of flu vaccine the first time they get it, so check with your health care provider. For more information about flu recommendations, visit [www.doh.wa.gov/flu](http://www.doh.wa.gov/flu).

\* For a copy of the full IOM report, visit: [www.nationalacademies.org/hmd/Reports/2002/Immunization-Safety-Review-Hepatitis-B-Vaccine-and-Demyelinating-Neurological-Disorders.aspx](http://www.nationalacademies.org/hmd/Reports/2002/Immunization-Safety-Review-Hepatitis-B-Vaccine-and-Demyelinating-Neurological-Disorders.aspx).

**QUESTION:** Are there different types of flu vaccine?

**ANSWER:** Yes. Two types of flu vaccine are available, though only the first is recommended: an injectable form or shot (called Inactivated Influenza Vaccine or IIV) and a nasal spray (called Live, Attenuated Influenza Vaccine or LAIV). The flu shot contains inactivated (killed) viruses and can be given to anyone six months and older. Pregnant women only use this form of the vaccine. The nasal spray flu vaccine is a live (but weakened) vaccine and is sprayed into both nostrils. Although still licensed by the FDA, following the 2015-2016 flu season ACIP has recommended that the nasal spray not be used by anyone of any age. Only the shot, IIV, is recommended.

**QUESTION:** Can I get the flu vaccine when I'm pregnant?

**ANSWER:** Yes. The flu shot is recommended for all pregnant women and women who recently gave birth. Getting vaccinated during pregnancy offers infants some protection at the time of delivery and up to six months after they're born. The CDC and the Washington State Department of Health strongly encourage every pregnant woman to get a flu shot. Pregnant women should not get the nasal spray vaccine.

## MEASLES, MUMPS, AND RUBELLA (MMR)

**QUESTION:** Is there evidence of an association between the MMR vaccine and autism?

**ANSWER:** No. The best available science indicates that the development of autism is unrelated to the use of MMR or any other vaccine. Experts in behavioral and developmental disorders agree genetics play a role in causing autism, and current research shows that there is more than just one "autism gene." Other things being researched as possible causes of autism are abnormal brain growth, something in the environment, being born too early, older parents, and pregnancies that are close together.<sup>27</sup>

The idea that there is a link between the measles, mumps, and rubella (MMR) vaccine and autism came from one small report of only eight children conducted in England in 1998 that led a research group to feel that there was a link between the combination vaccine and autism.<sup>43</sup> This report turned out to be completely false. A former member of the research lab revealed that the data reported in the study were fabricated!<sup>44</sup> In 2004, the report was retracted by the journal that published it.<sup>45</sup> In 2010, the lead author lost his license to practice medicine and was accused of fraud.<sup>28</sup>

In 2008, a team of researchers tried and failed to duplicate the findings of this now discredited researcher. A large number of studies and reviews involving more than ten million children shows no connection between the MMR vaccine and autism.<sup>46</sup>

Because of this fabricated study, some parents chose to skip the MMR vaccine. And since then, measles epidemics have occurred in both the U.S. and the United Kingdom. (See Chapter 1: Immunizations Save Lives for more information on the measles epidemic.) Dr. Ari Brown summarizes the problem of faulty science:

"Don't base health decisions for your child on one research study or what the media says! Talk to your child's doctor about any vaccine safety concerns."<sup>27</sup>

**QUESTION:** I've heard some parents say that their autistic child was "perfectly normal" until about 18 months old. Can autism affect a child this way?

**ANSWER:** Sometimes, yes. A small minority of children with autism\* have what is called "late onset autism," which means they have completely typical milestones and then regress. Scientists believe this means the child has a genetic abnormality that turns on or off around this age. There may not be an identifiable moment or incident that sets it off.<sup>27</sup>

For most children with autism spectrum disorders (ASD), doctors and parents miss or ignore the early signs of the disorder in the first year of life. The child's atypical development only becomes clear at 18 months old. Read the next answer for more details.

**QUESTION:** If the MMR vaccine doesn't cause autism, why is the diagnosis made around the same time as the vaccination?

**ANSWER:** One way doctors diagnose autism is by noticing a delay in language skills. Typically, kids under 12 months do not have a lot of expressive language, so doctors need to wait until they are 15 to 18 months to confirm a delay in language before making a diagnosis. Children usually show clues to the diagnosis long before their first birthday and their "official" diagnosis. MMR vaccine is usually given to children 12 to 15 months of age. Although autism may be detected during the weeks or months following MMR vaccination, this does not mean that the vaccine caused the disorder. Because they happen around the same time, some parents wonder if there is a connection between autism and the vaccine. However, there is no connection, and the possible causes of autism are still being studied.

**QUESTION:** Can I get measles, mumps, and rubella as separate shots instead of the combined MMR vaccine?

**ANSWER:** No. Measles, mumps, and rubella are no longer available as separate vaccines. Separating vaccines is not recommended because protection for the diseases winds up getting delayed, which is risky both for a child who might get any of these diseases as well as for the community since the diseases may spread. Delaying the rubella vaccine, in particular, leaves unborn babies at risk. Unvaccinated kids could spread the disease to pregnant women who may miscarry or whose babies might be born with congenital rubella syndrome (CRS), which can cause birth defects like blindness, deafness, or developmental delays.

