Vaccines work!

CDC statistics demonstrate dramatic declines in vaccine-preventable diseases when compared with the pre-vaccine era

DISEASE	PRE-VACCINE ERA ESTIMATED ANNUAL MORBIDITY[1]	MOST RECENT REPORTS OR ESTIMATES OF U.S. CASES	PERCENT DECREASE
Diphtheria	21,053	1[2]	>99%
H. influenzae (invasive, <5 years of age)	20,000	40[2,3]	>99%
Hepatitis A	117,333	3,473[4]	98%
Hepatitis B (acute)	66,232	19,764[4]	70%
Measles	530,217	667[2]	>99%
Meningococcal disease	2,886[5]	433[2]	85%
Mumps	162,344	1,223[2]	>99%
Pertussis	200,752	32,971[2]	84%
Pneumococcal disease (invasive, <5 years of age)	16,069	1,900[6]	88%
Polio (paralytic)	16,316	0[2]	100%
Rotavirus (hospitalizations, <3 years of age)	62,500[7]	12,500[8]	80%
Rubella	47,745	6[2]	>99%
Congenital Rubella Syndrome	152	1[2]	99%
Smallpox	29,005	0[2]	100%
Tetanus	580	25[2]	96%
Varicella	4,085,120	151,149[9]	96%

1. CDC. *JAMA* November 14, 2007; 298(18):2155–63.
2. CDC. *MMWR* September 18, 2015; 64(36):1019–33.
3. An additional 11 cases of Hib are estimated to have occurred among the 204 reports of Hib (<5 years) with unknown serotype.
4. CDC. Viral Hepatitis Surveillance – United States, 2013.
5. CDC. *MMWR* October 6, 1995; 43(53):1–98.
6. CDC. Active Bacterial Core Surveillance, 2013 data (unpublished).
7. CDC. *MMWR*, February 6, 2009; 58(RR-2):1–25.
8. CDC. New Vaccine Surveillance Network, 2013 data (unpublished); U.S. rotavirus disease now has a biennial pattern.
9. CDC. Varicella Program, 2014 data (unpublished). Calculation based on the percent decline from 4 states that have continuously reported varicella cases to CDC.

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www.immunize.org/catg.d/p4037.pdf • Item #P4037 (1/16)

Clear Answers and Smart Advice About Your Baby's Shots

By Ari Brown, MD, FAAP

Dr. Brown received her medical degree from Baylor College of Medicine in Houston, Texas; she did her pediatric residency at Harvard Medical School/Boston Children's Hospital. In private practice since 1995, Dr. Brown is perhaps best known as the coauthor of the 411 parenting book series – ***Expecting 411: Clear Answers and Smart Advice for Your Pregnancy***, ***Baby 411***, and ***Toddler 411*** (Windsor Peak Press).

In response to the recent media attention given to vaccines, autism, and other controversies concerning vaccines, the Immunization Action Coalition (IAC) offers this **special excerpt from *Baby 411*** that answers these questions and more. IAC thanks Dr. Brown for this clearly written information, but mostly we are grateful for her continued advocacy for safe and effective vaccines.

It's time to jump right into a hot topic you'll find in parent circles – vaccines. Nothing seems to stir the blood these days more than a good ol' fashion debate on vaccinating your child. And after the 2015 measles outbreak at Disneyland, the silent majority of parents who believe in vaccinations are far from silent.

A head's up: since there is so much misinformation out there on vaccines, you need to be armed with detailed, accurate information. And like the rest of this book, that is what you will get in this chapter. The information we provide is based on scientific evidence and solid peer-reviewed research. Remember our mantra: show us the science! Your child is too precious to make such important decisions on anything less. This chapter is not based on personal anecdotes, conspiracy theories, "research" done in people's basements (we are not kidding), or the crusades of B-list celebrities.

However, before we get to our take on this debate, let's go back in time a bit. Well, more than a bit. How did the human race survive when other early humans didn't? Yes, making tools and finding food most efficiently played a big role. But here's another key element: we built civilizations. And we developed a sense of responsibility – to ourselves and to our society. Every time we respond to a tragedy in our nation – whether it be 9/11, Hurricane Sandy, or the Boston Marathon bombing – we are reminded of how we are not just individuals living in our own little worlds. It's part of our civic duty to lend a hand and take care of our neighbors.

So, what's this pontificating have to do with vaccines? Again, it is our responsibility to work together as a community…this time, the subject isn't terrorism or storms, but something that can be just as terrifying: infectious diseases. Consider a bit of history: in the 1890s, people would have seven or eight children in their families and only half of them would survive childhood. Just go to an old graveyard sometime and look at the ages listed on the headstones. Many of the diseases that killed those children are now prevented by vaccination. It's a fact: vaccinations have increased the life expectancy of our nation's children. That's why our grandparents and parents embraced vaccines.

Here's a crucial point: the key to a vaccine's success is that everyone in the community gets vaccinated. Vaccines won't work if a large number of folks just choose to opt out of the system and their responsibility. Please keep this in mind as you read about vaccinations. Your decision (and every other parent's decision) affects your child. And society as a whole. Germs are rather simple creatures…they just look for a new person to infect. They don't play politics.

REALITY CHECK

The concept of "public health" has been around since antiquity. Obviously, rulers had a vested interest in keeping their subjects healthy so they had a society to rule. Through the years, governments have been responsible for managing numerous programs. The most important advances in public health have been vaccination programs, water purification, and waste disposal/sanitation systems. The only way for public health to work, though, is for all members of the community to follow the same rules.

Q Who came up with the idea of vaccinations in the first place?

It took centuries of observation as well as trial and error. (And sometimes, error meant death.) The first real step was describing the disease, in this case, smallpox. Smallpox was a deadly disease that, historically, wiped out entire civilizations. The earliest descriptions can be found as far back as the ninth and tenth centuries among Turks. In fact, "inoculation," or the infecting of a person with the disease in hopes of introducing a mild form and then creating immunity, was practiced first in Asia. In the 1700s an English aristocrat, Lady Mary Wortly Montagu, was living in Constantinople and learned of the practice of inoculation (known then as variolation). She had her son inoculated and subsequently, brought the practice back to England.

At about the same time, an English country doctor, Edward Jenner, made an interesting connection: milkmaids who had been exposed to cowpox (a common disease in cattle at the time) never seemed to get smallpox infections during epidemics. He began to study the idea that vaccinating humans with cowpox virus would make them immune to smallpox. In 1798 he published a paper on his idea and called it "Vaccination." Not to say, by the way, that Dr. Jenner's idea was accepted with completely open arms. In the nineteenth century there did emerge a group opposed to vaccination led by Mary C. Hume. See, even the anti-vaccination lobby has been around a long time! Of course, in those days, you could be prosecuted for refusing to vaccinate.[1]

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People were inoculated with a small amount of cowpox virus on their arm. It caused a localized infection at that site (hence, the scar that we forty-somethings and above bear). And true to Dr. Jenner's hypothesis, it provided protection against smallpox disease. In 1972, the United States stopped vaccinating against smallpox because it was no longer a threat to the population. In 1977, the last case of smallpox occurred in Somalia. In 1980, the World Health Organization declared the world free of smallpox, thanks to a global effort to immunize all children.

The success of the smallpox vaccine and other scientific discoveries led to the evolution of many vaccines. These new, safer vaccines are extremely effective in preventing diseases and epidemics that our grandparents and parents can still remember.

Q Why do you care whether I vaccinate my child or not?

For starters, I want your baby to be protected. But I also want you to realize that the decision to vaccinate your child impacts the health of other children in the community. Choosing NOT to vaccinate your child is choosing to put your child AND your community's children at risk. As a parent, you want to make the right choices for your child to protect them. I want you to ask questions. I want you to be informed. And I want you to get your child vaccinated. YOUR decision impacts ALL children. Why? There are two critical points for vaccination to work:

1. You need to be vaccinated.
2. Your neighbor needs to be vaccinated.

This concept is called herd immunity. And yes, you are a member of a herd. When 90–95% of "the herd" is protected, it is nearly impossible for a germ to cause an epidemic. Think of germs as rain. Vaccination is a raincoat. Even with a raincoat on, you can still get wet. You need an umbrella, too. The umbrella is "herd immunity." Those who don't vaccinate expect someone to share their umbrella when it rains. But society can only buy umbrellas TOGETHER. And raincoats aren't made for newborns – they need umbrellas!

As comedian Jon Stewart once put it, herd immunity is like a zombie movie. You are in an isolated farmhouse and the occupants rely on each other to board up their windows to keep the zombies (germs) out. The zombies get in when some lady from Marin County decides not to board up her windows because she read an article on a wellness blog about the potential health risks of boarding up windows. You can guess what happens!

Some parenting decisions have little or no impact on the community at large. Deciding whether or not your child eats organic baby food, goes to preschool, or sleeps in a family bed is entirely up to you – your decision only affects your child.

However, your decision whether or not to vaccinate your child affects all our kids. If you are a parent who is considering delaying or skipping vaccinations altogether, please realize the impact of your decision.

If more than 10% of American parents choose to "opt out" of vaccines, there's no question that our entire country will see these horrible diseases of bygone days return. Fortunately, very few parents decide to do this.

What is most concerning today is that there are pockets of under-vaccinated children. Birds of a feather flock together. Like-minded parents who don't vaccinate their kids tend to live in the same community and send their kids to the same schools. With lower immunization rates, there is no herd immunity. We have these "Ground Zero" areas to thank for recent measles and whooping cough outbreaks.[2]

REALITY CHECK

The Good News – While parents are asking more questions, they are still choosing to vaccinate their kids. The most recent Centers for Disease Control and Prevention (CDC) survey (2013) showed 99.3% of U.S. children aged 19 to 35 months are being vaccinated. Yes, 99.3%. Despite all the media stories on vaccine "controversy," only a tiny fraction of parents – less than 1% – are choosing to forgo vaccinations.

Some Common Vaccine Questions

Q What are vaccines?

Vaccines are materials that are given to a person to protect them from disease (that is, provide immunity). The word vaccine is derived from "vaccinia" (cowpox virus), which was used to create the first vaccine in history (smallpox). Modern medicine has created many vaccines. Vaccines PREVENT viral and bacteria infections that used to cause serious illness and death.

Q How do vaccines work?

Here is your microbiology lesson for today. Your immune system is your body's defense against foreign invaders (viruses, bacteria, parasites). Vaccines prepare your body to recognize foreigners without getting infected. A vaccine revs up your immune system to make antibodies (smart bombs with memory) for the signature of a particular germ. So, if your body sees the real germ, voila! You already know how to fight it off. There are three types of vaccinations: inactivated, live attenuated, and inactivated bacterial toxins.

- Inactivated vaccines do not contain any living germs. An immune response forms against either a dead germ, part of the germ (recombinant DNA), or a protein or sugar marker that sits on the outer layer of the germ (its signature). Very cool. These vaccines are safe to give to immune-compromised people. The only down side is that several doses of the vaccine are needed to provide full, life-long protection against disease. Some of these types of vaccines include: influenza, hepatitis A & B, *Haemophilus influenzae* type B (Hib), pertussis (whooping cough), inactivated polio, pneumococcal.
- Live attenuated vaccines are weak forms of the germs that cause infection. An immune response occurs just as if your body had the infection. So one or two doses of vaccine gives you lifelong protection. These vaccines are not given to immune-compromised people because they can make them sick. Examples include: measles, mumps, and rubella, oral polio, smallpox, tuberculosis, varicella (chickenpox), rotavirus.
- Toxoids (inactivated bacterial toxins) are vaccines that create a defense against the toxin (poison) that a bacteria germ makes. Examples of toxoid vaccines include: diphtheria, tetanus.

Q What are the diseases we are protected against with vaccination?

Good question. You are probably unfamiliar with most of these diseases since we don't see them much anymore in the U.S. After you hear about the many successes we've had in eradicating disease with vaccination, thank your parents for immunizing you. As you read

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through the vaccination schedule, note that some diseases are viruses. Antibiotics kill bacteria only. Doctors have no medications to cure the viral infections. Doubt the effectiveness of vaccines? Just take a look at the sharp decline of illness and death rates from these diseases since 1950. Here is the link if you want to check it out: www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/E/reported-cases.pdf. Rather amazing, no? Diseases that used to kill thousands (if not hundreds of thousands) now only harm a handful of people – thanks to vaccines.

How are vaccines tested to make sure they're safe?

Vaccines are researched extensively for an average of 15 years before being approved for use. A pharmaceutical company conducts medical research trials in a series of stages. Once safety is proven, the vaccine is tested in several thousand volunteers to make sure the vaccine actually works. These volunteers are followed for at least one year to be sure that no serious side effects occur.

Nothing in this world is 100% foolproof, including vaccine science. But the research trials that occur before licensing are very rigid. If you think there are a lot of vaccines on the market, imagine how many didn't make it through the research phase of development.

The Food and Drug Administration (FDA) governs this whole process. The FDA is the watchdog for any medication that is sold over-the-counter or by prescription. There are extremely high standards that must be met before any product is allowed for human use.

After a vaccine is approved for use, long-term follow-up studies are done to assess for side effects, adverse reactions, and potency over a lifetime.

REALITY CHECK

Given the FDA's mixed track record, you may be skeptical about trusting the government when it comes to vaccine safety. But in truth, the system is in place to protect consumers. Although conspiracy theorists might disagree, the FDA really is on our side.

To improve drug and vaccine safety, the Institute of Medicine has called for an overhaul of how the FDA works – in the future, the FDA will do more ongoing safety reviews of medicines and make all clinical study results public. This should help boost public confidence in the FDA and vaccine safety.

Why is my child getting more shots than I did?

Simple answer: we've been successful inventing vaccines to fight more diseases. It's one of the important advances in modern medicine – vaccines prevent disease, injury, and death. More vaccines are a good thing!

An important point: many of the vaccine-preventable diseases are viruses. These viral infections cannot be treated with medicine once an infection occurs (for example, Hepatitis B).

Vaccines that protect against bacterial diseases are often serious ones, and resistant to many antibiotics (for example, Prevnar).

And even though the number of shots has gone up, the total load on the immune system has gone down. Today's vaccines are smarter and better engineered than the shots from a few decades ago. In fact, the total number of immunologic agents in the entire childhood vaccination series today is less than what was in just two vaccines in 1980!

Our children are getting smarter, safer vaccines today and better protection than we ever got as kids.

Are we giving too many shots, too soon?

This is a false mantra of the anti-vaccine crowd: they say babies are receiving too many shots (compared to say, 1980) and too soon (infants can't handle all these shots, they say).

So, let's look at this scientifically. On any given day, your baby is exposed to literally thousands of germs (it doesn't matter how spotless your house is). Exposing your child to five to eight different germs in the form of vaccines is a spit in the bucket.

Young children have better immune responses to vaccines than adults and older children. So they will form adequate immune responses to various vaccines simultaneously. (This is studied extensively before a vaccine is licensed.) Even if your baby got 11 shots at the same time, he would only need to use about 0.1% of his immune system to respond to them.[3]

Giving several vaccines at once does not damage, weaken, or overload the immune system. Vaccines boost the immune system. Also, the diseases that the vaccines protect against are the most severe in infants and young children. Your doctor wants to get those vaccinations in as safely and effectively as possible. That's why the timing is so important (and why a staggered or delayed vaccination schedule is a bad idea – more on that in the controversies section of this handout).

Can't you just give one big shot that has all the vaccines in it?

Medical science is working on it!

There have been a few combination vaccines licensed for use. The largest combination vaccines are Pediarix (DTaP, IPV, Hepatitis B) and Pentacel (DTaP, IPV, Hib). The reason there isn't just one big shot is that some vaccines are ineffective when they are sitting together in a solution. Your baby may still need more than one shot, but if your doctor uses a combo vaccine, at least it will be fewer shots than if they are all administered separately.

More combination vaccines are on the horizon.

What groups make decisions about vaccinations for children?

There are four governing panels of experts in infectious diseases that make recommendations for vaccinations. These smart folks include: American Academy of Pediatrics (AAP), American Academy of Family Physicians (AAFP), Advisory Committee on Immunization Practices (ACIP), and the Centers for Disease Control and Prevention (CDC). Because there are several groups involved in this effort, there is some variability in vaccination schedule recommendations.

My baby has a cold. Should I hold off on vaccinations?

No! This is a common misconception of parents. Even if your baby has a minor illness, he can still get his shots. We cannot stress how important it is to get your child vaccinated in a timely manner. So don't let a sniffle or two make you reschedule an office visit for shots. Your child can also get his shots even if he is on antibiotics.

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Can I choose not to vaccinate my child?

Yes, but we wouldn't advise it. Choosing not to vaccinate is not a risk-free choice. It's choosing to expose your child to potentially serious infection. It's also choosing to expose other children in your community to serious, preventable diseases. And if you think your child will be safe because everyone else vaccinates his or her kids, you'd be wrong (and very selfish, we might add). You can also choose not to stop at a stop sign, but we wouldn't advise it!

REALITY CHECK

Vaccine requirements for school entry vary by state. There is no one consistent policy. All 50 states allow vaccine exemptions for medical reasons, 47 states allow exemptions for religious reasons, and about 21 states allow exemptions for philosophical reasons.[4] After the 2015 measles outbreak, several state legislatures are reconsidering their existing laws for vaccine exemptions. Limiting the exemptions improves vaccination rates and thus protects more children.

I've heard that getting a disease provides immunity forever and vaccinations might not provide lifelong protection. Wouldn't it be better to get the disease? Isn't that a more "natural" way of creating immunity?

No. The diseases we prevent by vaccination are not minor illnesses (this includes chickenpox). For instance, would you rather have your child get meningitis and die or get the vaccine? Getting chickenpox or any other disease the "natural way" is a much greater health risk without any significant benefit. And just think of the discomfort, pain and perhaps serious injury that come with getting any of these diseases.

It is true that some vaccinations require a booster dose to keep antibody levels high. That is why we need a tetanus booster every ten years.

What would happen if we stopped using vaccinations?

That's an easy one. The diseases would come back.

Vaccinations keep us from getting sick from these infections. But all of the infections we protect against are alive and well in our world. As of today, the only disease we have completely eliminated is smallpox. And when it was eliminated, we stopped vaccinating for it.

Anyway, it's a simple fact: when immunization rates drop, epidemics occur. Just look at states with lower immunization rates – their rates of pertussis (whooping cough) are twice the number seen in states with higher percentages of immunization rates. Children whose parents opt out of vaccines face a 23x greater risk of getting whooping cough.[5] In the 2015 measles outbreak, most cases occurred in communities with measles immunization rates below 80%.

REALITY CHECK

In 1990, low immunization rates led to a measles epidemic of 55,000 cases and over 100 preventable deaths in the U.S. The U.S. saw a measles epidemic again in 2008 – over 90% of these cases were unvaccinated children, two-thirds of which were by parental choice. But a few of the cases were infants who were too young to be vaccinated (and exposed to an infected child in the doctor's waiting room). You would think we would have learned our lesson, but 2015 was another banner year for measles. This serves as a reminder that vaccine-preventable diseases have not disappeared.

What are the typical side effects of vaccination?

Fever, fussiness, redness, or lump at the site of the injection.

Inactivated vaccines cause an immediate immune response. The body mounts a response to the foreign invader as if it were being infected. The result, typically, is a fever within 24 hours of vaccination. Babies sometimes feel like they are coming down with a cold or flu (body aches, pains). Some babies prefer to sleep through the experience; some choose to tell you how they feel (fussiness, crying). All of these symptoms resolve within 24 to 48 hours of vaccination.

Live attenuated vaccines (MMR, Varicella) cause a delayed immune response. This occurs one to four weeks after the vaccination is given. Long after the doctor's visit, your child may wake up one morning and have a fever.