## MENINGOCOCCAL DISEASE (MCV, MPSV, B)

**QUESTION:** Are there different meningococcal vaccines?

**ANSWER:** Yes. There are three types of meningococcal vaccine. Meningococcal conjugate vaccine (MCV) is recommended for high-risk children as young as 9 months old and all children 11 to 12 years old, with a booster dose at age 16. Meningococcal polysaccharide vaccine (MPSV) is not routinely recommended for children. These two vaccines protect against the A, C, W, and Y strains of meningococcal disease. The third type of vaccine protects against meningococcal B strain and is only recommended for children 10 years or older at high risk for the disease.

\* By autism, we mean autism spectrum disorder or ASD, a collection of several disorders with three areas that can be affected: social skills, communication skills, and repetitive or obsessive traits. ASD can be mild, severe, or anywhere in between. A child with Asperger syndrome, for example, which falls under ASD, can communicate but has trouble with social skills. A child with more severe problems in all three areas may have classic autism. Cases with more severe symptoms are more likely to be caught earlier than milder forms of ASD, such as Asperger syndrome.

**QUESTION:** Is there a higher risk for getting Guillain-Barré syndrome (GBS) with the meningococcal vaccine than without the vaccine?

**ANSWER:** No. GBS is an autoimmune disorder that causes nerve damage and can lead to muscle weakness and paralysis, which is usually temporary. Several years ago, when a few people reported they got GBS after getting the MCV4 meningococcal vaccine, two large safety studies were done to investigate. They found the rate of GBS was the same among people who had gotten the vaccine as among those who were not vaccinated. No evidence showed the vaccine caused GBS, and you can get the vaccine even if you've had GBS in the past.<sup>49</sup> CDC continues to carefully monitor reported vaccine data for GBS cases.

## PNEUMOCOCCAL DISEASE (PCV, PPSV)

**QUESTION:** Are there different pneumococcal vaccines for children?

**ANSWER:** Yes. The pneumococcal polysaccharide vaccine (PPSV), used in the U.S. since 1983, is not effective in children under two years of age and therefore is not recommended for this age group.

A pneumococcal conjugate vaccine (PCV) is recommended for children under two years of age. The current version, called PCV13, targets the 13 most common types of pneumococcal infection that cause the majority of invasive disease in this age group. PCV13 has been used since 2010; before that, one targeting the seven most common types (PCV7) was used. In the past, pneumococcal infections could be treated effectively with certain antibiotics. However, many of these infections are becoming resistant to antibiotics, which makes vaccination even more important.

## POLIO

**QUESTION:** Is it still necessary to be immunized against polio?

**ANSWER:** Yes. Although wild polio disease was eliminated from the U.S. in 1979, it still exists in other countries. Until polio is eliminated worldwide, our children need to be protected. Because international travel is common, diseases from other parts of the world are only a plane ride away.

**QUESTION:** What is the difference between inactivated poliovirus vaccine (IPV) and oral poliovirus vaccine (OPV)?

**ANSWER:** IPV is a killed form of the virus and given as a shot, while OPV uses a live but weakened form of the virus and is given by mouth. IPV is currently the only polio vaccine available in the U.S. Because wild poliovirus no longer exists in the U.S. and other countries in the western hemisphere, IPV has been the only vaccine given and recommended in the U.S. since January 2000.

OPV was the vaccine of choice for routine immunization of most children in the U.S. from 1963 to the mid-1990s. It is highly effective at preventing polio, but it is associated with a very rare occurrence of paralysis in people who received the vaccine as well as in those with whom they have had contact. Approximately eight cases of vaccine-associated paralytic polio (VAPP) occurred in the U.S. each year when OPV was the primary vaccine in use, about 1 case per 2.5 million doses. The currently used vaccine, IPV, cannot and does not cause VAPP because it does not contain live poliovirus.



## ROTAVIRUS (RV)

**QUESTION:** Is rotavirus disease just a kids' illness?

**ANSWER:** Adults can be infected with rotavirus, but they tend to have milder cases. Children between 6 and 24 months old are at greatest risk for severe rotavirus disease.

**QUESTION:** What is intussusception? Is there a risk for this condition with the rotavirus vaccine?

**ANSWER:** Intussusception is an uncommon bowel obstruction that causes one part of the intestine to slide into the next, much like the pieces of a telescope. Current studies have not shown an increased risk of intussusception in infants getting the vaccine compared to unvaccinated infants. (See Chapter 4, Vaccine Safety.) A previous rotavirus vaccine had a slight risk of intussusception, but it was taken off the market in 1999 when this risk was discovered.

How effective are vaccines against the diseases they prevent?	
Disease	All recommended doses, minimum effectiveness (protection can be higher than listed)
Chickenpox, children	97%
Chickenpox, adolescents	99%
Diphtheria	95%
Flu	Varies every season
Hepatitis A	100%
Hepatitis B, children/adolescents	95%
Hib	95%
HPV	97%
Measles	98%
Meningococcal types A, C*	85%
Mumps	88%
Pneumococcal, PCV13	90%
Pneumococcal, PPSV23	60%
Polio	99%
Rotavirus, all disease	74%
Rotavirus, severe disease	92%
Rubella	95%
Tetanus**	100%
Whooping cough	80%

Data source: Centers for Disease Control and Prevention

\*Vaccines also protect against meningococcal disease types W, Y, and B, but their effectiveness has not been calculated separately.

\*\*Tetanus protection wears off and you must get a booster every 10 years to maintain this level of protection.