This may be accompanied by a rash that looks like measles (pimples) or chickenpox (clear, fluid-filled pimples). The rash can sometimes be dramatic. Both the fever and the rash tell you that your baby is forming an immune response to the vaccination. Babies are not contagious and aren't too bothered by the rash. You don't need to call your doctor. This reaction is expected.

Redness at the injection site is common. In particular, the fifth booster dose of the DTaP (at age five years) can cause a pretty dramatic area of redness. No worries. We do get quite a few phone calls about it, though!

A firm lump may develop at the injection site if some of the fat in the arm/leg gets nicked as the needle goes into the muscle. This is called fat necrosis. It usually goes away within six to eight weeks. It doesn't hurt.

Red flag! If your baby has a fever more than 72 hours after being vaccinated, it's not from the vaccination. You need to call your doctor. The only exceptions are the MMR and chickenpox vaccines, which typically cause a fever one to four weeks afterwards.

REALITY CHECK

To help reduce fever and discomfort from shots, it's okay to give your baby acetaminophen (Tylenol) as long as you wait at least four hours after vaccinations are given. The dose is not listed on the package. It says to "consult a doctor." That's because doctors don't want you giving this medicine to a baby three months or younger with a fever without checking in first. Other than with shots, you need to call your doctor about fevers in this age group.

What are the worst reactions to vaccination?

These are called adverse reactions. This is the equivalent of an allergic reaction to a medication – and fortunately, they are all quite rare. With each generation of newer vaccinations, the risk of serious reactions is almost eliminated.

Adverse reactions include:
1. Death.
2. Anaphylactic reaction.
3. Encephalitis.
4. Fever-related seizure (convulsions).

Both the CDC and FDA keep close tabs on adverse reactions to vaccines via a Vaccine Adverse Event Reporting System (VAERS). Both doctors and patient families may submit a VAERS form if any adverse reaction occurs.

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Keep in mind that medical illness reports do not prove an association of a particular illness with a specific vaccination. The job of both the CDC and FDA is to review each report that occurs and see if there is a pattern of subsequent illness after vaccination. VAERS data is publicly available at vaers.hhs.gov. To report a possible reaction, you can download a form at the same site. There is also a Clinical Immunization Safety Assessment Project comprised of six U.S. academic medical centers that evaluates adverse reactions to vaccines.

While we would be remiss if we didn't tell you that vaccinations have some risks associated with them, we want you to remember that the risk of adverse reaction is significantly lower than leaving your baby unprotected.

In 1988, recognizing that there are rare, serious reactions that occur as a result of vaccinating children, the U.S. Department of Health and Human Services created the Vaccine Injury Compensation Program. This program attempts to determine whether adverse reactions from vaccines are responsible for injuries or death and then to provide the victim with compensation. Since 1988 there have been about 15,000 claimants. Considering there are four million babies born each year and most have been vaccinated, the odds of an injury are staggeringly tiny.

Another statistic to mull over: 1.9 billion doses of vaccine were given in the U.S. from 1991 to 2001. Only 2,281 cases of allergic reactions were reported.[6] (Compare that statistic to one in 50 adults who have a food allergy!)

We agree that an adverse reaction only has to happen to one child for it to be heartbreaking. But if we look at the big picture, we can point to the millions of children who might have experienced illness, chronic disability, and death if diseases like smallpox or polio were not controlled by vaccinations.

Q Are there any reasons I should not vaccinate my child?

There are several very specific medical reasons to discontinue or hold off on certain vaccinations. These include:

1. Patient or family member is immune-compromised.
2. Patient had disease (for example, if you've had chickenpox, you don't need the vaccine).
3. Patient has encephalitis or degenerative brain disorder.
4. Patient has allergy to vaccine or to an additive in the vaccine.

If your baby has a food allergy to eggs or gelatin, or an allergy to antibiotics (such as neomycin, streptomycin, polymyxin B), notify your doctor before any vaccinations are given. Several vaccines are grown in chick embryo cells and therefore contain a small amount of egg protein: flu vaccine, MMR, rabies, and yellow fever vaccine. The MMR vaccine also includes gelatin.

Rabies, MMR, chickenpox, and polio vaccines include several different kinds of antibiotics to prevent contamination of the vaccine itself. Check with your doctor if your child is allergic to any antibiotics.

While there is a scant amount of egg protein in the MMR vaccine, it is still safe to give to a person with an egg allergy in your pediatrician's office. And, although the flu vaccine contains trace amounts of egg protein, beginning with the 2016–17 vaccination season, it is recommended that patients with an egg allergy of any severity can safely be vaccinated with any influenza vaccine product.

Q Who keeps a record of my child's vaccinations?

You and your doctor. Your doctor keeps a record of vaccinations in your child's records. And some states have an immunization registry that also keeps records of vaccinations.

But ultimately, YOU need to have a copy of these in your personal medical record file. You will need proof of vaccinations for many things. Any childcare or school program requires this information. Summer camps and athletic programs want the records, too. If your child becomes a healthcare professional, joins the military, or is a food handler, he will also need this information.

▶ HELPFUL HINT

It's a good idea to have a medical passport for your child. This should include an immunization record, growth chart, list of medical problems, list of surgeries, drug allergies, and name and dosage of any medications that are used regularly (such as asthma medicine). Some medical practices now offer a patient portal that allows you to keep track of your own records. If so, we encourage you to take advantage of it!

Q How do I know when my child needs booster shots?

Your doctor will remind you at each well child visit. We wish pediatricians were more like dentists or veterinarians, who long ago figured out how to send out reminders of needed visits. Sadly, only a minority of pediatric practices have electronic reminder or recall systems. Most do not usually send out reminder cards to let you know your child is due for shots. What most practices do is provide the schedule in an information packet at your child's first visit. Your doctor will tell you at each well check when to return. This system works pretty well unless you start missing well-child visits. Then your child gets behind on his vaccination series. You can try to catch your child up on shots when he is in for a sick visit if this happens.

■ REALITY CHECK

Wanted: A National Immunization Registry – There is no uniform system of tracking immunization status and sending reminder cards to patients' families. One solution: a national immunization registry. Advocates of this plan feel it will improve our country's immunization rates. Those opposed to the plan think it invades personal privacy and creates a government health care tracking system. So, like most governmental decisions, it may take years to resolve.

Q What vaccines are required and which ones are optional?

The answer varies state to state. It also varies depending on the frequency of disease in particular counties within a state. We have provided a table of the most recent requirements in the U.S. on our website, Baby411.com (click on "Bonus Material").

Q Can I take my baby out before she gets her first set of shots?

Yes, just be smart about it. Pediatricians usually recommend limiting human contact with babies under four weeks of life. Why? Because if your newborn gets any fever (of 100.4 or greater), that is an automatic

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ticket to the hospital for two days. Even if your baby has the cold that the rest of the household has, we still need to rule out a serious infection.

That said, you aren't quarantined, but use discretion when planning your outings. In cold and flu season, avoid crowded places for the first three months of life.

With respect to an unvaccinated baby, the biggest threat these days is whooping cough. Whooping cough is spread by cough and sneeze droplets of an infected person. Babies get a series of four shots over the first two years of life to protect them from whooping cough. To keep everyone inside that long is crazy! But being cautious until she gets her first shot at two months isn't a bad idea.

I have a friend who does not vaccinate her child. Is it okay for our babies to play together?

Awkward, right? Well, the most politically correct thing to do would be cancel a playdate when either child is ill. This is not a foolproof solution, however. A person with measles, for instance, is contagious for three to four days before the rash erupts.

If you want to make a statement (and potentially lose the friendship), be honest and explain to her that you feel uncomfortable with your kids being together – it may give her pause to consider her choices.

Controversies

Let's face it, controversy drives TV ratings and web traffic. No one is interested in hearing about things that work as they should – and vaccines are a good example. Vaccines have been a hot topic for the last decade or so. Unfortunately, rare adverse events and theoretical concerns tend to make more headlines than the remarkable success story of vaccinations. These problems are then seized on by vaccine opponents and spread online through the web like a, well, virus.

So, let's address this head on. Here are the controversies you might hear about with vaccines:

I've heard that the MMR vaccine might cause autism. Is this true?

No. Parents also hear that vaccinations cause multiple sclerosis, diabetes, asthma, and SIDS. None of these are caused by vaccination. The government operates a safety monitoring system (VAERS, FDA, CDC) – watching for any possible adverse effects from vaccines. No one wants to increase autism rates.

One small case report of only eight patients in 1998 led a research group to feel that the combination MMR vaccine might cause autism.[7] But don't try to find the article online because the journal that published the article later retracted it when a former member of the research lab revealed that the data reported in the study was fabricated! Twelve years later, the lead author lost his license to practice medicine in England and was accused of fraud. The whole thing was a hoax.

Before this came to light, several reputable scientists tried to replicate the findings of this now discredited researcher. No one ever could – and now we know why!

Unfortunately, frightened parents chose to skip the MMR vaccine and measles epidemics occurred both in England and the U.S. as a result of these unfounded claims.

Bottom line: Don't base health decisions for your child on one research study or what the media reports! Talk to your child's doctor about any vaccine safety concerns.

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

One of the criteria used to make a diagnosis of autism is a language delay. Because children do not have significant expressive language under a year of age, doctors have to wait until 15 to 18 months to confirm a language delay and make the diagnosis. That's about the same time as the MMR vaccination, which leads some parents to wonder about autism and vaccination.

I've heard there is mercury preservative in the vaccines. Is this true?

Not anymore. It was removed from all required childhood vaccines by 2001. This deserves repeating: YOUR baby will not be getting required vaccines that contain mercury (thimerosal) as a preservative.

Despite the fact that vaccines have been mercury preservative-free for over a decade now, speculation persists about vaccines previously containing mercury and links to autism. This speculation continues even after the Institute of Medicine (IOM) published a conclusive report in 2004 negating any association between vaccines and autism.[8] (The IOM spent four years studying both the mercury question and the MMR combo vaccine question and published a series of eight reports on the subject.)

Bottom line: Thimerosal will remain on blogs and anti-vaccine websites forever, but the preservative does not remain in any of the required childhood vaccines that YOUR baby will get.

Because of ongoing concerns, the next two Q&As should provide you with more than you ever wanted to know about thimerosal.

I heard that I should still ask my doctor if the vaccines for my baby are thimerosal-free. What do you suggest?

We think you should ask as many questions as you need to feel comfortable. Remember that since 2001, the entire childhood vaccine series went thimerosal (mercury) preservative-free. If your doctor has a 2001 vintage vaccine vial sitting on the shelf (which would be long expired by now), I'd have bigger concerns about your doc than his vaccine supply.

Here is the specific rule regarding thimerosal use in vaccines: the FDA requires manufacturers of routine childhood immunizations to no longer use thimerosal as a preservative. This rule does NOT apply to flu vaccine because (technically) this vaccination is optional (except in New Jersey) and not "routine."

Why does flu vaccine need thimerosal or any other preservative? First, understand the flu vaccine is reformulated every year to reflect the anticipated flu strains. Since millions of doses of flu vaccine are needed every year, the most efficient way to produce the shot is in multi-dose vials, which require a preservative.

Hence, some flu shots (not the flu nasal spray) contain the preservative

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thimerosal. However, there are single-dose preparations of flu vaccine that are mercury preservative-free. These can be given to young children and pregnant women. Ask your doctor for a thimerosal-free flu vaccine if you are concerned.

Even though thimerosal is safe, it would be ideal for all flu vaccines to be thimerosal preservative-free – this would put any concerns to rest. However, the technology just isn't there yet.

What about other vaccines? Do they contain thimerosal? There are four vaccines that use thimerosal in the production process – but it is extracted before the final product is bottled. As such, these vaccines must list that TRACE amounts of thimerosal (less than 0.003mg) may exist in the vaccine. There is probably little or no thimerosal in the finished product, but the manufacturer must declare it.

We have no concerns about these vaccines, but if you are completely freaked out about the thimerosal thing (despite the proof that they are safe), there are other alternatives to these specific vaccines made without any thimerosal: Pediarix (one brand combo of DTaP/HepB/IPV), Engerix-B (one brand of HepB).

The FDA has a chart online that tracks any thimerosal content in vaccines: vaccinesafety.edu/thi-table.htm We have a link to the chart on our website Baby411.com (click on "Links").

FYI: many vaccines such as the combination measles, mumps, and rubella vaccine (MMR) never used thimerosal in the production process or as a preservative.

Q Does thimerosal cause autism?

No. The Institute of Medicine reached this conclusion in 2004. What proof do we have?

Thimerosal has been removed from vaccines since 2001, but the rates of autism are still skyrocketing. A 2008 survey of autism rates in California confirms that mercury is essentially out and autism rates are still going up. If thimerosal was the cause and it was removed from vaccines seven years ago, autism rates would be going down by now. Why? Because autism spectrum disorders are usually diagnosed by three years of age. By now, any reduction in autism should have been obvious if thimerosal caused the disorder.[9]

Q Are there other additives in the vaccines?

Yes. And you should know about them.

As we have already discussed, vaccines contain the active ingredients that provide immunity. But there are inactive ingredients that improve potency and prevent contamination. Below is a list of additives and why they are there. These products are present in trace amounts and none have been proven harmful in animals or humans.[10]

- *Preservatives:* Prevent vaccine contamination with germs (bacteria, fungus). Example: 2-phenoxyethanol, phenol, (thimerosal, prior to 2001).
- *Adjuvants:* Improve potency/immune response. Example: aluminum salts.
- *Additives:* Prevent vaccine deterioration and sticking to the side of the vial. Examples: gelatin, albumin, sucrose, lactose, MSG, glycine.
- *Residuals:* Remains of vaccine production process. Examples: formaldehyde, antibiotics (neomycin), egg protein, yeast protein.

See our website (Baby411.com, click on "Bonus Material") for a list of ingredients for the routine childhood vaccination series.

REALITY CHECK

If vaccines contain ingredients like aluminum or formaldehyde, wouldn't it be better if vaccine makers got rid of these additives?

Shouldn't vaccines be "greener"?

This is a red herring argument against vaccines – current vaccines are safe, even with tiny/trace amounts of preservatives or additives like aluminum.

And your baby is exposed to many of these ingredients every day… simply by eating or breathing.

Q Why is formaldehyde in vaccines?

Small amounts of formaldehyde are used to sterilize the vaccine fluid so your child doesn't get something like flesh-eating strep bacteria when he gets his shots.

We know when you think of formaldehyde, that ever-present smell wafting from the anatomy lab in high school comes to mind. But what you probably don't know is that formaldehyde is also a naturally occurring substance in your body. And if you use baby shampoo, paper towels, or mascara, or have carpeting in your home, you've been exposed to formaldehyde. The small amount used in vaccines is not a health concern.[11]

Q Is it true that anti-freeze is used in vaccines?

No. There is a chemical used in some vaccines (called polyethylene glycol) that is also found in antifreeze, as well as toothpaste, lubricant eyedrops, and various skin care creams. Polyethylene glycol is used in the production process to purify vaccines.

Q Is it safer to delay vaccines or use an alternative vaccination schedule?

Easy answer: no. The CDC publishes a recommended vaccine schedule for American children. Many, many doctors, scientists, and researchers work together with the CDC to decide what is the best timing to give shots. The goal: protect babies as soon as it is safe and effective to do so. This schedule was not created out of thin air.

Between anti-vaccine activists shouting "too many shots, too soon" and Dr. Bob Sears hawking his book, new parents wonder if it would somehow be safer to wait on shots altogether or stagger them out on "Dr. Bob's schedule."

Here's a nasty little truth about alternative vaccination schedules: they are all fantasy. There is absolutely no research that says delaying certain shots is safer. Dr. Bob is making up "Dr. Bob's Schedule" all by himself. He even admits that. In an interview with iVillage, he commented, "My schedule doesn't have any research behind it. No one has ever studied a big group of kids using my schedule to determine if it's safe or if it has any benefits."

A 2010 study actually did study children whose vaccinations were delayed and found there was absolutely no difference in their development to children who'd received their shots on time (Smith). A 2013 study showed further evidence that giving numerous shots at the same

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time and giving the recommended vaccination schedule has no impact on a child's risk of autism.[12]

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.

What we do know about alternative vaccination schedules is that 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.

We realize that parents who choose to delay or opt out on vaccines are not bad parents. They are scared parents. What we are trying to help you realize is that the fear you should have is for the diseases that vaccines prevent.

Q If I want to do a staggered vaccination schedule, how should I do it?

I suggest setting up a consultation with your own pediatrician to discuss what both of you feel comfortable with doing. Remember, the ultimate goal is to have your child vaccinated in a timely manner.

With the 2015 measles outbreak on everyone's minds, more pediatricians are increasingly adamant about protecting their littlest patients. Many refuse to deviate from the recommended schedule just to appease a nervous parent. It may be difficult to find a board-certified pediatrician willing to modify or delay shots. It's our job to protect kids. Following the recommended schedule is the best way to do that.

Q How do I know that the CDC and FDA are on "our" side?

Ah, the government conspiracy theory – the belief by some that the government is part of a vast conspiracy to hurt children with bad vaccines…and enrich pharmaceutical makers who make vaccines.

Yes, years ago, some members of vaccine advisory committees had ties with vaccine producers. These people were invited to the table because they brought a wealth of knowledge with them (example: vaccine research scientists).

Today, no one working for the vaccine watchdogs (CDC, FDA, AAP, ACIP, or AAFP) receives any grant or research money from pharmaceutical companies. So there is no real or perceived financial incentive to allow a bad vaccine to stay on the market. If there is concern about a vaccine, it will be pulled from the market immediately.

To further ensure unbiased recommendations, the National Immunization Program (NIP) and the Vaccine Injury Compensation Program (VICP) parted ways in 2005 so there would be no perceived "conflict of interest."

Here is another consideration: why would these groups want our nation's children to suffer chronic illness, pain, or even death? Think about it. It is in nobody's interest to increase infant morbidity and mortality rates.

▶ HELPFUL HINTS – Where to get more information

Our advice: don't type in "vaccinations" in a Google search. You will end up with inaccurate information from concerned groups who do a great job of creating parental anxiety. The following sites will provide accurate information:

- Centers for Disease Control and Prevention: www.cdc.gov/vaccines/parents, (800) CDC-INFO or (800) 232-4636
- American Academy of Pediatrics: www aap.org/immunization, (800) 433-9016
- Immunization Action Coalition at www.immunize.org and www.vaccineinformation.org
- Vaccine Education Center, Children's Hospital of Philadelphia www.vaccine.chop.edu

Here is an excellent reference book written for parents: *Vaccines and Your Child. Separating Fact from Fiction*. Offit, P. and Moser C. New York: Columbia University Press. 2011.

Citations

1. UCLA website: https://web.archive.org/web/20100710111201/http:/unitproj.library.ucla.edu/biomed/his/smallpox/. Accessed on July 12, 2016.
2. Omer SB, et al. *American Journal of Epidemiology* 2008; 168(12):1389–96.
3. Offit P. Addressing parents' concerns: Do multiple vaccines overwhelm or weaken the infants' immune system? *Pediatrics* 2002;109(1);124–9.
4. Institute for Vaccine Safety, Bloomberg School of Public Health, Johns Hopkins…www.vaccinesafety.edu/cc-exem.htm.
5. O'Brien MA, et al. Parental refusal of pertussis vaccination is associated with an increased risk of pertussis infection in children. *Pediatrics* 2009;123(6).
6. Zeiger RS. Current issues with influenza vaccine in egg allergy. *Journal Allergy Clin Immunol* 2002;110:834.
7. Wakefield AJ, et al. Lancet. 1998;351:637–41.
8. Institute of Medicine. Immunization Safety Review: Vaccines and Autism. National Academies Press. 2004. https://web.archive.org/web/20100710111201/http://unitproj.library.ucla.edu/biomed/his/smallpox/
9. Schechter R, et al. *Archives of General Psychiatry* 2008;65(1):19–24.
10. Offit P. *Pediatrics* 2003;112(6):1394–1401.
11. Dept of Health and Human Services, Agency for Toxic Substances and Disease Registry, ToxFAQs for Formaldehyde, June 1999.
12. DeStefano F, et al. Increasing exposure to antibody-stimulating proteins and polysaccharides in vaccines is not associated with risk of autism. *Journal of Pediatrics* 2013. DOI 10.1016/jpeds.2013.02.001.

Diphtheria

Diphtheria Symptoms

Diphtheria is a very contagious bacterial disease. When the bacteria invade the respiratory system, they produce a toxin (poison) that can cause weakness, sore throat, fever, and swollen glands in the neck. Within 2 to 3 days, a thick coating can build up in the throat or nose, making it very hard to breathe and swallow. "We are very fortunate that this disease is virtually absent in the United States today," says Dr. Melinda Wharton of the Centers for Disease Control and Prevention's (CDC) National Center for Immunization and Respiratory Diseases. "It's heartbreaking to see a parent holding and trying to comfort a child who is painfully struggling to breathe." Effects from diphtheria also can lead to swelling of heart muscle and, sometimes heart failure. In severe cases, the illness can cause coma, paralysis, and death.

How Diphtheria Spreads

A child can get infected with diphtheria by direct contact with droplets from an infected person's cough or sneeze. A child also can get infected with diphtheria by coming in contact with an object, like a toy, that has been contaminated with diphtheria bacteria.

Diphtheria Vaccine for Baby

Babies get DTaP vaccine to protect them from diphtheria and two other diseases caused by bacteria, whooping cough (pertussis) and tetanus. DTaP vaccines are recommended at ages 2 months, 4 months, and 6 months, and at 15 through 18 months old. A DTaP booster is recommended at age 4 through 6 years. To reduce the number of shots needed at a vaccine visit, other vaccines have been combined with DTaP. Your doctor can tell you more about combination vaccines.

Because immunity to diphtheria decreases over time, preteens and adults need to get a booster shot every 10 years to stay protected. Adults should ask their doctor if it's time for a booster shot.

Diphtheria Yesterday and Today

It's hard to imagine how many lives were affected around the world before the diphtheria vaccine was available. In the United States, before there was treatment for diphtheria, up to half of the people who got the disease died from it. It's safe to say that most families, at one time or another, experienced the horror of this disease in one of their young relatives.

"Thanks to vaccines, diphtheria is very rare in the United States, and parents do not fear the sometimes fatal disease like previous generations did," says Dr. Tejpratap Tiwari of CDC. "Today's grandparents may remember having seen people with diphtheria, or even had the disease themselves."

In the past decade, there were less than five cases of diphtheria in the U.S. reported to CDC. Severe cases of diphtheria occurred among unvaccinated people or those who did not complete all the recommended doses of the vaccine.

Why Do We Still Vaccinate?

During the 1990s, a diphtheria outbreak in the Newly Independent States of the former Soviet Union showed what could happen if the United States did not have such steady, high vaccination coverage among children year after year with the vaccine that prevents diphtheria.

Every year, several thousand cases of diphtheria occur around the world," says Dr. Doug Campos-Outcalt of the American Academy of Family Physicians. "If we stopped using vaccine in the United States, then unvaccinated people would be susceptible to the disease and it could easily come back. Just one unvaccinated U.S. resident traveling abroad and coming home infected could cause an epidemic."

The best way to protect children is with vaccination. "I cannot stress enough how important it is for parents to vaccinate their children on time with the DTaP vaccine," adds CDC's Dr. Tiwari.

In the former Soviet states, from 1990 through 1998, there were more than 157,000 reported cases and 5,000 deaths from diphtheria. Experts think that several factors likely caused this diphtheria outbreak. Some states did not have high vaccination rates and an increase in travel made it easier for diphtheria to spread widely.

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Also during the challenging time of transition in the former states, it was difficult to maintain high childhood vaccination rates, even in places that had attained high rates in the past. Many school-aged children missed doses or received them late, and infant vaccination declined to between 60% and 80% in some places.

What can we learn from this outbreak? "Even though the threat of diphtheria may seem low, the disease still exists around the world, and from time to time there are even a few cases in some parts of the United States. So, as the experience in the former Soviet Union shows, keeping vaccination rates high is very important," says CDC's Dr. Tiwari.

Standard and consistent vaccination of children and use of booster shots for preteens, teens, and adults are critical to prevent diphtheria cases and outbreaks. Diphtheria is part of the tetanus-diphtheria (Td) booster vaccine—the shot that all adults should get every 10 years. It is also a part of the tetanus-diphtheria-pertussis (Tdap) vaccine that everyone needs to receive one time. Tdap is recommended for all 11- or 12-year-olds. Anyone who does not get the Tdap vaccine at that age should get one dose as a replacement for their 10-year tetanus-diphtheria (Td) booster shot. Tdap is especially important for expectant mothers and people who will have close contact with babies because it can not only prevent tetanus and diphtheria, but also, potentially deadly cases of whooping cough. Cases of whooping cough are on the rise and can have very serious consequences for young babies.

Benefits of DTaP Vaccine

In addition to protecting from tetanus and pertussis (also known as whooping cough), getting a vaccine to protect against diphtheria as recommended—

- Saves lives.
- Prevents hospitalizations.
- Reduces the spread of the disease.
- Protects young children, for whom the disease can be especially serious.
- Protects the community, especially infants who are too young to get DTaP vaccine.

Risks of DTaP Vaccine

- Mild side effects are fever, redness, swelling or soreness at the site of the injection, fussiness, tiredness or poor appetite, or vomiting.
- Moderate side effects are uncommon. One out of 1,000 children may cry for 3 or more hours; 1 out of 14,000 children may have a seizure; 1 out of 16,000 children may have high fever.
- Severe side effects are rare. For example, fewer than one in a million children have a severe allergic reaction.

Selected References

Centers for Disease Control and Prevention (CDC). Diphthera. In: Atkinson W, Hamborsky J, McIntyre L, Wolfe S, eds. Epidemiology and Prevention of Vaccine-Preventable Diseases (The Pink Book). 11th ed. Washington, DC: Public Health Foundation, 2009. p. 59–69. http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm

CDC. Prevention of pertussis, tetanus, and diphtheria among pregnant and postpartum women and their infants: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMMR. 2008;57(04):1–47,51. http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5704a1.htm

Dittmann S, Wharton M, Vitek C, et al. Successful control of epidemic diphtheria in the states of the former Union of Soviet Socialist Republics: Lessons learned. The Journal of Infectious Diseases. 2000;181(suppl 1):S10–S22. http://www.journals.uchicago.edu/doi/pdf/10.1086/315534

Salisbury, G, Salisbury, L. The Cruelest Miles: The Heroic Story of Dogs and Men in a Race against an Epidemic. New York: W.W. Norton & Company, 2003.

Vitek CR, Wharton M. Diphtheria in the former Soviet Union: Reemergence of a pandemic disease. Emerging Infectious Diseases. 1998;4:539-50. http://www.cdc.gov/ncidod/eid/vol4no4/adobe/v4n4.pdf

The Centers for Disease Control and Prevention, the American Academy of Family Physicians, and the American Academy of Pediatrics strongly recommend vaccines.

800-CDC-INFO *(800-232-4636)*

http://www.cdc.gov/vaccines

Tetanus

also known as lockjaw

Tetanus Symptoms

Tetanus is a bacterial disease. When the tetanus bacteria invade the body through a wound, they produce a toxin, or poison, that causes muscles to become tight, which is very painful. Tetanus mainly affects the neck and abdomen. Tetanus is also known as "lockjaw" because it often causes a person's neck and jaw muscles to lock, making it hard to open the mouth or swallow. It also can cause breathing problems, severe muscle spasms, and seizure-like movements. Complete recovery can take months. If left untreated, tetanus can be fatal.

Causes of Tetanus

Unvaccinated children can get tetanus just by playing outdoors and getting cuts that become infected with the bacteria. That's because tetanus bacteria are common in soil. Tetanus is not like any other vaccine-preventable disease. The main difference is that tetanus enters the body through wounds. It cannot be passed from person to person.

"Parents may have heard this, and it is true: children can get tetanus from stepping on a rusty nail," says Doug Campos-Outcalt of the American Academy of Family Physicians. "Of course, they also can get it from other wounds as well. Deeper and more severe wounds are more likely to become infected with tetanus."

Tetanus: The United States Story

In the United States, widespread vaccination against tetanus has made the disease almost non-existent. Vaccination to prevent tetanus began in the late 1940s. From 1947 through 1949, before widespread use of the vaccine, an average of 580 cases of tetanus and an average of 472 deaths from tetanus were reported.

Today, tetanus is uncommon in the United States, with an average of 29 reported cases annually from 2000 through 2009. Nearly all cases of tetanus are among people who have never received a tetanus vaccine, or adults who don't stay up to date on their 10-year booster shots. More than half of the reported cases from 2001 through 2009 were among persons younger than 50 years of age, but almost all of the fatal cases were in persons age 65 and older.

"People of all ages can get tetanus," says Dr. Tejpratap Tiwari of the Centers for Disease Control and Prevention (CDC). "Beginning tetanus vaccination on schedule and getting timely boosters is the best way to make sure you keep yourself and your children safe."

Tetanus: The Global Story

"Disease caused by a toxin from the bacteria is always possible for people who are not vaccinated, because the tetanus bacteria are present everywhere in our environment," says Dr. Vance Dietz of CDC's Global Immunization Division. "Because we have a very safe and effective tetanus vaccine, parents don't need to worry about seeing their child suffer from this disease."

Unfortunately, cases of tetanus are still common in other parts of the world and it kills thousands of babies each year. In places where birthing conditions are not sanitary, tetanus in newborns is a real threat. The World Health Organization estimates that 58,000 newborns died of tetanus in 2010.

"I have seen the tragedy tetanus causes in other countries. It is very hard to forget seeing the babies who die from this vaccine-preventable disease," says Dr. Dietz.

Tetanus Vaccine for Baby

Babies get DTaP vaccine to protect them from tetanus and two other diseases caused by bacteria, diphtheria and whooping cough (pertussis). DTaP vaccines are recommended at ages 2 months, 4 months, and
6 months, and at 15 through 18 months old. A DTaP booster is recommended at age 4 through 6 years. To reduce the number of shots needed at a vaccine visit, other vaccines have been combined with DTaP. Your doctor can tell you more about combination vaccines.

Because immunity to tetanus decreases over time, a booster shot (Td) is recommended every 10 years to stay protected. Tetanus is also part of the tetanus-diphtheria-pertussis vaccine (Tdap) that everyone needs to receive one time. Tdap is recommended for all 11- or 12-year-olds. Anyone who does not get the Tdap vaccine at that age should get one dose as a replacement for their 10-year tetanus-diphtheria (Td) booster shot.

Benefits of DTaP Vaccine

In addition to protecting from diphtheria and pertussis (also known as whooping cough), getting the vaccine to protect against tetanus as recommended—

- Saves lives.
- Prevents hospitalizations.

Getting DTaP as recommended also—

- Protects young children, for whom the diseases prevented by this vaccine can be especially serious.
- Protects the community by reducing the number of people who may spread diphtheria or pertussis.

Risks of DTaP Vaccine

- Mild side effects are fever, redness, swelling or soreness at the site of the injection, fussiness, tiredness or poor appetite, or vomiting.
- Moderate side effects are uncommon. One out of 1,000 children may cry for 3 or more hours; 1 out of 14,000 children may have a seizure; 1 out of 16,000 children may have high fever.
- Severe side effects are rare. For example, fewer than one in a million children have a severe allergic reaction.

Selected References

Centers for Disease Control and Prevention (CDC). Tetanus. In: Atkinson W, Hamborsky J, McIntyre L, Wolfe S, eds. Epidemiology and Prevention of Vaccine-Preventable Diseases (The Pink Book). 11th ed. Washington, DC: Public Health Foundation, 2009. p. 273–282. http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm

CDC. Prevention of pertussis, tetanus, and diphtheria among pregnant and postpartum women and their infants: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMMR. 2008;57(04);1–47,51. http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5704a1.htm

Fair E, Murphy TV, Golaz A, Wharton M. Philosophic objection to vaccination as a risk for tetanus among children younger than 15 years. Pediatrics. 2002;109(1):e1-3. http://pediatrics.aappublications.org/content/109/1/e2.long

Roper MH, Vandelaer JH, Gasse FL. Maternal and neonatal tetanus. Lancet. 2007;370(9603):1947–59. http://www.who.int/immunization_monitoring/resources/Maternal_and_neonatal_tetanus_Seminar.pdf

Roush SW, Murphy TV. Historical comparisons of morbidity and mortality for vaccine-preventable diseases in the United States. JAMA. 2007;298:2155–2163. http://jama.ama-assn.org/cgi/reprint/298/18/2155

World Health Organization: Maternal and neonatal tetanus elimination. http://www.who.int/immunization_monitoring/diseases/MNTE_initiative/en/index.html

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http://www.cdc.gov/vaccines

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Whooping Cough

also known as pertussis

"A Preventable Tragedy": A True Story

Preventing whooping cough—and saving lives in the process—must be a community-wide effort to vaccinate infants, children, adolescents, and adults. Pertussis vaccine has saved thousands upon thousands of lives, but we need to keep up the fight against whooping cough by using vaccines. Here is one family's story.

On Christmas Eve 2009, Katie and Craig welcomed their daughter Callie Grace into the world. After trying for 5 years to have a child—and suffering several miscarriages—the couple considered Callie their miracle baby. Callie was born 6 weeks early, but she was healthy and strong and came home after only 2 weeks in the hospital.

In January, when she was a month old, Callie developed a soft, dry cough. "It sounded like when a child mimics their parent to get attention. I took her to the doctor," Katie recalls. The doctor did not find any serious signs of illness, so he sent them home.

However, over the next couple of days, Callie's condition worsened. She continued to cough, and she also became pale, didn't move around much, and suddenly lost her healthy appetite. Katie took Callie back to the doctor, and while they waited, Callie stopped breathing. A nurse was able to get Callie breathing again, and they were rushed to the hospital by ambulance.

"At the hospital, nurses and doctors flocked to our room," Katie remembers. "It was truly overwhelming. I was scared and Callie was screaming." Callie was admitted to the Pediatric Intensive Care Unit, where the staff ran tests to try to find out what was wrong. After a couple of days of monitoring, they started her on antibiotics, while still waiting on test results.

During Callie's second day at the hospital, she seemed to be doing OK and her parents were hopeful that she'd recover. According to Katie, "Callie was alert and would smile. She kept sticking her feet in the air so we could rub them for her. We never really thought her life was in danger."

But the next night, Callie stopped breathing again. Family members watched helplessly from behind a glass wall as doctors tried for 45 minutes to revive her. Tragically, Callie could not be saved. She was only 5 weeks old. "We never dreamed we'd lose her," Katie said. "Callie was a more loved, more wanted baby than you'd ever find."

A few days later, the family found out that whooping cough was the cause of Callie's death. "We could not believe it," Katie says, "We were so careful to not expose her to a lot of people. She never left the house except to go to the pediatrician," Katie says.

The first dose of DTaP vaccine is recommended at 2 months of age but babies are not fully protected until they get all the recommended doses. Callie was too young to even get her first dose of DTaP.

Babies need whooping cough vaccination on time, but there's another important way to protect them. Family members and others who are around babies should be vaccinated. Children should be up to date with DTaP, and everyone 11 years of age and older should get Tdap, the booster shot that prevents pertussis.

"Callie could have caught whooping cough from any of the few people that she had contact with—even from someone in the hospital right after she was born. People with even a slight cough might have whooping cough but not know it. I urge everyone to make sure their children have all their DTaP shots on time. I also encourage people to be sure they get the Tdap booster shot," Katie says. "Getting that shot could save a life."

What is Whooping Cough?

Whooping cough, another name for pertussis, is a very contagious disease caused by the bacteria *Bordetella pertussis*. It can be serious for anyone, but life-threatening for newborns and infants.

Symptoms—Sometimes the Cough is the Clue, but not Always

Whooping cough may begin like a common cold—runny nose, low-grade fever, and coughing. It spreads when an infected person sneezes or coughs while in close contact with others. Unlike the common cold, the pertussis cough continues and may get worse.

Coughing can come in violent fits. The name "whooping cough" comes from the high-pitched noise—a "whoop"—that infants and children make when they gasp for air after a fit of coughing.

"If you've ever heard the coughing and whooping, you never forget it," says Donna Weaver, a nurse educator at the Centers for Disease Control and Prevention (CDC). "It's especially

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frightening to see babies who have become so weak they have a hard time catching their breath—some even become blue because they cannot get enough air."

Very young infants may not actually cough as the disease gets worse. Instead, they may have a hard time breathing, or even stop breathing for short periods.

Adolescents and adults usually do not whoop. But, for them and for children, coughing can last up to 10 weeks or more. That's why this disease is called the 100-day cough.

Whooping Cough—Most Serious for the Very Young

Whooping cough in infants is very concerning because infants suffer the most serious complications. In infants younger than 1 year old who get whooping cough, about half are hospitalized. For infants who are hospitalized, 1 out of 4 develops pneumonia (lung infection), and, sadly, about 1 or 2 out of 100 dies.

Benefits of DTaP Vaccination for Infants and Young Children

In addition to protecting from diphtheria and tetanus, getting the vaccine to protect against pertussis (also known as whooping cough) as recommended—

- Saves lives.
- Prevents hospitalizations.
- Protects young infants, for whom the disease can be especially serious.
- Protects the community, especially infants who are too young to get pertussis vaccine.

Risks of DTaP Vaccine

- Mild side effects are fever; redness, swelling or soreness at the site of the shot; fussiness; tiredness or poor appetite; or vomiting.
- Moderate side effects are uncommon. One out of 1,000 children may cry for 3 or more hours; 1 out of 14,000 children may have a seizure; 1 out of 16,000 children may have high fever.
- Severe side effects are very rare. For example, fewer than one in a million children have a severe allergic reaction.

Whooping Cough Today

While most vaccine-preventable diseases are rare in the United States today, whooping cough continues to spread. Often, people who have a serious or long-lasting cough don't see a doctor to get diagnosed or treated, and they unknowingly spread the disease.

"In the United States, we've been using vaccines widely against whooping cough since the 1940s," says CDC pediatrician Dr. Tom Clark. "As a result, cases and deaths from whooping cough have dropped about 75%. Unfortunately, since protection from childhood vaccination wears off, thousands of people each year still get the disease."

Whooping cough comes in cycles, with higher numbers of reported cases some years. The last peak was in 2012, when, nationally, more than 48,000 cases of whooping cough were reported and 15 infants younger than 3 months died.

Whooping Cough Vaccine for Baby

Whooping cough vaccine is part of the DTaP— diphtheria, tetanus, and pertussis—shot that also protects against diphtheria and tetanus. Shots that contain protection against whooping cough are recommended at ages 2 months, 4 months, and 6 months, with a booster at 15 through 18 months old. Another booster is recommended at age 4 through 6 years.

Whooping Cough Vaccines for Pre-Teens and Adults

In 2005, health care professionals got a vital new tool in the fight against whooping cough—the Tdap booster. Says CDC's Dr. Clark, "We knew that pertussis immunity from childhood vaccination wears off, which is why teens and adults get whooping cough. But we didn't have a booster shot to use for anybody older than 6 years of age. Now we do."

According to Dr. Meg Fisher of the American Academy of Pediatrics, "When an infant gets whooping cough, we don't always know who in the baby's environment had the disease and passed it on. Often, though, a family member or other close contact has whooping cough, but they don't know their cough is caused by a disease that can be very serious for infants. Infected teens and adults may think they just have a cold."