## 8. Legal Requirements

**QUESTION:** What are the legal requirements for immunizing children?

**ANSWER:** Federal law requires that before kids get immunizations, parents or guardians must have:

- Information in writing (the Vaccine Information Statement) about the benefits and risks of vaccination.
- An opportunity to ask questions and get additional information about vaccinations from their healthcare provider.

States require vaccination because they have a responsibility to protect the health of the public and individuals. Each state determines which vaccines are required by law for school, preschool, and child care attendance, so requirements vary from state to state. In Washington State, you can find the requirements for childhood immunizations in the Revised Code of Washington (RCW), Chapter 28A.210 and explained in the Washington Administrative Code (WAC), Chapter 246-105. For more information, visit [www.doh.wa.gov/immunization/schoolandchildcare](http://www.doh.wa.gov/immunization/schoolandchildcare).

The law requires parents or guardians to complete a Certificate of Immunization Status (CIS)\* for each child before attending licensed child care, preschool, and school. A CIS that is pre-filled with immunizations from state records can be obtained from a healthcare provider, a school, or the Department of Health.

Parents who want to exempt, or excuse, their child from immunization requirements must fill out a Certificate of Exemption (COE). All exemptions require a parent or guardian signature. For most exemptions, a licensed healthcare provider must also sign the COE verifying that the parent or guardian got information about the benefits and risks of vaccination.

A child who is not fully immunized (due to an exemption) may be excluded from attending child care, preschool, or school during outbreaks of certain diseases that vaccines prevent.

Be sure to keep a record of your child's immunizations. You can order a Washington State Lifetime Immunization Record card free of charge from the Family Health Hotline at 1-800-322-2588, or track their immunizations online at [wa.myir.net](http://wa.myir.net).

**QUESTION:** Why don't the vaccine requirements for school entry match the current vaccines listed in the Recommended Childhood Immunization Schedule?

**ANSWER:** The Advisory Committee on Immunization Practices' (ACIP) Recommended Childhood Immunization Schedule provides a vaccine schedule for the best protection from vaccine-preventable diseases. But some recommended vaccines protect against diseases that are most serious to infants and toddlers, like *Haemophilus influenzae* type b and pneumococcal disease. These diseases do not pose as great a threat to school-age children and therefore are not required for school entry.

To protect babies and young children against the most common diseases before they start school, following the ACIP recommended immunization schedule is best.

\*Find and download the CIS at

[www.doh.wa.gov/CommunityandEnvironment/Schools/Immunization/VaccineRequirements](http://www.doh.wa.gov/CommunityandEnvironment/Schools/Immunization/VaccineRequirements) or from your MyIR account at [wa.myir.net](http://wa.myir.net).

## 9. To Wait or Not to Wait

Parents often ask why immunizations are given so early in life. You may wonder if you can wait until your child enters school to get the required immunizations. You may also wonder about the risk if your child does not receive all recommended immunizations. The following questions and answers cover this information and more.

**QUESTION:** Who determines the U.S. Recommended Immunization Schedules? Why should I follow them?

**ANSWER:** The Advisory Committee on Immunization Practices (ACIP) develops a recommended schedule for children (as well as teens and adults) in the U.S. ACIP is a CDC committee and collaborates with the American Academy of Pediatrics and the American Academy of Family Physicians.

Further, individual states determine which recommended vaccines are required for entry into child care, preschool, and school. (See Chapter 8: Legal Requirements.)

The goal of the recommended schedule for children is to protect them as soon as it is safe and effective to do so. There is no evidence that delaying any shots is safer. Dr. Ari Brown says, "I'd much rather follow a schedule that has been extensively researched for both safety and effectiveness by experts in the field of infectious diseases. Delaying shots is playing Russian roulette with your child. The simple truth is that you are leaving your child unprotected, at a time when she is the most vulnerable."<sup>27</sup>

A 2010 study found no differences in development between children who received their shots on time and children whose vaccinations were delayed.<sup>27</sup> In addition, alternative schedules are developed without any research supporting them. In other words, they have never been tested. Vaccines in the ACIP schedule have to be proven safe and effective before they're recommended. Delaying shots also means delaying protection from the diseases.

**QUESTION:** What happens if I wait to immunize my child until he or she is ready to start school?

**ANSWER:** Waiting to vaccinate puts your child at increased risk for serious diseases. Many diseases that vaccines prevent are more severe and pose the greatest risk for complications in infants and very young children. Delaying immunizations until kindergarten or even until after the first birthday can put your child at unnecessary risk when he or she is most vulnerable. Compare this to car seat or seatbelt use. It's possible that your child would not get hurt riding in your car without a car seat or seatbelt. But we know from research that without these safety devices, your child is at greater risk of injury, especially serious injury. Riding in a car is a risk, but you can make choices that decrease that risk. The same is true for diseases that vaccines prevent. Vaccines decrease your child's risk of serious illness, disability, and death.

**QUESTION:** If my baby is born with maternal immunity, why should I vaccinate in the first year?

**ANSWER:** It's important to vaccinate your baby in the first year of life because:

- Maternal antibodies are only temporary. They wane during the first year of life.
- Maternal antibodies are only passed on to the newborn if the mother has immunity herself.
- Research shows that in the first years of life, your baby is most vulnerable to many serious diseases that vaccines prevent.
- Your baby will likely be exposed to many other children and adults in the first year of life who may be infected with these diseases.