Preteens going to the doctor for their regular check-up at age 11 or 12 years should get the recommended dose of Tdap. Teens and adults who have never gotten Tdap should get a dose. Women who are pregnant should ask their doctor about getting Tdap during each pregnancy.

"Tdap is important for two reasons. It protects preteens, teens, and adults from whooping cough, which can cause coughing that lasts for months. And the more people who get Tdap," says Dr. Clark, "the better for reducing the number of infants who are too young to be fully vaccinated who might catch whooping cough from them."

According to Dr. Clark, "The easiest thing for adults to do is to get one recommended dose of Tdap instead of their next regular tetanus booster (Td)—the shot that you're supposed to get every 10 years. You can get your dose of Tdap earlier than the 10-year mark. Pregnant women, their partners, grandparents and others who will be caring for infants should talk to their doctor about being up-to-date with Tdap."

Selected References:

Centers for Disease Control and Prevention (CDC). Pertussis. In: Atkinson W, Hamborsky J, McIntyre L, Wolfe S, eds. Epidemiology and Prevention of Vaccine-Preventable Diseases (The Pink Book). 11th ed. Washington, DC: Public Health Foundation, 2009. p. 199–216. http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm

Bisgard KM et al. Infant pertussis. Who was the source? Pediatr Infect Dis J 2004;23:985–989. Abstract available at http://journals.lww.com/pidj/Abstract/2004/11000/Infant_Pertussis__Who_Was_the_Source_.2.aspx

Cherry JD. Pertussis in adults. Ann Intern Med 1998;128:64–66. http://www.annals.org/cgi/content/full/128/1/64#T1

The Centers for Disease Control and Prevention, the American Academy of Family Physicians, and the American Academy of Pediatrics strongly recommend vaccines.

800-CDC-INFO *(800-232-4636)* **http://www.cdc.gov/vaccines**

Hib

also known as *Haemophilus influenzae* type b

"Gasping for Life": A True Story

"I didn't realize it, but the diseases that they give children shots for still exist," says Kelly Lacek. "Every parent should know these diseases are still a threat."

Kelly and her husband have three children. Ashley, the oldest, was fully vaccinated; Stephen, the middle child, had some but not all vaccinations; and Matthew, the youngest, had only his first round of shots. The Laceks stopped vaccinating their kids after a health care professional they trusted gave them misinformation that caused them not to trust the safety of childhood vaccines.

Acting on this misinformation almost ended in tragedy.

It was April 22, 2006, shortly after his third birthday, when Matthew started having trouble breathing. His parents rushed him to their local hospital. There, a seasoned physician recognized the disease as one he had seen often—more than 20 years ago. Matthew's windpipe was swollen because he was infected with *Haemophilus influenzae* type b—known as Hib.

When it comes to a Hib infection, time is of the essence. Without prompt treatment, Hib disease can be fatal. Matthew immediately had a tube inserted into his windpipe so he could breathe. He spent 6 days in the hospital and eventually made a complete recovery. The Laceks began catching Matthew up on his vaccinations soon afterward. Today, Matthew and Stephen are fully vaccinated.

Since the first Hib vaccine was introduced in the late 1980s, the number of cases in the United States has plummeted. As a result, many doctors have never seen a case of Hib disease.

"We were lucky the doctor at our local hospital recognized Hib," says Kelly. "We later spoke to pediatricians at a children's hospital, and they admitted they might not have identified it so quickly, because Hib is rare now, thanks to vaccination."

The family does not know who Matthew caught the disease from. What the Laceks do know now is that infant immunization is crucial. As Kelly puts it, "There is almost nothing worse than your child suffering and nearly dying from a disease that can be prevented with a vaccine."

Hib is Serious and Potentially Deadly

Hib disease, which is caused by the bacteria *Haemophilus influenzae* type b, can be serious, especially when it causes invasive diseases. Invasive disease means that germs invade parts of the body that normally are free from germs (such as the fluid around the brain and spinal cord). When this happens, disease is very severe. Overall, before Hib vaccine, there were more than 20,000 cases of invasive Hib disease each year. All invasive infections can be life-threatening.

Meningitis (infection of the covering around the brain and spinal cord) is just one of the invasive diseases that can be caused by Hib. The disease also can cause epiglottitis (life-threatening infection that can block the windpipe and lead to serious breathing problems), as well as pneumonia (infection in the lungs).

In the United States, before Hib vaccine was available, about 12,000 children each year—most of them younger than 5 years old—got Hib meningitis. In fact, Hib was the most common cause of bacterial meningitis in this country. As many as 600 of the children who got Hib meningitis each year died, and as many as 4,000 suffered serious life-long disability, including blindness, deafness, or mental impairment.

"Before Hib vaccine was available, a child's risk for getting invasive Hib disease was 1 out of 200 by age 5," says pediatrician Dr. Elizabeth Briere of the Centers for Disease Control and Prevention (CDC). "That's about the same as the risk for polio in the United States before vaccination. Even though we no longer have polio cases in this country, most parents have heard of polio, but they may not have heard of Hib or know how dangerous it can be."

How Hib Spreads

Hib is spread from person to person by direct contact, or by contact with respiratory droplets from a cough or sneeze. Hib can be spread by people who are ill with the disease. More importantly, Hib can be spread by people who have the bacteria in their noses and throats but who do not show symptoms. In fact, this is the most common way that the disease is spread.

Hib Today

The story of Hib today is the story of an amazingly effective and very safe vaccine. "The Hib vaccine that we use now was first recommended for infants and toddlers in the United States in 1991," explains Dr. Anne Schuchat, director of CDC's National Center for Immunization and Respiratory Diseases. "In less than a decade of using this Hib vaccine, the serious disease was nearly wiped out in the United States."

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By 1998, only 54 cases of invasive Hib disease were reported in children younger than 5 years old. Today, with ongoing vaccination, every year there are fewer than 55 cases and fewer than 5 deaths from Hib among children under 5 years of age.

"Despite the success of the vaccine, parents need to remember the disease is still out there. It is common in some countries and so it can spread to the United States. Hib can also spread in this country because Hib bacteria are carried in the noses and throats of people who are not sick from the disease," explains Dr. Schuchat. "So, vaccinating infants and toddlers on time to protect them against Hib disease is crucial. And fully vaccinated children won't spread the disease to others, including infants and toddlers who are too young to have gotten all their recommended doses of Hib vaccine."

Making an Effective Hib Vaccine for Infants

When most of today's moms were infants, the Hib vaccine was not available. But at the time, people were working hard to develop an effective vaccine to prevent needless suffering and death from infection with *Haemophilus influenzae* type b.

To produce immunity, the first Hib vaccines used a sugar-like substance from the surface of the Hib bacteria. Unfortunately, these first Hib vaccines were not very effective because the immune system did not respond well to these substances. Today's Hib vaccines are made by joining the sugar-like substance to other antigens (the parts of germs that cause the body's immune system to go to work) that the immune system responds to very well. This seemingly simple change resulted in vaccines that are very effective in infants and toddlers. In countries where Hib vaccine is used routinely, the disease has been virtually eliminated. Hib vaccine has a long track record of being very safe; it has not been found to cause serious side effects.

Benefits of Hib Vaccine

Getting Hib vaccine as recommended—

- Saves lives.
- Prevents hospitalizations.
- Prevents serious life-long disability such as blindness, deafness, and mental retardation.
- Protects young children for whom the disease can be especially serious.
- Protects the community, especially infants and toddlers who are too young to be fully vaccinated, and people who have weak immune systems.

Risks of Hib Vaccine

- Mild problems include redness, warmth, swelling or pain where the shot is given in up to one out of four children.
- Fever can occur in up to 1 out of 20 children.

Selected References

Centers for Disease Control and Prevention (CDC). Haemophilus influenzae type b. In: Atkinson W, Hamborsky J, McIntyre L, Wolfe S, eds. Epidemiology and Prevention of Vaccine-Preventable Diseases (The Pink Book). 11th ed. Washington, DC: Public Health Foundation, 2009. p. 71–84. http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm

CDC. Progress toward elimination of Haemophilus influenzae type b invasive disease among infants and children-United States, 1990–2000. MMWR 2002;51(11):234–237. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5111a4.htm

Bisgard KM, et al. Haemophilus influenzae invasive disease in the United States, 1994–1995: Near disappearance of a vaccine-preventable childhood disease. Emerging Infect Dis 1998;4(2):229–237. http://www.cdc.gov/ncidod/eid/vol4no2/bisgard.htm

Hib Vaccination Can't Wait

"Before vaccination to protect against Hib, most of those infected with Hib were infants younger than 1 year old, and infection was most common among infants age 6 through 12 months. That's why the primary doses of Hib vaccine are recommended to be given by 6 months," explains Dr. Briere. Four doses of the Hib vaccine are recommended: one at 2 months, 4 months, and 6 months old, and the final dose at 12 through 15 months old. For one brand of the vaccine, a dose at 6 months is not required. To reduce the number of shots needed at a doctor visit, other vaccines have been combined with Hib vaccine. Your doctor can tell you more about combination vaccines.

Most cases of Hib today are in children who have not received Hib vaccine or who have not been fully vaccinated. "Because Hib disease is still out there in communities, delaying Hib vaccination is dangerous," stresses Dr. Briere. Every child should get each dose of Hib vaccine on time, starting at age 2 months.

"Some children, like those in child care, and Alaska Native and American Indian children, are at increased risk for Hib disease. It's especially important for these infants not to miss Hib vaccinations," says Dr. Briere.

"If a child who has not had all doses of Hib vaccine on time becomes ill, parents should make sure to tell paramedics, nurses, or doctors that their child is not fully vaccinated against Hib so that the possibility of illnesses such as meningitis and epiglottitis caused by Hib can be considered," adds Dr. Meg Fisher of the American Academy of Pediatrics.

Understanding Bacterial Meningitis

Meningitis is an infection of the covering around the brain and the spinal cord. The results of meningitis can be devastating, and can lead to life-long disability—including intellectual disability—or death.

Before Hib vaccine, Hib was the leading cause of bacterial meningitis in the United States. Hib used to cause about 12,000 cases of meningitis every year, but thanks to the vaccine, Hib meningitis is now rare.

Now, the leading causes of bacterial meningitis are two other bacteria, *Streptococcus pneumoniae* and *Neisseria meningitidis*. The good news: there are also vaccines to prevent infection with these bacteria. The pneumococcal conjugate vaccine is recommended for infants and toddlers and the meningococcal conjugate vaccine is recommended for children starting at age 11 years.

Diagnosing bacterial meningitis usually requires a spinal tap, in which a needle is used to take out some of the fluid that surrounds the spinal cord for testing. Typical signs of meningitis include stiff neck, severe headache, and changes in mental function. In infants, these signs can be difficult to detect, if they happen at all. Infants with meningitis may appear inactive or irritable. They may also vomit or not eat much. The spinal tap helps doctors determine whether this serious infection is present.

The Centers for Disease Control and Prevention, the American Academy of Family Physicians, and the American Academy of Pediatrics strongly recommend vaccines.

800-CDC-INFO *(800-232-4636)* **http://www.cdc.gov/vaccines**

Give birth to the end of Hep B

FROM THE IMMUNIZATION ACTION COALITION

Nearly one in three U.S. newborns leaves the hospital unprotected from life-threatening hepatitis B infection. As a result, approximately 800 U.S. newborns are chronically infected each year through perinatal exposure.

A birth dose of HepB vaccine can prevent perinatal transmission – yet today, only 70% of U.S. infants receive the vaccine within three days of birth. That's why the Immunization Action Coalition (IAC) is urging hospitals and birthing centers to meet the national standard of care by providing a universal birth dose of HepB vaccine.

Why should we give HepB vaccine to *all* newborns?

- **It prevents mother-to-infant transmission**
  Prevents 70%–95% of transmission to infants born to HBsAg-positive women
- **It prevents household transmission**
  Protects infants from infected family members and other caregivers
- **It provides protection if medical errors occur**
  Provides a safety net to prevent perinatal transmission when medical errors occur

Why is a safety net needed? Because medical errors happen!

Reported medical errors include:

- Ordering the wrong hepatitis B screening test
- Misinterpreting or mistranscribing hepatitis B test results
- Failing to communicate results to or within the hospital
- Not giving hepatitis B vaccine to infants born to mothers of unknown HBsAg status within 12 hours of birth
- Not giving prophylaxis to an infant even when the mother's HBsAg-positive status is documented

To comply with the national standard of care from CDC and to meet the quality measure of the National Quality Forum, birthing institutions should:

1. Implement the recommended "universal HepB vaccine birth dose policy," by way of a standard newborn admission order. This ensures that every infant receives HepB vaccine at birth, no later than discharge from the birth unit.
2. Follow national recommendations for prophylaxis of infants born to women who are HBsAg positive or whose HBsAg status is unknown.
3. Measure and report the percentage of newborns who receive HepB vaccination before discharge.

The HepB birth dose is recommended by the:

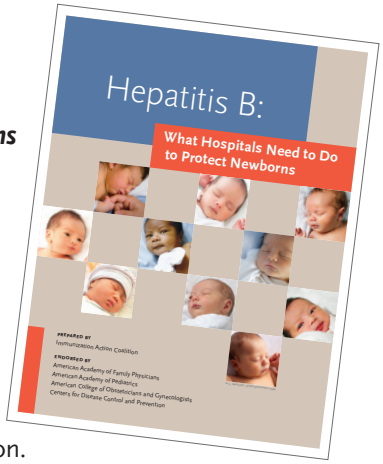
- American Academy of Family Physicians (AAFP)
- American Academy of Pediatrics (AAP)
- American College of Obstetricians and Gynecologists (ACOG)
- Centers for Disease Control and Prevention (CDC)

CDC's complete hepatitis B birth dose recommendations are found at www.cdc.gov/mmwr/PDF/rr/rr5416.pdf

IAC's complete guide

Hepatitis B: What Hospitals Need to Do to Protect Newborns is a complete resource to help birthing institutions establish, implement, and optimize their birth dose policies.

Endorsed by AAFP, AAP, ACOG, and CDC, IAC's e-book breaks new ground as a policy and best practice guide for newborn hepatitis B immunization.



Download the guide at www.immunize.org/protect-newborns
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The ABCs of Hepatitis

	HEPATITIS A is caused by the Hepatitis A virus (HAV)	**HEPATITIS B** is caused by the Hepatitis B virus (HBV)	**HEPATITIS C** is caused by the Hepatitis C virus (HCV)
U.S. Statistics	• Estimated 2,500 new infections in 2014	• Estimated 19,200 new infections in 2014 • Estimated 850,000–2.2 million people with chronic HBV infection	• Estimated 30,500 new infections in 2014 • Estimated 2.7–3.9 million people with chronic HCV infection
Routes of Transmission	Ingestion of fecal matter, even in microscopic amounts, from: • Close person-to-person contact with an infected person • Sexual contact with an infected person • Ingestion of contaminated food or drinks	Contact with infectious blood, semen, and other body fluids primarily through: • Birth to an infected mother • Sexual contact with an infected person • Sharing of contaminated needles, syringes, or other injection drug equipment • Needlesticks or other sharp instrument injuries	Contact with blood of an infected person primarily through: • Sharing of contaminated needles, syringes, or other injection drug equipment Less commonly through: • Sexual contact with an infected person • Birth to an infected mother • Needlestick or other sharp instrument injuries
Persons at Risk	• Travelers to regions with intermediate or high rates of Hepatitis A • Sex contacts of infected persons • Household members or caregivers of infected persons • Men who have sex with men • Users of certain illegal drugs (injection and non-injection) • Persons with clotting-factor disorders	• Infants born to infected mothers • Sex partners of infected persons • Persons with multiple sex partners • Persons with a sexually transmitted disease (STD) • Men who have sex with men • Injection drug users • Household contacts of infected persons • Healthcare and public safety workers exposed to blood on the job • Hemodialysis patients • Residents and staff of facilities for developmentally disabled persons • Travelers to regions with intermediate or high rates of Hepatitis B (HBsAg prevalence of ≥2%)	• Current or former injection drug users • Recipients of clotting factor concentrates before 1987 • Recipients of blood transfusions or donated organs before July 1992 • Long-term hemodialysis patients • Persons with known exposures to HCV (e.g., healthcare workers after needlesticks, recipients of blood or organs from a donor who later tested positive for HCV) • HIV-infected persons • Infants born to infected mothers
Incubation Period	15 to 50 days (average: 28 days)	45 to 160 days (average: 120 days)	14 to 180 days (average: 45 days)
Symptoms of Acute Infection	**Symptoms of all types of viral hepatitis are similar and can include one or more of the following:** • Fever • Fatigue • Loss of appetite • Nausea • Vomiting • Abdominal pain • Gray-colored bowel movements • Joint pain • Jaundice		
Likelihood of Symptomatic Acute infection	• < 10% of children < 6 years have jaundice • 40%–50% of children age 6–14 years have jaundice • 70%–80% of persons > 14 years have jaundice	• < 1% of infants < 1 year develop symptoms • 5%–15% of children age 1-5 years develop symptoms • 30%–50% of persons > 5 years develop symptoms **Note:** Symptoms appear in 5%–15% of newly infected adults who are immunosuppressed	• 20%–30% of newly infected persons develop symptoms of acute disease
Potential for Chronic Infection	None	• Among unimmunized persons, chronic infection occurs in >90% of infants, 25%–50% of children aged 1–5 years, and 6%–10% of older children and adults	• 75%–85% of newly infected persons develop chronic infection • 15%–25% of newly infected persons clear the virus
Severity	Most persons with acute disease recover with no lasting liver damage; rarely fatal	• Most persons with acute disease recover with no lasting liver damage; acute illness is rarely fatal • 15%–25% of chronically infected persons develop chronic liver disease, including cirrhosis, liver failure, or liver cancer • 1,800 persons in the United States die with HBV-related liver disease as documented from death certificates	• Acute illness is uncommon. Those who do develop acute illness recover with no lasting liver damage. • 60%–70% of chronically infected persons develop chronic liver disease • 5%–20% develop cirrhosis over a period of 20–30 years • 1%–5% will die from cirrhosis or liver cancer • 19,600 deaths in 2014

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Continued on next page

	HEPATITIS A	HEPATITIS B	HEPATITIS C
Serologic Tests for Acute Infection	• IgM anti-HAV	• HBsAg in acute and chronic infection • IgM anti-HBc is positive in acute infection only	• No serologic marker for acute infection
Serologic Tests for Chronic Infection	• Not applicable—no chronic infection	• HBsAg (and additional markers as needed)	• Screening assay (EIA or CIA) for anti-HCV • Verification by an additional, more specific assay (e.g., nucleic acid testing (NAT) for HCV RNA)
Screening Recommendations for Chronic Infection	• Not applicable—no chronic infection Note: Screening for past acute infection is generally not recommended	Testing is recommended for: • All pregnant women • Persons born in regions with intermediate or high rates of Hepatitis B (HBsAg prevalence of ≥2%) • U.S.–born persons not vaccinated as infants whose parents were born in regions with high rates of Hepatitis B (HBsAg prevalence of ≥8%) • Infants born to HBsAg-positive mothers • Household, needle-sharing, or sex contacts of HBsAg-positive persons • Men who have sex with men • Injection drug users • Patients with elevated liver enzymes (ALT/AST) of unknown etiology • Hemodialysis patients • Persons needing immunosuppressive or cytotoxic therapy • HIV-infected persons • Donors of blood, plasma, organs, tissues, or semen	Testing is recommended for: • Persons born from 1945–1965 • Persons who currently inject drugs or who have injected drugs in the past, even if once or many years ago • Recipients of clotting factor concentrates before 1987 • Recipients of blood transfusions or donated organs before July 1992 • Long-term hemodialysis patients • Persons with known exposures to HCV (e.g., healthcare workers after needlesticks, recipients of blood or organs from a donor who later tested positive for HCV) • HIV-infected persons • Children born to infected mothers (do not test before age 18 mos.) • Patients with signs or symptoms of liver disease (e.g., abnormal liver enzyme tests) • Donors of blood, plasma, organs, tissues, or semen
Treatment	• No medication available • Best addressed through supportive treatment	• Acute: No medication available; best addressed through supportive treatment • Chronic: Regular monitoring for signs of liver disease progression; some patients are treated with antiviral drugs	• Acute: Antivirals and supportive treatment • Chronic: Regular monitoring for signs of liver disease progression; new direct acting antiviral medications offer shorter durations of treatment and increased effectiveness, including over 90% of patients who complete treatment are cured
Vaccination Recommendations	Hepatitis A vaccine is recommended for: • All children at age 1 year • Travelers to regions with intermediate or high rates of Hepatitis A • Men who have sex with men • Users of certain illegal drugs (injection and non-injection) • Persons with clotting-factor disorders • Persons who work with HAV-infected primates or with HAV in a research laboratory • Persons with chronic liver disease, including HBV- and HCV-infected persons with chronic liver disease • Family and care givers of recent adoptees from countries where Hepatitis A is common • Anyone else seeking long-term protection	Hepatitis B vaccine is recommended for: • All infants at birth • Older children who have not previously been vaccinated • Susceptible sex partners of infected persons • Persons with multiple sex partners • Persons seeking evaluation or treatment for an STD • Men who have sex with men • Injection drug users • Susceptible household contacts of infected persons • Healthcare and public safety workers exposed to blood on the job • Persons with chronic liver disease, including HCV-infected persons with chronic liver disease • Persons with HIV infection • Persons with end-stage renal disease, including predialysis, hemodialysis, peritoneal dialysis, and home dialysis patients • Residents and staff of facilities for developmentally disabled persons • Travelers to regions with intermediate or high rates of Hepatitis B (HBsAg prevalence of ≥2%) • Unvaccinated adults with diabetes mellitus 19–59 (for those aged ≥60 years, at the discretion of clinician) • Anyone else seeking long-term protection	There is no Hepatitis C vaccine
Vaccination Schedule	2 doses given 6 months apart	• Infants and children: 3 to 4 doses given over a 6- to 18-month period depending on vaccine type and schedule • Adults: 3 doses given over a 6-month period (most common schedule)	No vaccine available

HPV

also known as *Human Papillomavirus*

As parents, you do everything you can to protect your children's health for now and for the future. Today, there is a strong weapon to prevent several types of cancer in our kids: the HPV vaccine.

HPV and Cancer

HPV is short for Human Papillomavirus, a common virus. In the United States each year, there are about 17,500 women and 9,300 men affected by HPV-related cancers. Many of these cancers **could be prevented with vaccination.** In both women and men, HPV can cause anal cancer and mouth/throat (oropharyngeal) cancer. It can also cause cancers of the cervix, vulva and vagina in women; and cancer of the penis in men.

For women, screening is available to detect most cases of cervical cancer with a Pap smear. Unfortunately, there is no routine screening for other HPV-related cancers for women or men, and these cancers can cause pain, suffering, or even death. **That is why a vaccine that prevents most of these types of cancers is so important.**

More about HPV

HPV is a virus passed from one person to another during skin-to-skin sexual contact, including vaginal, oral, and anal sex. HPV is most common in people in their late teens and early 20s. Almost all sexually active people will get HPV at some time in their lives, though most will never even know it.

Most of the time, the body naturally fights off HPV, before HPV causes any health problems. But in some cases, the body does not fight off HPV, and HPV can cause health problems, like cancer and genital warts. Genital warts are not a life-threatening disease, but they can cause emotional stress, and their treatment can be very uncomfortable. About 1 in 100 sexually active adults in the United States have genital warts at any given time.

HPV vaccination is recommended for preteen girls and boys at age 11 or 12 years

All preteens need HPV vaccination so they can be protected from HPV infections that cause cancer. Teens and young adults who didn't start or finish the HPV vaccine series also need HPV vaccination. Young women can get HPV vaccine until they are 27 years old and young men can get HPV vaccine until they are 22 years old. Young men who have sex with other men or who have weakened immune systems can also get HPV vaccine until they are 27.

HPV vaccination is a series of shots given over several months. The best way to remember to get your child all of the shots they need is to make an appointment for the remaining shots before you leave the doctor's office or clinic.

Is the HPV vaccine safe?

Yes. HPV vaccination has been studied very carefully and continues to be monitored by CDC and the Food and Drug Administration (FDA). No serious safety concerns have been linked to HPV vaccination. **These studies continue to show that HPV vaccines are safe.**

The most common side effects reported after HPV vaccination are mild. They include pain and redness in the area of the arm where the shot was given, fever, dizziness, and nausea. Some preteens and teens may faint after getting a shot or any other medical procedure. Sitting or lying down for about 15 minutes after getting shots can help prevent injuries that could happen if your child were to fall while fainting.

Why does my child need this now?

HPV vaccines offer the best protection to girls and boys who complete the series and have time to develop an immune response **before** they begin sexual activity with another person. This is not to say that your preteen is ready to have sex. In fact, it's just the opposite—it's important to get your child protected before you or your child have to think about this issue. The immune response to this vaccine is better in preteens, and this could mean better protection for your child.

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Serious side effects from HPV vaccination are rare. Children with severe allergies to yeast or latex shouldn't get certain HPV vaccines. Be sure to tell the doctor or nurse if your child has any severe allergies.

Help paying for vaccines

The Vaccines for Children (VFC) program provides vaccines for children ages 18 years and younger who are uninsured, Medicaid-eligible, or American Indian/Alaska Native. Learn more about the VFC program at **www.cdc.gov/Features/VFCprogram/**

Whether you have insurance, or your child is VFC-eligible, some doctors' offices may also charge a fee to give the vaccines.

Jacquelyn's story: "I was healthy—and got cervical cancer."

When I was in my late 20's and early 30's, in the years before my daughter was born, I had some abnormal Pap smears and had to have further testing. I was told I had the kind of HPV that can cause cancer and mild dysplasia.

For three more years, I had normal tests. But when I got my first Pap test after my son was born, they told me I needed a biopsy. The results came back as cancer, and my doctor sent me to an oncologist. Fortunately, the cancer was at an early stage. My lymph nodes were clear, and I didn't need radiation. But I did need to have a total hysterectomy.

My husband and I have been together for 15 years, and we were planning to have more children. We are so grateful for our two wonderful children, but we were hoping for more—which is not going to happen now.

The bottom line is they caught the cancer early, but the complications continue to impact my life and my family. For the next few years, I have to get pelvic exams and Pap smears every few months, the doctors measure tumor markers, and I have to have regular x-rays and ultrasounds, just in case. I have so many medical appointments that are taking time away from my family, my friends, and my job.

Worse, every time the phone rings, and I know it's my oncologist calling, I hold my breath until I get the results. I'm hopeful I can live a full and healthy life, but cancer is always in the back of my mind.

In a short period of time, I went from being healthy and planning more children to all of a sudden having a radical hysterectomy and trying to make sure I don't have cancer again. It's kind of overwhelming. And I am one of the lucky ones!

Ultimately I need to make sure I'm healthy and there for my children. I want to be around to see their children grow up.

I will do everything to keep my son and daughter from going through this. I will get them both the HPV vaccine as soon as they turn 11. I tell everyone—my friends, my family—to get their children the HPV vaccine series to protect them from this kind of cancer.

What about boys?

HPV vaccine is for boys too! This vaccine can help prevent boys from getting infected with the types of HPV that can cause cancers of the mouth/throat, penis and anus. The vaccine can also help prevent genital warts. HPV vaccination of males is also likely to benefit females by reducing the spread of HPV viruses.

Learn more about HPV and HPV vaccine at **www.cdc.gov/hpv**

For more information about the vaccines recommended for preteens and teens:
800-CDC-INFO *(800-232-4636)*
www.cdc.gov/vaccines/teens

Influenza:
Questions and Answers

Q&A

INFORMATION ABOUT THE DISEASE AND VACCINES

What causes influenza?

Viruses cause influenza. There are two basic types, A and B, which can cause clinical illness in humans. Their genetic material differentiates them. Influenza A can cause moderate to severe illness in all age groups and infects humans and other animals. Influenza B causes milder disease and affects only humans, primarily children.

Subtypes of the type A influenza virus are identified by two antigens (proteins involved in the immune reaction) on the surface of the virus. These antigens can change, or mutate, over time. An antigen "shift" (major change) creates a new influenza virus and an epidemic is likely among the unprotected population. This happened when the novel H1N1 influenza virus appeared in March 2009 and led to a major pandemic, lasting until the summer of 2010.

How does influenza spread?

Influenza is transmitted through the air from the respiratory tract of an infected person. It can also be transmitted by direct contact with respiratory droplets.

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

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

What are the symptoms of influenza?

Typical influenza disease is characterized by abrupt onset of fever, aching muscles, sore throat, and nonproductive cough. Additional symptoms may include runny nose, headache, a burning sensation in the chest, and eye pain and sensitivity to light. Typical influenza disease does not occur in every infected person. Someone who has been previously exposed to similar virus strains (through natural infection or vaccination) is less likely to develop serious clinical illness.

How serious is influenza?

Although many people think of influenza as just a common cold, it is really a specific and serious respiratory infection that can result in hospitalization and death.

In the United States, the number of influenza-associated deaths has increased since 1990. This increase is due in part to the substantial increase in the number of people age 65 years or older who are at increased risk for death from influenza complications. The Centers for Disease Control and Prevention (CDC) estimates that from the 1976–77 influenza season to the 2006–07 season, influenza-associated deaths ranged from a low of about 3,000 to a high of about 49,000 each year. It is estimated that approximately 43–89 million people became ill with 2009 pandemic H1N1 in the U.S. from April 2009 to April 2010.

Influenza disease can occur among people of all ages; however, the risks for complications, hospitalizations, and deaths are higher among people age 65 years or older, young children, and people of any age who have certain medical conditions. Pregnancy also increases the risk for serious medical complications from influenza.

During an outbreak in a long-term care facility, up to 60% of residents may become infected, with up to a 30% fatality rate in the infected people. Risk for influenza-associated death is highest among the oldest of the elderly: people age 85 years and older are 16 times more likely to die from an influenza-associated illness than people age 65–69 years.

Hospitalization from influenza-related complications is also high among children age 24 months and younger – comparable to rates for people age 65 and older. There were 146 laboratory-confirmed influenza-related pediatric deaths reported during the 2014–15 influenza season. During the H1N1 pandemic (April 2009 through September 2010), 348 influenza-related deaths in children were reported.

What are possible complications from influenza?

The most frequent complication of influenza is bacterial pneumonia. Viral pneumonia is a less common complication but has a high fatality rate. Other complications include inflammation of the heart and worsening of pulmonary diseases (e.g., bronchitis).

Reye's syndrome is a complication that occurs almost exclusively in children – patients suffer from severe vomiting and confusion, which may progress to coma

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Technical content reviewed by the Centers for Disease Control and Prevention

Saint Paul, Minnesota ▪ 651-647-9009 ▪ www.immunize.org ▪ www.vaccineinformation.org

www.immunize.org/catg.d/p4208.pdf ▪ Item #P4208 (9/16)

because of swelling of the brain. To decrease the chance of developing Reye's syndrome, infants, children, and teenagers should not be given aspirin for fever reduction or pain relief.

What is the best way to prevent influenza?

The best way to prevent influenza is with annual vaccination.

Is there an alternative to vaccination in preventing influenza?

Vaccination is the principal means of preventing influenza and its complications. Here are some additional steps that may help prevent the spread of respiratory illnesses like influenza:

1. Cover your nose and mouth with your sleeve or a tissue when you cough or sneeze – throw the tissue away after you use it.
2. Wash your hands often with soap and water, especially after you cough or sneeze. If you are not near water, use an alcohol-based hand cleaner.
3. Stay away as much as you can from people who are sick.
4. If you get influenza, stay home from work or school for at least 24 hours after the fever has ended. If you are sick, don't go near other people to avoid infecting them.
5. Try not to touch your eyes, nose, or mouth. Germs often spread this way.

Are any drugs available to prevent or treat influenza?

There are five antiviral agents approved for preventing or treating influenza in selected patients. Only three, oral oseltamivir (Tamiflu), inhaled zanamivir (Relenza), and intravenous peramivir (Rapivab) will provide protection against both A and B viruses; the other two, amantadine and rimantadine, protect only against the A viruses. Their use is generally limited to situations where an outbreak is underway and immediate protection of vulnerable, unvaccinated people is critical (e.g., nursing home residents) or in people who are expected to have an inadequate antibody response to the vaccine (e.g., people with cancer or being treated for cancer) or who could not otherwise be vaccinated (e.g., people with severe allergies to a vaccine component). Antiviral agents are not a substitute for vaccination. Recent evidence indicates that a high proportion of currently circulating influenza A viruses in the United States have developed resistance to amantadine and rimantadine. Researchers are watching for additional antiviral resistance to any of these five agents that might develop in the future.

If I contract influenza, what should I do?

Call your healthcare provider to discuss your particular situation. You will need to get plenty of rest and drink a lot of liquids. You can take medications to relieve the symptoms of influenza (but never give aspirin to children or teenagers who have influenza-like symptoms, particularly fever). If you are at high risk of developing complications from influenza, you should consult your healthcare provider immediately if you develop influenza-like symptoms. For purposes of treatment and prevention, antiviral medicines are prioritized for people at high risk for influenza-related complications, such as people 65 years or older, people with chronic medical conditions, pregnant women, and young children.

When is a person with influenza contagious?

A person is most likely to pass on the virus during the period beginning one to two days before the onset of symptoms and ending four to five days after the onset.

Can you get influenza more than once?

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

When did influenza vaccine first become available?

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

What kind of vaccine is it?

The most common influenza vaccine is made from inactivated (killed) viruses. A vaccine containing live viruses that have been weakened (attenuated) is also available, although it is not recommended to be used during the 2016–17 influenza season. Influenza vaccine in the United States contains either 3 or 4 strains of influenza virus.

Why is the live influenza vaccine (LAIV, FluMist) not recommended for the 2016–17 influenza season?

The Centers for Disease Control and Prevention (CDC) monitors the effectiveness of influenza vaccines during each influenza season. During the 2010–11 through 2012–13 seasons, the estimated effectiveness of LAIV

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and inactivated influenza vaccine (IIV) was about the same (45% to 71%, depending on the season). During the 2013–14 and 2015–16 seasons, CDC studies indicated that LAIV was not effective against the H1N1 component among children ages 2 through 17 years (during the 2014–15 season, neither vaccine was effective because of a mismatch between the vaccine and circulating influenza strains). It was because of these 3 consecutive years of low or no effectiveness that the Advisory Committee on Immunization Practices (ACIP) and the American Academy of Pediatrics (AAP) made the recommendation not to use LAIV during the 2016–17 season.

How are the vaccines made?

Every year, researchers and manufacturers develop a vaccine that contains virus strains they believe will be circulating in the upcoming influenza season. Influenza vaccine typically contains both type A and type B viruses.

For the inactivated (injectable) vaccine, the viruses are inactivated (killed), purified, and packaged in vials or syringes. Live virus vaccine is packaged in a special nasal sprayer. About six months are required to produce influenza vaccine each year.

How is the vaccine given?

The inactivated vaccine is generally given as an intramuscular injection; one inactivated vaccine can be given as an intradermal injection with a micro needle into the skin of the arm for persons ages 18 through 64 years. The live attenuated vaccine is sprayed into the nose.

Is the vaccine that contains 4 viruses preferred over the vaccine that contains 3 viruses?

Vaccines that contain four strains of influenza virus may eventually replace 3-virus vaccines. CDC and other groups do not have a preference for use of the 4-virus vaccine over the 3-virus vaccine.

Who should get influenza vaccine?

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

What are the unique features of giving influenza vaccine to children compared with adults?

Children ages 6 months through 8 years should receive two doses of influenza vaccine, separated by at least 4 weeks, the first time they receive this vaccine. Children who received 2 or more total doses of influenza vaccine before July 1, 2016 need only one dose for the 2016–17 season. Your doctor or other healthcare professional should be able to tell you if your child needs a second dose.

Children age 6 through 35 months should receive only Fluzone inactivated vaccine.

Who recommends the influenza vaccine?

The Centers for Disease Control and Prevention (CDC), the American Academy of Pediatrics (AAP), the American Academy of Family Physicians (AAFP), the American College of Physicians (ACP), and the American College of Obstetricians and Gynecologists (ACOG) all recommend this vaccine.

How often should this vaccine be given?

Influenza vaccine is given each year because immunity decreases after a year and because each year's vaccine is formulated to prevent only that year's anticipated influenza viruses. An annual vaccination is recommended even if the strains included in the vaccine are not changed from one year to the next.

When should people be vaccinated?

Health experts recommend that patients should be vaccinated as soon as vaccine is available in their clinic, which can be as early as August or September. Vaccination should continue into the winter and spring, even until April or May. Travelers should be aware that the influenza season typically occurs from April to September in the Southern Hemisphere and throughout the year in the tropics. If they missed vaccination in the previous season, they should still be vaccinated before they travel, even if it's in the following spring or summer.

Are there recommendations for the prevention of influenza outbreaks in institutions?

The most important factor in preventing outbreaks is annual vaccination of all occupants of the facility and all people working or volunteering in the facility who share the same air as the high-risk occupants. Groups that should be targeted include physicians, nurses, and all other personnel in hospitals, long-term care facilities, other care facilities, and outpatient settings who have contact with high-risk patients in all age groups.

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Should siblings of a person with a chronic illness receive influenza vaccine even though the chronically ill person has been vaccinated?

Yes. Vaccination is recommended for all people ages 6 months and older. This includes all household contacts of people with high-risk conditions.

Should siblings of a healthy child who is younger than age 6 months be vaccinated?

Yes, it is especially important that all household contacts of children too young to be vaccinated against influenza (i.e., younger than age 6 months) receive annual influenza vaccination to protect the infant from serious infection. This is very important because these infants are too young to be vaccinated and are most vulnerable to complications from influenza.

Why are different influenza vaccines (Fluzone High-Dose; Fluad) available for adults 65 and older?

Aging decreases the body's ability to develop a good immune response after getting influenza vaccine, which places older people at greater risk of severe illness from influenza. Vaccine manufacturers have taken two different approaches to improve the immune response in older people.

For Fluzone High-Dose, a larger amount of antigen in the vaccine gives older people a better immune response and provides better protection against influenza. Data from clinical trials comparing regular Fluzone to Fluzone High-Dose among people age 65 and older indicate that higher antibody levels occur after vaccination with Fluzone High-Dose. Compared to standard Fluzone, the high-dose formulation reduced laboratory-confirmed influenza by about 24% and reduced the risk of pneumonia and hospitalization.

For Fluad (new in the U.S. for the 2016-2017 season), the manufacturer includes an adjuvant to improve the response to the vaccine. The adjuvant is called MF59 and is an oil-in-water emulsion containing squalene, an oil that occurs naturally in many plants and animals. Fluad is the first influenza vaccine licensed in the U.S. that contains an adjuvant.

Both Fluzone High-Dose and Fluad are trivalent formulations (containing H3N2, H1N1 and B viruses) and both are approved for use only in people 65 years of age and older. Neither vaccine should be given to people younger than 65 years.

CDC has stated no preference for using high-dose or adjuvanted vaccine or standard-dose influenza vaccine for people age 65 and older. But it is reasonable for a person age 65 years or older to receive either Fluzone High-Dose or Fluad if it is readily available. However, influenza vaccination should not be deferred if the high-dose or adjuvanted formulation is not immediately available. Standard dose vaccine should be given.