**QUESTION:** Can my child catch up if he or she is behind on getting immunized?

**ANSWER:** Yes. If your child is behind on the immunization schedule, talk to your child's doctor, nurse, or clinic about a catch-up schedule. Your child does not need to start the series over for any vaccine. However, until your child gets the entire vaccine series for a particular disease, your child will not have the maximum protection against it.

Some vaccines, such as rotavirus and Hib, cannot be given if they are not started or completed by a certain age. It is best to follow the recommended schedule as closely as possible.

**QUESTION:** Can my child get immunizations even if he or she has a minor illness?

**ANSWER:** Yes. Immunizations can be given during any visit to your doctor or nurse, even if your child has a minor illness, such as mild fever, cold, ear infection, or diarrhea, or is taking antibiotics. The vaccines will not make your child's illness worse, and the vaccines will still be effective. Studies show that minor illnesses, body temperature, and the use of antibiotics do not affect the vaccine's effectiveness, and that young children with these mild illnesses respond just as well to the vaccines as children who are vaccinated while they are healthy.<sup>4</sup>

Getting all immunizations when they are due is an important way to get the best protection, complete each vaccine series on time, and avoid extra visits.

**QUESTION:** Are there times that vaccines should NOT be given?

**ANSWER:** Yes. Sometimes a child has medical reasons for not getting a vaccine or for delaying it. These are referred to as "contraindications" and "precautions." Contraindications are medical conditions that increase the chance of a serious adverse reaction. Precautions are medical conditions (usually temporary) that might increase the chance of an adverse reaction or might compromise the effectiveness of the vaccine.<sup>4</sup> In general, a child should not receive an immunization if he or she:

- Has a contraindication: a medical condition that could be made more severe, or even life-threatening if the vaccine were given. For example, if a child has a severe allergy to a vaccine component (such as neomycin or gelatin), then he or she may experience difficulty breathing, low blood pressure, or shock if the vaccine were given. The vaccine is not an option.
- Has a precaution: a medical condition that could reduce the ability of the vaccine to produce the desired immunity. For example, if a child has recently received blood products (such as immune globulin or a blood transfusion), then the antibodies in the blood could damage a live vaccine, such as measles vaccine (MMR).

As we mentioned above, vaccines may be given if a child is breastfed, is taking antibiotics, or has mild diarrhea, mild fever, a cold, an ear infection, or other mild illness. Infants or children living in a household with a pregnant woman may receive all vaccines, including live vaccines (such as MMR and varicella). However, if a child is moderately to severely ill, postponing vaccination may be a good idea. Talk to your doctor if you have questions about what "moderately to severely ill" means in terms of immunization, or if you have specific questions about vaccinating during these or other circumstances.

**QUESTION:** I am worried about my baby getting too many shots at once and I am nervous about some vaccines. Our pediatrician prefers to follow the recommended schedule but has agreed to adjust the schedule for our family. What do I need to consider and what should I do next?

**ANSWER:** Here are some things to consider and next steps before you make your decision.

Considerations:

- Using combination vaccines reduces the number of shots given at one time.
- Vaccines routinely recommended for children are thimerosal-free except for flu and Td that come in multi-dose vials. In Washington state, pregnant women and children younger than three cannot get vaccines that contain thimerosal. (See Chapter 5: Vaccine Ingredients.)
- Some diseases are more serious for infants than older children.
- Adjusting the schedule may lead to more visits to your doctor or nurse and repeated discomfort for your child.

Next Steps:

- Educate yourself about the diseases. (See Chapter 6: Compare the Risks.)
- Protect your unimmunized baby by encouraging everyone who spends time with your baby (including you) to be immunized.
- Continue to discuss your decision with your doctor or nurse at each visit.

## 10. Adolescent Health Visit

As kids get older, protection from some of their childhood vaccines can begin to wear off. Older kids and young adults are also at higher risk for other serious, but preventable, diseases, such as meningococcal disease and pertussis (whooping cough). When teens aren't protected from diseases that vaccines prevent, they are more likely to spread these infections to vulnerable people, like infants and the elderly.

In order to protect teens and young adults from serious yet entirely preventable diseases, the Advisory Committee on Immunization Practices, American Academy of Pediatrics, and American Academy of Family Physicians all strongly recommend an adolescent health visit at 11 to 12 years of age. This doctor visit allows parents to discuss the recommended vaccines for this age group with their doctor or nurse and learn about the immunizations their teen needs. Parents: help prepare your pre-teen for a healthy adulthood by bringing them to their doctor, nurse, or clinic for an adolescent health visit, and protect them by making sure their immunizations are up to date. Other health and safety issues that are important during the teen years will also be discussed during this visit.

**QUESTION:** Which vaccines are recommended for my adolescent?

**ANSWER:** The Centers for Disease Control and Prevention recommends the following vaccines beginning at age 11 to 12:

- Tdap to protect against tetanus, diphtheria, and pertussis (whooping cough)
- MCV4 to protect against meningococcal disease
- HPV to protect against human papillomavirus (which can be given starting at age 9)
- Flu shot (yearly) to protect against influenza

Teens should get the following vaccinations if they did not receive all recommended doses when younger:

- Hepatitis A (HepA)
- Hepatitis B (HepB)
- Polio (IPV)
- Measles, mumps, and rubella (MMR)
- Chickenpox (varicella)

If your teen has any chronic medical conditions, he or she may need additional vaccines. Check with your healthcare provider.

Adolescent health visits build a lifelong commitment to good health. Every time your teen goes to the doctor, including for sports physicals, injuries, or illness, ask about immunizations. You will find it helpful to keep a written record of your child's vaccinations for future reference, as schools, camps, colleges, the military, and employers may ask about his or her immunization status. You can also set up an account at [wa.myr.net](http://wa.myr.net) to track your child's immunizations and print their Certificate of Immunization Status.

## 11. Adults Need Vaccines Too!

Vaccine-preventable diseases have no age limits. You can get them at any time in your life. Some diseases are more common in adults and may cause life-threatening health problems. Other diseases can be more severe for adults than for children. Each year in the U.S., about 50,000 adults die from diseases that could have been prevented by vaccines.<sup>47</sup> Protect yourself, and make sure you don't spread dangerous diseases, like whooping cough, flu, or chickenpox, to those you love.

**QUESTION:** What vaccines do I need?

**ANSWER:** All healthy adults should get immunized against tetanus, diphtheria, and pertussis (available as one shot, called Tdap) and influenza. A tetanus and diphtheria booster, called Td, is needed every 10 years. If you are not already immune to measles, mumps, rubella, and chickenpox, you may need those vaccines too.

Depending on your lifestyle, age, and medical conditions, you might need other vaccines like hepatitis A and B, pneumococcal, human papillomavirus, and shingles. Ask your healthcare provider about what immunizations are recommended if you:

- Are pregnant.
- Will travel out of the country.
- Are 26 or younger, or 60 or older.
- Have a condition that compromises your immune system, including HIV infection.
- Have asplenia (no spleen, or your spleen doesn't work due to illness or injury).
- Have a condition like heart disease, lung disease, liver disease, asthma, or diabetes.
- Are a man who has sex with men.
- Work in a healthcare setting.

To learn more about immunizations for adults, visit:

[www.doh.wa.gov/youandyourfamily/immunization/adult.aspx](http://www.doh.wa.gov/youandyourfamily/immunization/adult.aspx).

**QUESTION:** Where can I get vaccinated?

**ANSWER:** Your healthcare provider or your child's doctor may be able to give you the immunizations you need. Many pharmacies also give vaccinations to adults. Most health plans cover recommended immunizations for adults. Check with your insurance plan, doctor, or nurse. If you need help finding low-cost immunization clinics, call the Family Health Hotline at 1-800-322-2588 or visit [www.parenthelp123.org](http://www.parenthelp123.org) for more information.

## 12. Evaluating Immunization Information on the Internet

**QUESTION:** How do I know if the vaccine information I find on the Internet is accurate?

**ANSWER:** The Internet can be a valuable resource to find health information, but it is important to remember that anyone can put up a website and not necessarily have the credentials or the ability to interpret information correctly. Often, it is difficult to evaluate if a website is offering reliable information, just an opinion, or a common myth or misunderstanding. Another thing to consider is that medical information changes rapidly, so it is a good idea to check more than one place for anything you find.

The following tips can help you determine if the information you find is accurate and trustworthy:<sup>48</sup>

### 1. The ownership of the site should be clear.

Is the name of the organization or individual posting the information in clear view? Look for text that tells you more about the author of an article, website, or an "about" page that describes the organization or individual. On some sites, the name of the site's owner can be found by right-clicking and selecting "View page info" (Chrome and Firefox) or "Properties" (Internet Explorer).

### 2. The information provided should be based on sound scientific study.

Scientists discover truth by testing their findings repeatedly, to be sure that their thinking and methods are not flawed, biased, or a result of specific circumstances. Studies with hundreds of participants are more trustworthy than descriptions of what happened to a single person. The most useful studies compare what happened with one group of people to what happened with another group (also called a control group). A sign that you have come across sound scientific study is that the findings are endorsed by organizations or institutions dedicated to science, such as professional associations or universities.

### 3. The site should carefully weigh the evidence and acknowledge the limitations of the work.

What does the weight of the evidence indicate? There is power in numbers. If conclusion #1 is found in three studies, but conclusion #2 is found in 30 studies, which is more likely to point to the truth? The more studies there are showing a certain thing, especially studies that have used bigger groups of participants, the more likely that the conclusion is true. Be wary of people or sites proclaiming that they, and only they, have discovered the "hidden truth." Also, credible researchers are not afraid to address the weaknesses as well as the strengths of their findings. In fact, other scientists expect them to share their thoughts on the weaknesses, to say whether their findings were inconclusive, or that additional research is needed before any conclusions can be drawn. A scientifically sound website will reflect this.

### 4. Beware of "junk science" and suggestions of "conspiracies."

While the scientific approach takes time, and often answers are slow in coming or don't come at all, the hallmarks of junk science are hasty, sometimes sensational claims that other scientists have not seen, reviewed, or verified. "Conspiracy" theories offer a quick and exciting answer to a puzzle, and media attention does not necessarily mean a claim is true. Often the pieces of "evidence" the author is describing do not really fit together.

**5. The individuals or group providing the information should be qualified to address the subject matter.**

Beware of information attributed to unnamed “noted researchers” or “world-renowned scientists.” A researcher who has done good, solid work would insist that his or her name be attached to it, even if it’s controversial. Ask yourself: Who stands behind the information? What educational background do they have that relates to the health topic area? What other work have they published, and where was it published?