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

People with cancer need to be protected from influenza. Cancer patients and survivors are at higher risk for complications from influenza, including hospitalization and death. They can and should receive injectable (inactivated) influenza vaccine (not the nasal spray vaccine) even if they are being treated for cancer. Here is a helpful CDC web page on cancer and influenza for patients: www.cdc.gov/cancer/flu.

Is it safe for pregnant women to get influenza vaccine?

Yes. In fact, vaccination with the inactivated vaccine is recommended for women who will be pregnant during the influenza season. Pregnant women are at increased risk for serious medical complications from influenza. One recent study found that the risk of influenza-related hospitalization was four times higher in healthy pregnant women in the fourteenth week of pregnancy or later than in nonpregnant women. An increased risk of severe influenza infections was also observed in postpartum women (those who delivered within the previous 2 weeks) during the 2009–10 H1N1 pandemic. In addition, vaccination of the mother will provide protection for her newborn infant. The live intranasal vaccine is not licensed for use in pregnant women. However, pregnant women do not need to avoid contact with people recently vaccinated with this vaccine.

Vaccination is especially important for all people who are contacts of infants or children from birth through age 59 months because infants and young children are at higher risk for influenza complications and are more likely to require medical care or hospitalization if infected. Women who are breastfeeding may be vaccinated.

How safe is this vaccine?

Influenza vaccine is very safe. The most common side effects of the injectable (inactivated) influenza vaccine include soreness, redness, or swelling at the site of

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the injection. These reactions are temporary and occur in 15%–20% of recipients. Less than 1% of vaccine recipients develop symptoms such as fever, chills, and muscle aches for 1 to 2 days following the vaccination. Experiencing these non-specific side effects does not mean that you are getting influenza.

Healthy children ages 2 through 4 years who received the live attenuated virus (nasal spray) vaccine during clinical trials appeared to have an increased chance of wheezing. In previous years, children with a history of recurrent wheezing or have had a wheezing episode within the past 12 months were not recommended to receive the live nasal spray vaccine. Healthy adults receiving the live influenza vaccine reported symptoms such as cough, runny nose, sore throat, chills, and tiredness at a rate 3%–18% higher than for placebo recipients. ACIP recommends that LAIV not be used in any age group for the 2016–17 season.

Serious adverse reactions to either vaccine are very rare. Such reactions are most likely the result of an allergy to a vaccine component. In 1976, the swine influenza vaccine was associated with a severe illness called Guillain-Barré syndrome (GBS), a nerve condition that can result in temporary paralysis. Injectable influenza vaccines since then have not been clearly linked with GBS, because the disease is so rare it is difficult to obtain a precise estimate of any increase in risk. However, as a precaution, any person without a high risk medical condition who previously experienced GBS within 6 weeks of an influenza vaccination should generally not be vaccinated. Instead, their physician may consider using antiviral drugs during the time of potential exposure to influenza.

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

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

In recent years, several large scientific studies have determined that thimerosal in vaccines does not lead to serious neurologic problems, including autism. However, because we generally try to reduce people's exposure to mercury if at all possible, vaccine manufacturers have voluntarily changed their production methods to produce vaccines that are now free of thimerosal or have only trace amounts. They have done this because it is possible to do, not because there was any evidence that the thimerosal was harmful.

How effective is influenza vaccine?

Protection from influenza vaccine varies by the similarity of the vaccine strain(s) to the circulating strains, and the age and health of the recipient. Healthy people younger than age 65 years are more likely to have protection from their influenza vaccination than are older, frail individuals. It is important to understand that although the vaccine is not as effective in preventing influenza disease among the elderly, it is effective in preventing complications and death.

When the "match" between vaccine and circulating strains is close, the injectable (inactivated) vaccine prevents influenza in about 50%–70% of healthy people younger than age 65 years. Among elderly nursing home residents, the shot is most effective in preventing severe illness, secondary complications, and deaths related to influenza.

Can the vaccine cause influenza?

No. Neither the injectable (inactivated) vaccine nor the live attenuated (nasal spray) vaccine can cause influenza. The injectable influenza vaccine contains only killed virus fragments and cannot cause influenza disease. Fewer than 1% of people who are vaccinated develop influenza-like symptoms, such as mild fever and muscle aches, after vaccination. These side effects are not the same as having the actual disease. The nasal spray influenza vaccine contains live attenuated (weakened) viruses that can produce mild symptoms similar to a cold. While the viruses are able to grow in the nose and throat tissue and produce protective immunity, they are weakened and do not grow effectively in the lung. Consequently, they cannot produce influenza disease.

Protective immunity develops 1 to 2 weeks after vaccination. It is possible that a recently vaccinated person can be exposed to influenza disease before they develop immunity from the vaccine and consequently develop disease. This can result in someone erroneously believing they developed the disease from the vaccination.

Also, to many people "the flu" is any illness with fever and cold symptoms. If they get any viral illness, they

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may blame it on the influenza vaccination or think they got "the flu" despite being vaccinated. Influenza vaccine only protects against certain influenza viruses, not all viruses.

Who should NOT receive influenza vaccine?

In general, the inactivated (injectable) influenza vaccine can be given to everyone except children younger than age 6 months and people with a history of a severe allergic reaction to a previous dose of influenza vaccine (see next question).

Although not recommended for the 2016–17 season, LAIV is expected to be available and some providers may choose to administer it to their patients. In this situation the following people should not be vaccinated with the live, attenuated virus (nasal spray) influenza vaccine; however, most (except infants younger than 6 months) can be vaccinated with the injectable vaccine:

- People younger than age 2 years
- People age 50 years or older
- Immunosuppressed persons
- Children ages 2 through 4 years with a history of recurrent wheezing or who have had a wheezing episode in the last 12 months
- Children 2 through 17 years who are receiving aspirin or aspirin-containing products
- Pregnant women (adolescents or adults)
- People with a history of egg allergy
- People with severe allergic reaction following a previous dose of nasal spray vaccine
- People who have taken influenza antiviral medication within the previous 48 hours

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

In addition, the following conditions are considered precautions to LAIV:

- Moderate or severe acute illness
- Chronic pulmonary conditions
- Asthma in someone 5 years old or older
- Cardiovascular (except isolated hypertension) conditions
- Renal conditions
- Hepatic conditions
- Neurologic conditions
- Hematologic conditions
- Metabolic conditions (including diabetes mellitus)

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

People with a history of Guillain-Barré syndrome should also consult with their physician before receiving this vaccine, so that the potential risks and benefits of influenza immunization can be weighed. People who are moderately or severely ill at the time of their influenza vaccination appointment should usually wait until their symptoms are improved before getting the vaccine.

Some people believe they are allergic to thimerosal, the preservative used in some brands of influenza vaccine supplied in multi-dose vials, because in the past they developed eye irritation after using eye drops containing thimerosal. Past eye irritation is not a valid reason to avoid getting influenza vaccine. Only serious, life-threatening allergies to thimerosal are reasons not to be vaccinated with an influenza vaccine containing thimerosal.

Some brands of influenza vaccine are packaged in vials or syringes that contain natural rubber or latex. People with a severe allergy to latex generally should not receive vaccine packaged in these vials or syringes.

Please summarize the influenza vaccine that does not contain egg protein.

In January 2013 the U.S. Food and Drug Administration (FDA) licensed Flublok, the first influenza vaccine available in the United States that is completely egg-free. Unlike current production methods for other influenza vaccines, production of Flublok does not use the whole influenza virus or chicken eggs in its manufacturing process. It is licensed for persons age 18 years and older.

Some providers may choose to administer FluBlok to their severely egg-allergic patients. ACIP recommends that any available influenza vaccine may be given to egg-allergic patients without a preference for FluBlok. However, vaccination of people with severe egg allergy with a vaccine other than FluBlok should be supervised by a healthcare provider who is able to recognize and manage a severe allergic reaction.

WHAT YOU NEED TO KNOW ABOUT MENINGOCOCCAL DISEASE

- Meningococcal disease can refer to any illness that is caused by the bacteria *Neisseria meningitidis*, also known as meningococcus. These illnesses are often severe and include infections of the lining of the brain and spinal cord (meningitis) and bloodstream infections (bacteremia or septicemia).
- Approximately 600 – 1,000 people contract meningococcal disease in the U.S. each year.
- Meningococcal disease is rare, but it can be deadly, leading to death in 10-15% of cases.
- Among those who survive, as many as 19% (1 in 5) live with permanent disabilities, such as brain damage, hearing loss, loss of kidney function or limb amputations.
- Prevention of meningococcal disease is critical because it can be mistaken for flu or other viral infections and it can rapidly lead to death or disability.
- Health officials recommend quadrivalent meningococcal conjugate (MCV4) vaccination at 11-12 years with a booster at 16 years. Young adults between 16 and 23 years should also ask a healthcare provider about MenB vaccination against serogroup B.
- 1 in 5 (20%) U.S. teens have not yet received their first dose of the quadrivalent meningococcal conjugate (MCV4) vaccination and remain unprotected. And less than one-third of first dose recipients have received the recommended booster dose.
- Many teens have not received the meningococcal serogroup B vaccine (MenB) since it was only recently permissively recommended by the Centers for Disease Control and Prevention (CDC) in 2015.

Q & A

Who is at risk for meningococcal disease?

Anyone at any age can contract meningococcal disease, but some groups have a higher risk for contracting the disease if exposed.

- Adolescents and young adults (11-24 years); 21% of all meningococcal disease occurs in preteens, teens and young adults.
- Infants less than 1 year;
- Those living in crowded settings such as dorm rooms or military barracks;
- Those with persistent complement component deficiencies or anatomic or functional asplenia;
- Those traveling to specific areas outside of the United States, such as the meningitis belt in Africa;
- Laboratory personnel who are routinely exposed to meningococcal bacteria; and
- Those who may have been exposed to meningococcal disease during an outbreak.

Why are adolescents and young adults at increased risk for meningococcal disease?

Certain lifestyle factors common among adolescents and young adults increase their risk. These include, but are not limited to:

- Crowded living (dormitories, boarding schools, sleep-away camps, etc.);
- Attendance at a new school with students from geographically diverse areas;
- Irregular sleeping patterns;

- Active or passive smoking;
- Social situations where there is crowding or sharing (drinks, food, lip gloss, etc.); and
- Moving to a new residence.

How is meningococcal disease spread?

Meningococcal disease is contagious. It is spread through the exchange of respiratory secretions during close contact such as kissing or coughing on someone. Although meningococcal bacteria are dangerous, they cannot live outside the human body for very long. This means the infection is not as easily spread as a cold virus. About 1 in 10 people carry meningococcal bacteria in their nose or throat without showing any signs or symptoms of the disease. These people can unknowingly transmit the bacteria to others.

What are the symptoms of meningococcal disease?

Meningococcal disease is often misdiagnosed as early symptoms resemble those of other infections like the flu. Symptoms may include sudden high fever, headache, nausea, vomiting and exhaustion. Particularly worrisome signs of the infection include a purplish rash, pain when looking at bright lights and a stiff neck. Since symptoms progress extremely quickly, it is very important that medical attention is sought immediately as the symptoms are recognized.

Can meningococcal disease be prevented?

Yes! Vaccination offers the best protection against the disease. Routinely recommended vaccines offer protection against the bacteria (*Neisseria meningitidis*) that cause meningococcal disease: Serogroups A, C, W and Y. The CDC recommends the quadrivalent meningococcal conjugate (MCV4) vaccine to all adolescents at age 11-12 years with a booster recommended at age 16 years.

The CDC additionally recommends permissive use of serogroup B meningococcal vaccination (MenB vaccines) at ages 16-23 years, with a preferred age of administration at 16 to 18 years. Older adolescents and young adults can decide, in collaboration with their healthcare professionals, to be vaccinated against serogroup B and it will be covered by private and public health insurance.

Vaccination is the best method of disease prevention. However, maintaining a healthy lifestyle by getting plenty of rest, being diligent about hand-washing and avoiding close contact with people who are sick can also help.

Why a school requirement?

Enforcement of mandatory immunization requirements for children entering childcare facilities and schools has resulted in high childhood and adolescent immunization coverage levels. Nevada previously only required the Tdap vaccine for 7th grade entry, and the quadrivalent meningococcal conjugate (MCV4) vaccine was recommended to be administered at the same visit. Unfortunately, national studies show that 86% of adolescent patients who were in the office for a "vaccine-only" visit did not receive their first dose along with other age-recommended vaccines. This requirement will help Nevada improve our immunization coverage for the quadrivalent meningococcal conjugate (MCV4) vaccine.

RESOURCES

National Meningitis Association: http://www.nmaus.org/
Immunization Action Coalition: http://immunize.org/meningococcal/
CDC: https://www.cdc.gov/meningitis/bacterial.html
Immunize Nevada: https://www.immunizenevada.org/meningitis

Updated 2/13/17

Meningococcal B Vaccine: Q&A
CDC Answers Your Questions

Experts from the National Center for Immunization and Respiratory Diseases at the Centers for Disease Control and Prevention answer your questions about meningococcal serogroup B (MenB) vaccine.

Which meningococcal vaccines are available in the United States?

Since 2005, two types of meningococcal vaccines have been available in the United States that protect against meningococcal serogroups A, C, W, and Y: 1) meningococcal polysaccharide vaccine (MPSV4, Menomune, Sanofi Pasteur) which is made up of polysaccharide (sugar molecules) from the surface of the meningococcal bacteria; and 2) meningococcal conjugate vaccines (MenACWY, Menactra, Sanofi Pasteur; Menveo, GSK) in which the polysaccharide is chemically bonded ("conjugated") to a protein to produce better protection.

More recently, two vaccines have become available that offer protection from meningococcal serogroup B disease (MenB, Bexsero, GSK; Trumenba, Pfizer). These vaccines are composed of proteins also found on the surface of the bacteria. Both MenB vaccines are approved by the Food and Drug Administration for use in persons 10 through 25 years of age.

MPSV4 and MenACWY provide no protection against serogroup B disease and meningococcal serogroup B vaccines (MenB) provide no protection against serogroup A, C, W, or Y disease. For protection against all 5 serogroups of meningococcus, it is necessary to receive MenACWY or MPSV4 *and* MenB.

Which individuals in risk groups are recommended to be vaccinated against meningococcal serogroup B disease?

CDC's Advisory Committee on Immunization Practices (ACIP) recommends routine MenB vaccination of the following individuals in certain risk groups:

- People age 10 years and older who have functional or anatomic asplenia
- People age 10 years and older who have persistent complement component deficiency, including people taking eculizumab (Soliris)
- People age 10 years and older who are at risk during an outbreak caused by a vaccine serogroup, such as on a college campus
- Microbiologists who work with meningococcus bacteria in a laboratory

Administration of MenB vaccine in persons older than 25 years of age is an off-label use. Clinicians may choose to use vaccines off-label if they believe it would be of benefit to their patients.

Which individuals are recommended to be vaccinated against meningococcal serogroup B disease who are not in risk groups?

ACIP recommends that a MenB vaccine series may be administered to people 16 through 23 years of age with a preferred age of vaccination of 16 through 18 years. This Category B recommendation gives clinicians an opportunity to discuss the value of MenB vaccination with their patients to make a decision together about the individual's need or desire for the vaccine based on risks, benefits, and wish for protection from the disease. Because it is a Category B recommendation, MenB vaccination is covered by the Vaccines for Children Program for anyone who is eligible. Under the Affordable Care Act, private insurance must also cover the costs of both Category A and B recommended vaccines.

What is the difference between a Category A and Category B recommendation?

A Category A recommendation is made for all persons in an age- or risk-factor-based group. The meningococcal conjugate vaccine recommendation for all preteens at 11–12 years of age is an example of a Category A recommendation. A Category B recommendation does not apply to everyone, but in the context of a clinician-patient interaction, vaccination may be found to be appropriate for a person as noted above for MenB vaccination of healthy adolescents.

Does the Affordable Care Act (ACA) require health plans (non-grandfathered) to provide benefit coverage on Category B recommended vaccines?

Yes. ACA requires coverage of vaccines with both Category A and B recommendations. The Vaccines for Children Program also includes vaccines with a Category A and B recommendations.

Should college students be vaccinated against meningococcal B disease?

Although several small meningococcal serogroup B disease outbreaks have occurred on college campuses since 2013, college students in general are not at higher risk of meningococcal B disease than persons of the same age who are not college students. Consequently, ACIP does not routinely recommend MenB vaccination for college students. However, college students may choose to receive MenB vaccine to reduce their risk of serogroup B meningococcal disease.

Should international travelers receive both meningococcal conjugate vaccine and meningococcal serogroup B vaccine?

Travelers are not considered to be a group at increased risk for serogroup B meningococcal disease and are not recommended to receive serogroup B vaccine. Meningococcal conjugate vaccine (MenACWY) continues to be recommended for certain international travelers (residents of and travelers to sub-Saharan Africa and the Hajj in Saudi Arabia).

What is the schedule for administering MenB vaccine?

Bexsero is a 2-dose series with dose #2 given at least 1 month after dose #1. Trumenba is either a 2-dose series with doses adminis-

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www.immunize.org/catg.d/p2040.pdf • Item #P2040 (11/16)

tered at least 6 months apart or a 3-dose series with dose #2 and dose #3 administered 2 and 6 months after dose #1. The ACIP recommends that persons at increased risk of meningococcal serogroup B disease (complement component deficiency, functional or anatomic asplenia, at risk during an outbreak of meningococcal B disease and microbiologists) receive either the 2-dose Bexsero series or the 3-dose Trumenba series. Persons not at increased risk (such as healthy adolescents and young adults) can receive either the 2-dose Bexsero series or the 2-dose Trumenba series.

What is the least amount of time allowable between doses (minimum intervals) when administering either of the MenB vaccines?

Neither ACIP nor the CDC meningococcal subject matter experts have addressed this issue. So we must assume that the routinely recommended intervals are also the minimum intervals (see previous question). It is important to use these intervals when scheduling doses. However, if these intervals are violated, CDC recommends that the dose can be counted and does not need to be repeated.

Can the MenB series be completed with a different MenB brand from the one the series was begun with?

No. You may not switch MenB vaccines in order to complete a series. The series must be started and completed with the same MenB brand.

I have a patient who was given Trumenba in August. Two months later she was given a dose of Bexsero. How should I proceed with her MenB vaccination series? We stock both vaccines.

Since the ACIP meningococcal serogroup B vaccine recommendations state that the same vaccine must be used for all doses in the MenB series, the clinician needs to complete a series with one or the other vaccine. If a non-high risk person has already received 1 dose of Bexsero and 1 of Trumenba, then pick a brand and finish a recommended schedule with that brand. Ignore the extra dose of the other product that was already administered. If you choose to use Bexsero, it should be separated from the previous dose of Bexsero by one month. If you choose to use Trumenba, it should be separated from the previous dose of Trumenba by 6 months.

We have a 1-year-old with congenital asplenia. He already received a series of meningococcal conjugate vaccine. Should we also give him MenB vaccine?

Use of either meningococcal serogroup B vaccine in persons younger than age 10 years is off-label in the U.S. There is currently no ACIP recommendation for use of this vaccine for this age group. However, Bexsero brand meningococcal B vaccine has been studied in children and is approved for children as young as 2 months of age by the European Medicines Agency (the European version of the U.S. Food and Drug Administration). It is routinely recommended for infants in the United Kingdom (see www.nhs.uk/conditions/vaccinations/pages/meningitis-b-vaccine.aspx for details). A clinician may choose to use a vaccine off-label if, in their opinion, the benefit of the vaccine exceeds the risk from the vaccine. Product information for Bexsero can be found on the European Medicines Agency website at www.ema.europa.eu/ema. These doses may not be covered by insurance.