**6. Arguments should be based on facts, not speculation.**

Beware of sites that mix fact with fantasy without distinguishing between the two. As with junk science, the resulting descriptions, scenarios, or “theories” can be sensational, but are not scientifically sound.

**7. The motives of the site should be clear.**

Is the site trying to sell you something and promote a product? There is nothing wrong with selling books and CDs, or enlisting you in a cause, but the author’s motives should be clear.

**8. The information provided should make sense.**

Is it too good to be true (“Lose 50 pounds in two days!”)? Or too awful to be true (“Thousands abducted by UFOs!”)? If so, then it probably is not true.

**9. You should find references from and to recognized peer-reviewed publications.**

One sign of a scientifically sound study, paper, article, or site is that it has been reviewed by peers. This means that experts in the same field have evaluated and critiqued it before it gets published. Peer review ensures a high standard of quality, accuracy, and academic integrity. Following a peer review, an author typically revises the work to make corrections and include peer suggestions that will make the article better, like correcting mistakes, including overlooked ideas, and addressing other concerns. If the author cannot or will not take the peer reviewers’ advice, the article may be rejected (not published) due to poor quality. Examples of poor quality include nonscientific experiments, faulty logic, omitted facts, bias, and incomplete conclusions.

**10. You should be able to get additional information if you need it.**

Is an email address, postal address, or telephone number provided so you can contact someone for further information? Is a reading list or sources for the article list provided? Is the reading available through a public library or is the list a source of income for the site owner?

If government documents or publications are referenced, remember that they are usually available free or at low cost through the publishing agency or the U.S. Government Bookstore in Washington, D.C. For the latter, visit [bookstore.gpo.gov](http://bookstore.gpo.gov), call toll-free at 1-866-512-1800 or email [contactcenter@gpo.gov](mailto:contactcenter@gpo.gov).

**QUESTION: Is there any regulation or standardization of information on the Internet?**

**ANSWER: No.** There is no regulation of information on the Internet. The following resources can provide some guidelines to consider when looking at health-related information on the Internet:

**Trust or Trash**

This nonprofit website offers simple guidelines to help you decide to “trust or trash” health information online. Visit [www.trustortrash.org](http://www.trustortrash.org).



**The Federal Trade Commission (FTC)**

This federal agency monitors the Internet for fraud, deception, and unproven claims; it can act against a company if it sees a pattern of law violations. If you come across a website that promotes fraudulent products, you can report the site at [www.ftccomplaintassistant.gov](http://www.ftccomplaintassistant.gov).

**The World Health Organization (WHO)**

The WHO has established guidelines for websites providing information about vaccine safety. It features a list of criteria that websites should meet to be trustworthy. Visit [www.who.int/vaccine\\_safety/good\\_vs\\_sites/en/](http://www.who.int/vaccine_safety/good_vs_sites/en/).

**Healthfinder**

This site is the federal government's gateway for reliable information from U.S. government agencies and other organizations. It displays selected resources of consumer health and human services information which have been reviewed and found reliable and credible. Visit [www.healthfinder.gov](http://www.healthfinder.gov).

## 13. Personal Stories

### One Family's Experience with Whooping Cough

By Heidi Bruch

On July 4, 2010, only days before I gave birth to our beautiful, healthy daughter, Caroline, I came down with a dry, annoying cough. By the time I got home from the hospital, my cough was worse. When I finally woke my husband out of a deep sleep gasping for air, he begged me to go to the doctor, who determined that I had a mild case of asthma.

When Caroline was around two weeks old, she started having a dry cough too, especially following feedings. At her two-week checkup, I mentioned her coughing and gagging, and her face turning purple as if she were choking. The doctor said that it was most likely reflux, which is very common in babies.

On August 1, I was feeding Caroline when she started to cough and turn blue around the mouth. Thankfully, my sister-in-law, a nurse, was there. She took one look at my baby and told me that we needed to take her to the ER.

Caroline tested positive for pertussis, commonly known as whooping cough. The doctors immediately asked if anyone around her had been coughing. My heart sank. I was the one with the cough. It turned out that I had pertussis, not asthma, and I had passed it on to Caroline.

We were quarantined on the medical floor, where Caroline's heart and oxygen levels were monitored 24/7. When a baby with pertussis coughs, the cough starts off silent, which is a result of not being able to get oxygen. Caroline turned blue and her heart rate dropped to extremely low levels. It looked as if she was choking to death, and in reality, she was. The classic "whoop" sound came when she finally caught that little breath and gasped in. I found myself at her bedside with every cough, whispering, "Please take a breath. Please take a breath, Caroline."

After the worst was over, we were told that Caroline's case was considered mild. That sounded crazy to me. Watching her heart rate plummet and watching her turn blue was beyond terrifying. We were told that many babies with pertussis need to have a tube put into their throats (be intubated) or put on a machine that bypasses the lungs and heart altogether.

Caroline was discharged on August 24, nearly a month after being admitted and she had a cough for over one hundred days. We feel blessed that our story has a positive outcome, but watching Caroline fight for her life was something I will never forget, and it has changed our lives forever. I had no idea that I needed a pertussis booster as an adult. I want all parents to learn from our experience. Get vaccinated with Tdap to protect your baby!