Can meningococcal conjugate (MenACWY) and MenB vaccines be given at the same visit?

Yes. Meningococcal conjugate and MenB vaccines can be given at the same visit or at any time before or after the other.

Which groups of patients should receive a booster dose of MenB vaccine after completion of the series?

ACIP does not currently recommend booster doses of MenB vaccine for any group.

By what route should meningococcal B vaccines be administered?

MenB vaccines are given by the intramuscular route.

What are the contraindications and precautions to MenB vaccine?

As with all vaccines, a severe allergic reaction to a vaccine component or a reaction following a prior dose is a contraindication to subsequent doses. The tip caps of the Bexsero pre-filled syringes contain natural rubber latex which may cause allergic reactions in latex-sensitive individuals. The only precaution for administering MenB vaccine is the presence of a moderate or severe acute illness. Vaccination should be deferred until the illness improves.

What adverse reactions have been reported after MenB vaccine?

For both MenB vaccines the most common adverse reactions observed in clinical trials were local reactions, including pain at the injection site (83%–85%), erythema and swelling.

How should MenB vaccines be stored?

MenB vaccines should be stored refrigerated at 36°F to 46°F (2°C to 8°C). Do not freeze the vaccines. Discard any vaccine that has been exposed to freezing temperature. Protect the vaccine from light.

REFERENCES

CDC. Use of Serogroup B Meningococcal Vaccines in Persons Aged ≥10 Years at Increased Risk for Serogroup B Meningococcal Disease: Recommendations of the Advisory Committee on Immunization Practices, 2015. *MMWR* 2016;64(No.22):608-12.

CDC. Use of Serogroup B Meningococcal Vaccines in Adolescents and Young Adults: Recommendations of the Advisory Committee on Immunization Practices, 2015. *MMWR* 2015;64(No.41):1171-6.

Measles

"106 Degrees": A True Story

If you hear "106 degrees" you probably think "heat wave," not a baby's temperature. But for Megan Campbell's 10-month-old son, a life-threatening bout of measles caused fevers spiking to 106 degrees and sent him to the hospital.

"After picking our son up at child care because he had a fever," Megan said. "We went straight to our pediatrician who said our baby had a virus. Two days later, his fever hit 104 degrees and a rash appeared on his head."

The rash quickly crept down to his arms and chest. Megan and husband Chris turned to the Internet. Finding pictures of measles that looked like their son's rash, they rushed him to the local children's hospital.

"No one there had seen or tested for measles for about 17 years," says Megan said. "And no one expected it in the year 2008 in the United States. The next day, an infectious disease specialist confirmed measles.

"We spent 3 days in the hospital fearing we might lose our baby boy. He couldn't drink or eat, so he was on an IV, and for a while he seemed to be wasting away. When he began to be able to drink again we got to take him home. But the doctors told us to expect the disease to continue to run its course, including high fever, —which did spike as high as 106 degrees. We spent a week waking at all hours to stay on schedule with fever reducing medications and soothing him with damp wash cloths. Also, as instructed, we watched closely for signs of lethargy or non-responsiveness. If we'd seen that, we'd have gone back to the hospital immediately."

Thankfully, the baby recovered fully.

Megan now knows that her son was exposed to measles during his 10-month check-up, when another mother brought her ill son into the pediatrician's waiting room. An investigation found that the boy and his siblings had gotten measles overseas and brought it back to the United States. They had not been vaccinated.

"People who choose not to vaccinate their children actually make a choice for other children and put them at risk," Megan explained. "At 10 months, my son was too young to get the measles, mumps, rubella (MMR) vaccine. But when he was 12 months old, we got him the vaccine, —even though he wasn't susceptible to measles anymore. This way, he won't suffer from mumps or rubella, or spread them to anyone else."

Measles Symptoms

Measles begins with an increasing fever, then coughing, runny nose, redness of the eyes, and finally, a rash breaks out. The rash usually starts on the head and then spreads to the rest of the body. Fever can persist, reaching extremely high temperatures, rash can last for up to a week, and coughing can last about 10 days.

Measles Is Serious

Measles ranges from a pretty uncomfortable disease to a very serious one. For example, for every 1,000 children who get measles in a developed country like the United States, 1 to 3 of them die, despite the best treatment. Even recently, from 2001 through 2010, an average of 1 out of every 4 people in the United States who got measles had to be hospitalized. Many of these serious cases were among children.

People Exposed to Measles Who Have Not Been Vaccinated Almost Always Get Measles

Measles is one of the most contagious diseases known. It is a virus that mainly spreads by direct contact with airborne respiratory droplets. For example, if someone who is contagious coughs or sneezes near someone who is susceptible, the susceptible person is very likely to get measles. You can catch measles just by being in a room where a person with measles has been—even if the person is gone!

Vaccination Has Made Measles Rare in United States, but Not Worldwide

Thanks to wide-spread use of a safe and effective vaccine, the number of reported measles cases in the United States is now, on average, less than 100 a year. But worldwide, measles still causes 164,000 deaths each year. There is no drug to cure measles. "It's critical to remember the global picture for any vaccine-preventable disease," said the World Health Organization's Dr. Peter Strebel. "More than ever, we live in a global society where travel is common. And even if you and

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your family don't travel, you can come into contact with travelers anywhere in your community, from the grocery store to a sporting event."

Measles, Mumps, and Rubella Vaccine

The measles, mumps, and rubella vaccine (MMR) is the best way to protect against getting measles. The risk of MMR vaccine causing a serious side effect is rare. Getting MMR vaccine is much safer than getting measles. In the United States, the first dose of MMR vaccine is recommended at age 12 months through 15 months old. The vaccine is less effective if it is given earlier than age 12 months, because the antibodies that babies may receive from their mothers may interfere with the process of making new antibodies after getting the vaccine. A second dose is recommended at age 4 through 6 years. Anyone born during or after 1957 who has not had measles or been vaccinated is at risk and should get at least one dose of MMR vaccine.

All Reputable Studies Have Found No Link Between MMR Vaccine and Autism

Some parents of children with autism believe the condition is linked to vaccination because their child's diagnosis of autism came after their child got MMR vaccine. According to Dr. Anne Schuchat, the director of the immunization program at the Centers for Disease Control and Prevention (CDC), "As you think about risks and benefits of the MMR vaccine for your child, you should know that the possibility of a link between MMR vaccine and autism has been studied since 1998—beginning immediately when the concern first came up." Dr. Schuchat added that "Large studies of children done in the United States, the United Kingdom, and Denmark found no link between MMR vaccine and autism. CDC and its partners support continued research to find the causes of autism. I encourage parents who are concerned about autism to visit CDC's 'Learn the Signs, Act Early' website at http://www.cdc.gov/ncbddd/autism/actearly/ to find out more about child development. Most importantly, parents who have questions about the MMR vaccine should talk to their child's doctor."

Benefits of MMR Vaccine

In addition to protecting from mumps and rubella, getting MMR vaccine as recommended to protect against measles—

- Saves lives.
- Prevents hospitalizations.
- Protects young children, for whom the disease can be especially serious.
- Keeps others safe. For example, following the recommended vaccination schedule, babies younger than 1 year old are not vaccinated, so they need the protection that comes from those around them being vaccinated. All babies are at increased risk for complications if they get measles.

Risks of MMR Vaccine

- Mild side effects are fever, mild rash, and, rarely, swelling of the glands in the cheeks or neck.
- Moderate side effects are rare. For example, about 1 out of 3,000 vaccinated children gets a fever that is high enough to cause a seizure. About 1 out of 30,000 could develop a temporary low platelet count, which could cause bruising.
- Severe side effects are very rare. For example, fewer than one in 1 million children have a serious allergic reaction.

Selected References

Centers for Disease Control and Prevention (CDC). Measles. In: Atkinson W, Hamborsky J, McIntyre L, Wolfe S, eds. Epidemiology and Prevention of Vaccine-Preventable Diseases (The Pink Book). 11th ed. Washington, DC: Public Health Foundation, 2009. p. 157–175. http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm

Centers for Disease Control and Prevention (CDC). Measles—United States, January–May 20, 2011. MMWR 2011; 60(20):666–668. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6020a7.htm?s_cid=mm6020a7_w

Perry RT, Halsey NA. The clinical significance of measles: a review. J Infect Dis 2004;189(Suppl 1):S4–S16. http://www.journals.uchicago.edu/doi/full/10.1086/377712

Institute of Medicine (US). Immunization safety review: vaccines and autism. Washington, DC: The National Academies Press; 2004. http://books.nap.edu/openbook.php?record_id=10997

Mrozek-Budzyn, D, Kieltyka, A, Majewska, R. Lack of association between measles-mumps-rubella vaccination and autism in children: A case-control study. Pediatric Infectious Disease Journal 2010; 29(5): 397–400. Abstract at http://www.ncbi.nlm.nih.gov/pubmed/19952979

Measles Vaccine Saves Lives

According to Dr. Michael Brady, Chair of the Committee on Infectious Diseases, American Academy of Pediatrics, "It's true that most people in the United States who get measles recover totally—most but definitely not all. By the late 1950s, even before the vaccine was developed, improved health care and nutrition had reduced the risk of measles. But getting measles is always risky; measles can result in hospitalization, life-long disability, and death."

Measles vaccine was developed in the United States in the 1960s. Right before the vaccine came out, there were about 3 to 4 million measles cases every year. About 48,000 people, most of them children, were hospitalized each year with complications such as encephalitis (brain swelling) or severe respiratory illness, and there were 400 to 500 deaths from complications. Most cases were in school-age children. Measles was, and remains, most risky for children younger than 5 years of age.

Measles Today

In 2011, the number of people with measles in the United States was higher than usual. "There were 220 people reported to have measles. That's more than any year since 1996," said Dr. Greg Wallace of the CDC. Measles sent 70 of these people to the hospital. People who had measles spread the disease to others. This caused 16 different measles outbreaks in U.S. communities in 2011.

Why are there so many people with measles? According to CDC's Dr. Jane Seward, a long-time leader in CDC's group that monitors vaccine-preventable viral diseases, "Measles spreads easily among unvaccinated people. In 2011, 86% of the people reported to have measles in the United States had not been vaccinated or did not know if they had been vaccinated."

In 2000, experts concluded that year-round circulation of measles virus had been interrupted in the United States because of our high immunity due to vaccination.

So where do measles cases come from? According to Dr. Wallace, "Measles is still common in other parts of the world, including countries in Europe, Asia, the Pacific, and Africa. These days, measles is brought into the United States by people who got infected while they were in other countries. Some people may not even realize they are at risk even when they travel to highly-industrialized countries, like France, England, and Italy. But, these countries do have measles and travelers who get measles can return and infect others in their communities. Communities with many unvaccinated people put themselves and others at risk."

Because of the risk of getting measles in another country, CDC recommends that babies ages 6 to 11 months who are traveling internationally receive one dose of MMR vaccine before their trip. These infants will still need 2 more doses of the vaccine later for best protection (one dose at 12 through 15 months and another dose at least 28 days later).

"The best thing we can all do," says Dr. Seward, "is to be vigilant about on-time vaccination for children and those adults who need vaccination, so measles cannot spread from person to person."

The Centers for Disease Control and Prevention, the American Academy of Family Physicians, and the American Academy of Pediatrics strongly recommend vaccines.

800-CDC-INFO *(800-232-4636)* **http://www.cdc.gov/vaccines**

Mumps and the Vaccine (Shot) to Prevent It

Last updated February 2014

The best way to protect against mumps is to get the measles-mumps-rubella shot (called the MMR shot). Doctors recommend that all children get the MMR shot.

Why should my child get the MMR shot?

The MMR shot:

- Protects your child from mumps, a potentially serious disease (and also protects against measles and rubella)
- Prevents your child from getting a fever and swollen glands under the ears or jaw from mumps
- Keeps your child from missing school or childcare (and keeps you from missing work to care for your sick child)

Is the MMR shot safe?

Yes. The MMR shot is very safe, and it is effective at preventing mumps (as well as measles and rubella). Vaccines, like any medicine, can have side effects. But most children who get the MMR shot have no side effects.

What are the side effects?

Most children don't have any side effects from the shot. The side effects that do occur are usually very mild, such as a fever or rash. More serious side effects are rare. These may include high fever that could cause a seizure (in about 1 person out of every 3,000 that get the shot) and temporary pain and stiffness in joints (mostly in teens and adults).

Is there a link between the MMR shot and autism?

No. Scientists in the United States and other countries have carefully studied the MMR shot. None has found a link between autism and the MMR shot.

What is mumps?

Mumps is a contagious disease caused by a virus. It spreads easily through coughing and sneezing. There is no treatment for mumps, and it can cause long-term health problems.

What are the symptoms of mumps?

Mumps usually causes the following symptoms for about 7 to 10 days:

- Fever
- Headache
- Muscle aches
- Tiredness
- Loss of appetite (not wanting to eat)
- Swollen glands under the ears or jaw

Some people who get mumps do not have symptoms. Others may feel sick but will not have swollen glands.

Doctors recommend that your child get 2 doses of the MMR shot for best protection. Your child will need one dose at each of the following ages:

- 12 through 15 months
- 4 through 6 years

Infants 6 months to 11 months old should have 1 dose of the MMR shot before traveling abroad.

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Is it serious?

In most children, mumps is pretty mild. But it can cause serious, lasting problems, including:

- Meningitis (infection of the covering of the brain and spinal cord)
- Deafness (temporary or permanent)
- Encephalitis (swelling of the brain)
- Orchitis (swelling of the testicles) in males who have reached puberty
- Oophoritis (swelling of the ovaries) and/or mastitis (swelling of the breasts) in females who have reached puberty

In rare cases, mumps is deadly.

How does mumps spread?

Mumps spreads when an infected person coughs or sneezes. Mumps can spread before swollen glands appear and for 5 days afterward.

Where can I learn more about the MMR shot and my child?

To learn more about the MMR shot, talk to your child's doctor, call 1-800-CDC-INFO, or visit www.cdc.gov/vaccines/parents.

The Centers for Disease Control and Prevention, American Academy of Family Physicians, and American Academy of Pediatrics strongly recommend children receive all vaccines according to the recommended schedule.

Rubella

also known as German Measles

What is Rubella?

Rubella, sometimes called "German measles," is a contagious disease caused by a virus. Unlike measles, rubella almost never causes serious illness or complications in infants and young children. However, rubella infection in pregnant women can cause unborn babies to have serious birth defects with devastating, life-long consequences, or even die before birth.

Rubella in Children

Children infected with the rubella virus sometimes have a mild rash. But it might be hard to know if a child has rubella, because up to half of people who have rubella may not have a rash or other symptoms. The rash usually starts on the face and then spreads to the neck, chest, arms, and legs, and it lasts for about 3 days. Swelling of the lymph nodes, particularly behind the ears or on the back of the neck, may occur before the rash breaks out. A child with rubella might also have a slight fever or other symptoms like a cold. In fact, rubella spreads through coughing or sneezing.

What Are the Dangers of Rubella to Unborn Babies?

Rubella infection during pregnancy can lead to miscarriage, stillbirth, premature delivery, and birth defects. The danger is highest for women who get rubella during the first 12 weeks of pregnancy. Birth defects caused by rubella include deafness, cataracts, and heart defects. Babies also may have mental retardation. This group of health problems is called Congenital Rubella Syndrome (CRS).

The last large U.S. epidemic of rubella occurred from 1962 through 1965. During those years, rubella caused about 11,250 deaths of unborn babies and 2,100 deaths of newborns. Approximately, 20,000 babies were born with CRS. Of these babies, 8,000 were deaf, 3,600 were deaf-blind, and 1,800 were mentally retarded.

"Today, families are still living with the health effects and painful memories of this epidemic," said Dr. Jane Seward of the Centers for Disease Control and Prevention (CDC). "The devastating consequences of the rubella epidemic made it clear that a vaccine was needed, and before the end of the decade, a very safe and effective vaccine had been invented, tested, and licensed."

Why Do We Vaccinate Children If Rubella Doesn't Cause Serious Illness in Children?

Stopping the spread of rubella is the best way to protect mothers and their unborn babies from the devastating effects of rubella infection during pregnancy. The best way to stop rubella from spreading is vaccinating children.

The vaccine is safe to give to children along with their other vaccines. Studies show that children have fewer side effects from rubella vaccine than teen or adult females who get vaccinated.

According to Dr. Susan Reef, a pediatrician at CDC, "Years of experience in the United States and around the world has shown that vaccinating children is the most effective way to stop the spread of rubella."

In 1969, the United States was one of the first countries to begin to use rubella vaccine. Since then, countries around the world have also added rubella to their vaccine schedules.

"Many strategies for vaccinating different age groups have been tried, for example, vaccinating only teen girls. But no strategy works as well to stop rubella as routinely vaccinating all young children," explained Dr. Reef.

So, in the United States, the first dose of rubella vaccine, which is part of the measles, mumps, and rubella vaccine (MMR), is recommended at age 12 through 15 months old. A second dose is recommended at age 4 through 6 years.

It is also important to note that protection from rubella vaccine lasts for life. Children who are vaccinated against rubella are very unlikely to catch or spread the disease when they are adults and may become parents themselves.

Elimination of Rubella in the United States

In October 2004, 35 years after the United States began to use rubella vaccine, international experts agreed that rubella was no longer a disease that circulated in this country.

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"We do everything we can to make sure women have healthy babies. Although people might not know it, keeping childhood vaccination against rubella at high levels has a tremendous impact in making sure that babies are born healthy," added Dr. Doug Campos-Outcalt of the American Academy of Family Physicians.

Without rubella vaccination, the devastation of rubella and CRS would return to the United States because rubella still circulates in other parts of the world. And you don't have to travel to become infected.

Unvaccinated people who do travel—either members of your community or visitors from other countries, can become infected in places where rubella still circulates. Then when they are in the United States, they can spread the disease. You and your family can come into contact with an infected traveler anywhere in your community, from the grocery store to a sporting event.

Measles, Mumps, and Rubella Vaccine

The measles, mumps, and rubella vaccine (MMR) is the best way to protect against getting rubella. Serious side effects after MMR vaccination are rare. The benefits of using MMR vaccine to prevent rubella, as well as measles and mumps infections, far outweigh the risks of getting the vaccine. In the United States, the first dose of MMR vaccine is recommended at age 12 through 15 months old. A second dose is recommended at age 4 through 6 years.

Benefits of MMR Vaccine

In addition to protecting from measles and mumps, getting MMR vaccine as recommended to protect against rubella—

- Reduces the spread of rubella, protecting unborn children who can die or develop life-long health problems if the mother is infected while pregnant.
- Protects vaccinated children from the rare complications of rubella infection in childhood.
- Protects vaccinated people for a lifetime, including keeping unborn children safe by preventing rubella infection in pregnant women.

Risks of MMR Vaccine

- Mild side effects are fever, mild rash, and, rarely, swelling of the glands in the cheeks or neck.
- Moderate side effects are rare. For example, about 1 out of 3,000 vaccinated children gets a fever that is high enough to cause a seizure. About 1 out of 30,000 children could develop a temporary low platelet count, which could cause bruising.
- Severe side effects are very rare. For example, fewer than one in 1 million children have a serious allergic reaction.

All Reputable Studies Have Found No Link Between MMR Vaccine and Autism

Some parents of children with autism believe the condition is linked to vaccination because their child's diagnosis of autism came after their child got MMR vaccine. According to Dr. Anne Schuchat, who directs CDC's immunization program, "As you sort out risks and benefits of the MMR vaccine for your child, you should know that the possibility of a link between MMR vaccine and autism has been studied since 1998—beginning immediately when the concern first came up." Dr. Schuchat added that "Large studies of children done in the United States, the United Kingdom, and Denmark found no link between MMR vaccine and autism. CDC and its partners support continued research to find the causes of autism. I encourage parents who are concerned about autism to visit CDC's 'Learn the Signs, Act Early' website at http://www.cdc.gov/autism/actearly/ to find out more about child development. Most importantly, parents who have questions about the MMR vaccine should talk to their child's doctor.