### A Father Speaks Up About Influenza

On Valentine's Day 2007, my oldest daughter suddenly and unexpectedly passed away at the age of eight. She had been suffering from influenza for a few days before her death, but the cause of her death was a complication known as viral myocarditis (inflammation of the heart). It was triggered by the influenza virus and infected the tissue of her heart, causing it to fail. Viral myocarditis is very difficult for even experienced health professionals to diagnose. In many cases, the symptoms are simply masked by symptoms more commonly associated with the flu. By the time we began to suspect that our daughter was suffering from something other than just ordinary flu, it was far too late.

The influenza strain responsible for the infection was apparently a particularly virulent strain that had rampaged through the community in the previous days and weeks. The week prior to her death, a local high school canceled classes for two days due to one-third of the student body being out sick with influenza. The week of my daughter's death, over 50 percent of her second grade class was absent from school with the flu. Then days before her death, another local girl had died from influenza-related viral myocarditis.

The influenza complication responsible for my daughter's death is still relatively rare. However, please remember that the influenza vaccine not only prevents illness, but it also prevents complications which result in death.

## Stand Together to Protect Us All: Jaxon's Story

by Paula Abalahin, Port Orchard

My son Jaxon got measles when he was 7 months old, too young to get immunized. He got better, but five years later he started having seizures. He lost the ability to swallow, speak, and walk. After suffering greatly, Jaxon died a few years later. His condition [SSPE] was caused by the measles virus.

We learned that, even though there is an effective vaccine, measles is still a leading cause of death among young children worldwide. And in our community, parents are not fully immunizing their children, which puts them at risk to get and spread measles and other terrible diseases. I hope my story can help prevent another child from experiencing what my son went through.

Meet Paula's family and see pictures of Jaxon at [www.jaxonscure.org](http://www.jaxonscure.org).

## Fear of Needles: A Very Real Thing

by Wendy Sue Swanson, MD, MBE, FAAP\*

Vaccine hesitancy comes in all flavors. It's not always concerns about safety that cause children, teens, and parents to hesitate or even refuse vaccines (shots, in particular). Sometimes it's about pain. Or simply discomfort. Or anxiety. It's perfectly natural, of course, to have a fear of needles. Sometimes this fear can manifest itself as a sincere phobia. In those cases, the fear is so overwhelming that it changes family decision-making around vaccinations and leaves kids unprotected.

Recently in my clinic I took care of a high school student soon after she'd had a terrible experience with influenza (the "flu") and it's changed how I care for my patients. She had asthma and her doctor had recommended a flu shot. Even though doctors recommend flu shots for all kids between 6 months of age and 18 years, we work very hard to get high-risk patients protected. Children and teens with asthma are more likely to have a severe pneumonia with, or after getting, the flu. We worry more about their infections because it can land them in the hospital and/or cause a life-threatening illness.

When I saw the girl in clinic she was exhausted and stressed, confused and scared. Because of the flu, she had missed 2 weeks of school and lost over 15 pounds. She was still coughing a few weeks later. I looked back to the chart note visit before her infection and saw that she had declined the shot. When I asked her why, she stated that she was terrified of needles. Because of her asthma, she couldn't get the nasal FluMist (wheezing is a contraindication) so the shot was her only option. Had you told the doctor your reason for staying NO? "Yup," she said. But no plan of action was made to support her.

So here's the thing, we know that fear and anxiety about injections worsens when a parent is scared, too. When I asked her mom if she was scared she nodded. But after the experience of the illness, both were very motivated to figure out how to get the shot next year.

\* See this article in full and other helpful articles on Dr. Swanson's blog at [seattlemamadoc.seattlechildrens.org](http://seattlemamadoc.seattlechildrens.org).

## Tips to Support Your Child When Fear of Needles Arises

- Don't make promises for "no shots" any time going to the clinic. You never know what plan will be recommended and what shots you've missed. If you make and break that promise, trust is broken. Don't joke about the doctor or nurse giving a shot as punishment either. NO SINGLE shot is ever given to make a child uncomfortable. Don't create that myth as it sets your child up to believe the doctor may harm them.
- Fear of needles is real. Validate your children when they state they are terrified. And then talk directly with the healthcare provider about ways to support your children during the shots.
- Consider using an anti-anxiety medication (something like Ativan, Valium, or Xanax) when true needle phobia is present.
- Consider using a numbing cream (something like EMLA) prior to the vaccination. You'll need a prescription from your provider to do so but often the cream provides a bit of comfort, a sense of control, and boosts confidence for anxious or fearful children/teens.
- Consider deep breathing and other behavioral modifications including distraction at the time of injections to support your child. Consider seeing a behavioral health clinician as well.
- Consider the "cough trick," asking the child to cough while the shot is given. I offer the cough trick to all of my patients and teens nervous about shots. Studies (and reports from my patients) confirm it works brilliantly!

## 14. Glossary

### Vaccines

DTaP:	Diphtheria, tetanus, and acellular pertussis (whooping cough)
DTP/DPT:	Diphtheria, tetanus, and whole cell pertussis (whooping cough)
Flu:	Influenza
HepA:	Hepatitis A
HepB:	Hepatitis B
Hib:	<i>Haemophilus influenzae</i> type b
HPV:	Human papillomavirus
IIV:	Inactivated influenza vaccine
IPV:	Inactivated polio vaccine
LAIV:	Live, attenuated influenza vaccine
MMR:	Measles, mumps, and rubella
MCV:	Meningococcal conjugate vaccine
MPSV:	Meningococcal polysaccharide vaccine
OPV:	Oral polio vaccine
PCV:	Pneumococcal conjugate vaccine
PPSV:	Pneumococcal polysaccharide vaccine
RV:	Rotavirus
Td:	Tetanus, diphtheria
Tdap:	Tetanus, diphtheria, and acellular pertussis
Var:	Varicella (chickenpox)

### Terms

COE:	Certificate of Exemption
CIS:	Certificate of Immunization Status
CRS:	Congenital Rubella Syndrome
GBS:	Guillain-Barré Syndrome
MS:	Multiple Sclerosis
SIDS:	Sudden Infant Death Syndrome
VAERS:	Vaccine Adverse Event Reporting System
VAPP:	Vaccine Associated Paralytic Polio
VIS:	Vaccine Information Statement
VSD:	Vaccine Safety Datalink Project

### Organizations

AAFP:	American Academy of Family Physicians
AAP:	American Academy of Pediatrics
ACIP:	Advisory Committee on Immunization Practices
CDC:	Centers for Disease Control and Prevention
FDA:	Food and Drug Administration
FTC:	Federal Trade Commission
IOM:	Institute of Medicine
VICP:	National Vaccine Injury Compensation Program
WHO:	World Health Organization

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## 16. Resources

### Washington State Resources

#### **Washington State Department of Health**

Office of Immunization and Child Profile  
[www.doh.wa.gov/immunization](http://www.doh.wa.gov/immunization)  
360-236-3595 or 1-866-397-0337

#### **Child Profile Health Promotion System**

Washington state's health promotion system mails information to parents of children birth to six years old  
[www.childprofile.org](http://www.childprofile.org)

#### **Washington State Immunization Information System**

Washington state's lifetime immunization registry  
For providers: [www.waiis.wa.gov](http://www.waiis.wa.gov)

#### **My Immunization Registry**

Parents and individuals can see their family's immunization records and due dates at home or on mobile using a simple website.  
[wa.myir.net](http://wa.myir.net)

#### **Local Public Health Agencies**

[www.doh.wa.gov/AboutUs/PublicHealthSystem/LocalHealthJurisdictions](http://www.doh.wa.gov/AboutUs/PublicHealthSystem/LocalHealthJurisdictions)

#### **WithinReach**

Family Health Hotline 1-800-322-2588 (services available in many languages)  
[www.withinreachwa.org](http://www.withinreachwa.org)  
[www.parenthelp123.org](http://www.parenthelp123.org)

#### **Immunity Community of Washington**

Tools for parents and others who want to share that vaccination is a safe and healthy choice for their community.  
[www.immunitycommunitywa.org](http://www.immunitycommunitywa.org)

### National Resources

#### **American Academy of Pediatrics**

[www.aap.org/immunization](http://www.aap.org/immunization)

#### **Allied Vaccine Group**

Dedicated to presenting valid scientific information about vaccines  
[www.vaccine.org](http://www.vaccine.org)

#### **PATH Vaccine Resource Library**

Easy access to global immunization resources  
[www.path.org/vaccineresources](http://www.path.org/vaccineresources)

**Children's Hospital of Philadelphia Vaccine Education Center**

<http://vaccines.chop.edu>

**Food and Drug Administration (FDA)**

Vaccine safety and regulations

[www.fda.gov/BiologicsBloodVaccines/Vaccines](http://www.fda.gov/BiologicsBloodVaccines/Vaccines)

**Immunization Action Coalition**

[www.immunize.org](http://www.immunize.org)

**Institute for Vaccine Safety at Johns Hopkins**

[www.vaccinesafety.edu](http://www.vaccinesafety.edu)

**U.S. Centers for Disease Control and Prevention  
National Immunization Program**

[www.cdc.gov/vaccines](http://www.cdc.gov/vaccines)

Hotlines, English and Spanish:

1-800-232-4636, TTY: 1-888-232-6348

**U.S. Department of Health and Human Services**

[www.vaccines.gov](http://www.vaccines.gov)

**Have a child under six? Are you getting Child Profile in the mail from the Department of Health?**

The Child Profile Health Promotion System sends health and safety information at no cost to all families with young children in Washington by mail and e-mail. Each mailing has age-specific reminders about well-child checkups and immunizations. They also give up-to-date information on growth and development, nutrition, safety, and many other health topics.

If you aren't receiving the mailings or recently moved to the state, and you have a child under 6 years old, sign up for the Child Profile mailings at [www.childprofile.org](http://www.childprofile.org). You can also get health and safety tips on Facebook by following Child Profile at @WatchMeGrowWA.



# Get your questions answered!



## Find out about:

- Diseases that vaccines prevent
- How vaccines work
- The risk of disease compared to risk of the vaccine
- Immunizations for children, teens, and adults



Check with your doctor, nurse, or clinic if you have more questions about immunizations.

All recommended vaccines are offered at no cost for children up to age 19 in Washington state. If you need help finding an immunization clinic, contact the Family Health Hotline:

- 1-800-322-2588 (voice)
- 711 (TTY relay)
- [www.parenthelp123.org](http://www.parenthelp123.org)

To track and print your family's immunization records at home, register at [wa.MyIR.net](http://wa.MyIR.net).



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