Selected References:

Centers for Disease Control and Prevention (CDC). Rubella. In: Atkinson W, Hamborsky J, McIntyre L, Wolfe S, eds. Epidemiology and Prevention of Vaccine-Preventable Diseases (The Pink Book). 11th ed. Washington, DC: Public Health Foundation, 2009. p. 257–271. http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm

CDC. Achievements in public health: elimination of rubella and congenital rubella syndrome—United States, 1969–2004. MMWR 2005;54:279–282. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5411a5.htm

Institute of Medicine (US). Immunization safety review: vaccines and autism. Washington, DC: The National Academies Press; 2004. http://books.nap.edu/openbook.php?record_id=10997

Plotkin SS. The history of rubella and rubella vaccination leading to elimination. Clin Infect Dis 2006;43:S164–S168. http://www.journals.uchicago.edu/doi/pdf/10.1086/505950

Reef SE, Cochi SL. The evidence for the elimination of rubella and congenital rubella syndrome in the United States: a public health achievement. Clin Infect Dis 2006;43:S123–S125. http://www.journals.uchicago.edu/doi/pdf/10.1086/505943

Mrozek-Budzyn, D, Kieltyka, A, Majewska, R. Lack of association between measles-mumps-rubella vaccination and autism in children: A case-control study. Pediatric Infectious Disease Journal 2010; 29(5): 397-400. Abstract at http://www.ncbi.nlm.nih.gov/pubmed/19952979

The Centers for Disease Control and Prevention, the American Academy of Family Physicians, and the American Academy of Pediatrics strongly recommend vaccines.

800-CDC-INFO *(800-232-4636)*

http://www.cdc.gov/vaccines

Pneumococcal Vaccines: Q&A
CDC Answers Your Questions

For complete information on CDC's recommendations for the use of pneumococcal vaccines, go to www.immunize.org/acip/acipvax_pneum.asp

Experts from the National Center for Immunization and Respiratory Diseases at the Centers for Disease Control and Prevention answer your questions about pneumococcal polysaccharide (PPSV23) and pneumococcal conjugate (PCV13) vaccines.

How serious is pneumococcal disease?

Pneumococcal disease is a serious disease that causes much sickness and death.

An estimated 36,850 cases and 4,250 deaths from invasive pneumococcal diseases (IPD-bacteremia and meningitis) occurred in the United States in 2011. In 2013 an estimated 13,500 cases of IPD occurred among adults age 65 years and older. Children younger than age 5 and adults older than 65 have the highest incidence of serious disease.

Case-fatality rates are highest for pneumococcal meningitis and bacteremia, and the highest mortality occurs among the elderly and patients who have underlying medical conditions. Despite appropriate antimicrobial therapy and intensive medical care, the overall case-fatality rate for pneumococcal bacteremia is about 20% among adults. Among elderly patients, the rate may be as high as 60%.

Who is recommended to receive pneumococcal polysaccharide vaccine (PPSV23)?

PPSV23 (Pneumovax, Merck) is recommended for anyone who meets any of the criteria below:

- Age 65 years and older
- Age 2 through 64 years with any of the following conditions

1. cigarette smokers age 19 years and older
2. alcoholism
3. chronic liver disease, cirrhosis
4. chronic cardiovascular disease, excluding hypertension (e.g., congestive heart failure, cardiomyopathies)
5. chronic pulmonary disease (including COPD and emphysema, and for adults age 19 years and older, asthma)
6. diabetes mellitus
7. candidate for or recipient of cochlear implant
8. cerebrospinal fluid (CSF) leak
9. functional or anatomic asplenia (e.g., sickle cell disease, splenectomy)
10. immunocompromising conditions (e.g., HIV infection, leukemia, congenital immunodeficiency, Hodgkin's disease, lymphoma, multiple myeloma, generalized malignancy, immunosuppressive therapy)
11. solid organ transplantation; for bone marrow transplantation, see www.cdc.gov/vaccines/pubs/hemato-cell-transplts.htm
12. chronic renal failure or nephrotic syndrome

Could you briefly summarize the revaccination recommendations for PPSV23?

Children and adults younger than age 65 who are at highest risk for serious pneumococcal infection or likely to have a rapid decline in antibody levels (see categories 9 through 12 in previous answer) should get 2 doses of PPSV23 5 years apart, with a third dose after they turn age 65 (if at least 5 years have passed since the last dose). Patients with no risk factors should get 1 dose at age 65. Thus, depending on risk and age at vaccination, a person age 65 or older may have received 1, 2, or 3 doses of PPSV23.

What are the recommendations for routinely administering PCV13 to children?

Give infants a primary series of pneumococcal conjugate vaccine (PCV13, Prevnar 13, Pfizer) at age 2, 4, and 6 months. Boost at age 12 through 15 months. For catch-up vaccination, give PCV13 to healthy children through age 59 months and give PCV13 to children through age 71 months who have certain underlying medical conditions. For information on underlying medical conditions, see next question and answer.

Which underlying medical conditions indicate that an older child or teen should receive PCV13?

PCV13 vaccination is recommended for unvaccinated children age 2 through 71 months (6 years) who are in categories 4–12 in the numbered list to the left and for PCV13-naïve children age 6 through 18 years who are in categories 7–12.

Which adults are recommended to receive a dose of PCV13 vaccine?

All adults age 65 years and older should receive one dose of PCV13. In addition, adults age 19 through 64 years who have not previously received PCV13 and who have the conditions specified below should receive a PCV13 dose at the next vaccination opportunity.

- Immunocompromising conditions (e.g., congenital or acquired immunodeficiency, HIV, chronic renal failure, nephrotic syndrome, leukemia, lymphoma, Hodgkin's disease, generalized malignancy, iatrogenic immunosuppression, solid organ transplant, and multiple myeloma)
- Functional or anatomic asplenia (e.g., sickle cell disease and other hemoglobinopathies and congenital and acquired asplenia)
- Cerebrospinal fluid (CSF) leak
- Cochlear implants

What dosing intervals should be observed when giving PCV13 and PPSV23 to patients (children and adults) who are recommended to receive both vaccines?

Give PCV13 before PPSV23 if possible. For children, if the child has already received PPSV23, wait 8 weeks before giving PCV13. For persons age 65 years and older who have not previously received pneumococcal vaccine or whose pneumococcal vaccine history is unknown, give PCV13 followed by PPSV23 12 months later. For adults 19 through 64 years at high risk of pneumococcal disease give PCV13 followed by PPSV23 at least 8 weeks later. For adults, if the person has already received PPSV23, wait 12 months before giving PCV13.

If patients who are in a recommended risk group for PPSV23 or PCV13 aren't sure if they have already received these vaccines, should healthcare providers vaccinate them?

Yes. If patients do not have a documented vaccination history and their records are not readily obtainable, you should administer the recommended doses. Extra doses will not harm the patient.

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We gave PCV13 then PPSV23 8 weeks later to a 66-year-old patient who is newly diagnosed with a medical condition that places him at increased risk for pneumococcal disease and its complications. Should we give him a second dose of PPSV23 in 5 years because of his underlying medical condition?

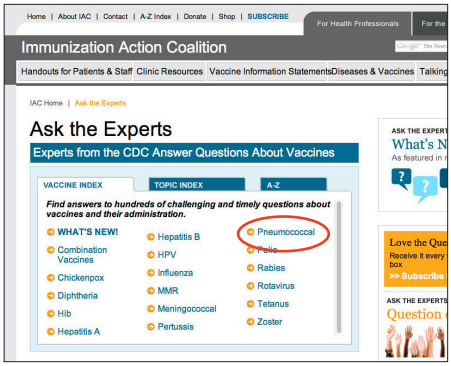
No. People who are first vaccinated with PPSV23 at age 65 years or older should receive only 1 dose, regardless of their underlying medical condition.

When should I vaccinate a child or adult who is planning to have either a cochlear implant or elective splenectomy?

If possible, administer the appropriate vaccine prior to the splenectomy or cochlear implant so that the person planning to have the procedure has antibody to pneumococcus at the time of the surgery. If the procedure is done on an emergency basis, vaccinate as soon as possible according to the routine schedule. Administer a dose of PPSV23 to all patients no sooner than 8 weeks (minimum interval) from the previous dose of PCV13.

If a patient has had laboratory-confirmed pneumococcal pneumonia, does he or she still need to be vaccinated with PCV13 and/or PPSV23?

Yes. More than 90 known serotypes of pneumococcus exist (23 serotypes are in PPSV23 and 13 serotypes are in PCV13). Infection with one serotype does not necessarily produce immunity to other serotypes. As a result, patients who are candidates for vaccination should be vaccinated even if they have had one or more episodes of invasive pneumococcal disease.



For more Q&As about pneumococcal vaccines from experts at CDC's NCIRD, visit www.immunize.org/askexperts/experts_pneumococcal_vaccines.asp.

Find more than 1,000 Q&As about vaccines and their administration at www.immunize.org/askexperts.

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Polio: Questions and Answers

INFORMATION ABOUT THE DISEASE AND VACCINES

What causes polio?

Polio is caused by a virus.

How does polio spread?

Polio is usually spread via the fecal-oral route (i.e., the virus is transmitted from the stool of an infected person to the mouth of another person from contaminated hands or such objects as eating utensils). Some cases may be spread directly via an oral to oral route.

How long does it take to show signs of polio after being exposed?

The incubation period for polio is commonly 6–20 days, with a range of 3–35 days.

What are the symptoms of polio?

Surprisingly, 95% of all individuals infected with polio have no apparent symptoms.

Another 4%–8% of infected individuals have symptoms of a minor, non-specific nature, such as sore throat and fever, nausea, vomiting, and other common symptoms of any viral illness.

About 1%–2% of infected individuals develop non-paralytic aseptic (viral) meningitis, with temporary stiffness of the neck, back, and/or legs. Less than 1% of all polio infections result in the classic "flaccid paralysis," where the patient is left with permanent weakness or paralysis of legs, arms, or both.

How serious is polio?

Although most cases of polio are mild, the 1% of cases resulting in flaccid paralysis has made polio a feared disease for hundreds of years. Of people with paralytic polio, about 2%–5% of children die and up to 15%–30% of adults die.

Are there any long-term concerns for persons who contracted paralytic polio in childhood?

About 25%–40% of people who suffered from paralytic polio as children develop new symptoms in adulthood (usually after an interval of 30–40 years). This problem is called post-polio syndrome (PPS) and symptoms can include new muscle pain, weakness, or paralysis. PPS is not infectious. For more information or for support for people with post-polio syndrome, go to www.post-polio.org.

How is polio diagnosed?

If a person is suspected of being infected, a sample from their stool or throat should be tested for the poliomyelitis virus.

How long is a person with polio contagious?

Patients infected with the polio virus can pass the virus on for 7–10 days before the onset of disease. In addition, they can continue to shed the virus in their stool for 3–6 weeks.

Is there a treatment for polio?

There is no "cure" for polio. People infected with polio need supportive therapy, such as bed rest and fluids. Standard precautions should be taken to avoid passing on the virus through any contamination from the patient's stool.

How common is polio in the U.S.?

Before a polio vaccine was developed, polio epidemics were common in the United States. For example, in the immediate pre-vaccine era (i.e., early 1950s), between 13,000 and 20,000 paralytic cases were reported each year. After the development of the inactivated (Salk) injectable vaccine in 1955 and the live (Sabin) oral vaccine in 1961, the number of polio cases dropped dramatically. In 1960, there were 2,525 paralytic cases reported, but by 1965 this number had fallen to 61.

Due to a concentrated effort to eradicate polio from the world, there have been no cases of "wild" (i.e., natural) polio acquired in the United States since 1979, and no cases of wild polio acquired in the entire Western Hemisphere since 1991.

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How common is polio in the world?

In 1988, the World Health Organization (WHO) adopted the goal of global polio eradication. Although the initial target date of 2000 was not met, substantial progress has been made. In 1988, there were estimated to be 350,000 reported cases of polio in the world; in 2001, just 483 cases were reported. Unfortunately, rumors about the safety of polio vaccine in 2003, and subsequent refusal of vaccine by many parents in Nigeria, led to an increase in cases and spread of the virus to nearby countries that had previously been polio free. In 2003, there were 784 reported cases; in 2004, there were 1,255 reported cases.

Wild polio currently exists only in a few countries in Asia and Africa. In 2014, only 359 cases of polio were reported from nine countries, according to the Global Polio Eradication Initiative. About 95% of all cases were reported from Pakistan, Afghanistan, or Nigeria. Many organizations have been working hard toward eradicating polio including the World Health Organization, the United Nations Children's Fund (UNICEF), the Centers for Disease Control and Prevention (CDC), Rotary International, the Bill and Melinda Gates Foundation, and many other international and national groups. Strategies include house-to-house vaccination and National Immunization Days, where even warring factions have called temporary cease fires to allow children to be vaccinated.

When did the polio vaccine first become available?

The first polio vaccine was an inactivated, or killed, vaccine (IPV) developed by Dr. Jonas Salk and licensed in 1955.

What are the polio vaccines that have followed the first Salk vaccine?

In 1961, a live attenuated (e.g., weakened) vaccine was developed by Dr. Albert Sabin. This vaccine was given as an oral preparation instead of as a shot. By 1963, this oral vaccine had been improved to include protection against three strains of polio and was licensed as "trivalent oral poliovirus vaccine" (OPV). OPV was the vaccine of choice for the United States and most other countries of the world from 1963 until changes in U.S. policy in the 1990s.

In 1988, an enhanced-potency IPV formulation became available and by 1997 had become part of the routine schedule for infants and children, given in a sequential combination with OPV. In 2000, an all-IPV vaccine schedule was adopted in the United States. IPV is also available in combination with other vaccines (e.g., DTaP-HepB-IPV, DTaP-IPV/Hib, or DTaP-IPV).

How is the vaccine administered?

- IPV is given as a shot in the arm or leg.
- OPV is given as an oral liquid. OPV is no longer used in the United States, but is still given in other parts of the world where polio is common.

Why was the U.S. polio immunization recommendation changed from OPV to IPV?

The change to an all-IPV schedule in the United States occurred because the few cases of polio that were occurring (8–10 per year) were caused by the OPV vaccine itself and not the wild virus. The change to IPV protects individuals against paralytic polio, while eliminating the small chance (about once in every 2.4 million doses) of actually contracting polio from the live oral vaccine. OPV is better at stopping the spread of the virus to others, but now that wild (natural) polio has been eliminated from the Western Hemisphere, this advantage is no longer a consideration in the United States. IPV has been used exclusively in the United States since 2000. However, in other countries where wild polio is still a threat, OPV is still used.

Who should get this vaccine?

All infants should get this vaccine unless they have a medical reason not to. A primary series of IPV consists of three properly spaced doses, usually given at two months, four months, and 6–18 months. A booster dose is given at 4–6 years (before or at school entry), unless the primary series was given so late that the third dose was given on or after the fourth birthday.

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Does my child need additional doses of polio vaccine if he received a combination of OPV and IPV?

No, four doses of any combination of IPV or OPV, properly spaced, is considered a complete poliovirus vaccination series.

Why should I vaccinate my child against polio if this disease has been eliminated from the Western Hemisphere since 1991?

Polio still exists in parts of Africa and Asia and can easily be imported. When the effort to eliminate polio from the world is successful, polio vaccine will become part of history. But we are not to that point yet.

Should adults get vaccinated against polio?

In the United States, routine vaccination of people 18 years of age and older against polio is not recommended because most adults are already immune and also have little risk of being exposed to wild polio virus. Vaccination is recommended, however, for certain adults who are at increased risk of infection, including travelers to areas were polio is common, laboratory workers who handle specimens that might contain polioviruses, and healthcare workers in close contact with patients who might be excreting wild polioviruses in their stool (e.g., those caring for recent immigrants from central Africa or parts of Asia).

If an adult is at increased risk of exposure and has never been vaccinated against polio, he or she should receive three doses of IPV, the first two doses given 1–2 months apart, and the third 6–12 months after the second. If time will not allow the completion of this schedule, a more accelerated schedule is possible (e.g., each dose separated four weeks from the previous dose).

If an adult at risk previously received only one or two doses of polio vaccine (either OPV or IPV), he or she should receive the remaining dose(s) of IPV, regardless of the interval since the last dose.

If an adult at increased risk previously completed a primary course of polio vaccine (three or more doses of either OPV or IPV), he or she may be given another dose of IPV to ensure protection. Only one "booster" dose of polio vaccine in a person's lifetime is recommended. It is not necessary to receive a booster dose each time a person travels to an area where polio may still occur.

Who recommends this vaccine?

The Centers for Disease Control and Prevention (CDC), the American Academy of Pediatrics (AAP), and the American Academy of Family Physicians (AAFP) have all recommended that children receive this vaccine.

How safe is this vaccine?

The IPV vaccine is very safe; no serious adverse reactions to IPV have been documented.

What side effects have been reported with this vaccine?

Possible side effects include minor local reactions at the site of injection (e.g., pain, redness).

How effective is this vaccine?

IPV is very effective in preventing polio, but only when all recommended doses are completed. A single dose of IPV produces little or no immunity, but 99% of recipients are immune after three doses.

Who should not receive the polio vaccine?

- Anyone who has ever had a life-threatening allergic reaction to neomycin, streptomycin, or polymyxin B should not get the IPV shot because it contains trace amounts of these antibiotics.
- Anyone who has had a severe allergic reaction to a dose of polio vaccine should not get another one.
- Anyone who is moderately or severely ill at the time the shot is scheduled should usually wait until they recover to get vaccination.

Can the IPV vaccine cause polio?

No, the inactivated polio vaccine (IPV) cannot cause paralytic polio because it contains killed virus only.

Rotavirus: Questions and Answers

Information about the disease and vaccines

What causes rotavirus disease?
Rotavirus disease is caused by a virus, the rotavirus. The name rotavirus is derived from the Latin *rota*, meaning "wheel," because the rotavirus has a wheel-like appearance when viewed by an electron microscope.

How does rotavirus spread?
The rotavirus enters the body through the mouth and then infects the lining of the intestines. Rotavirus is very contagious, spreading easily from children who are already infected to other children and sometimes adults. Large amounts of rotavirus are shed in the stool of infected people and the virus can be easily spread via contaminated hands and objects, such as toys. Children can spread rotavirus both before and after they become sick with diarrhea. Rotavirus is very stable and may remain viable in the environment for months if not disinfected.

How long does it take to show signs of rotavirus after being exposed?
The incubation period for rotavirus diarrhea is 1 to 3 days. Symptoms of infection vary and depend on whether it is the first infection or a repeat infection.

What are the symptoms of rotavirus?
In young children, rotavirus disease commonly begins with fever and vomiting, followed by diarrhea. Vomiting and diarrhea may last from three to seven days. The diarrhea may be watery and may lead to dehydration.

How serious is rotavirus?
All three symptoms of rotavirus disease (fever, vomiting, and diarrhea) cause children to lose fluids. Vomiting is especially dangerous because it's difficult to replace fluids in children who are vomiting persistently.

Prior to the availability of rotavirus vaccine, rotavirus infection was responsible for more than 400,000 doctor visits, more than 200,000 emergency room visits, 55,000 to 70,000 hospitalizations, and 20 to 60 deaths in the United States each year. In the first five years of life, four of five children in the United States would develop rotavirus gastroenteritis, one in seven would require a clinic or emergency room visit, one in 70 would be hospitalized, and one in 200,000 would die from this disease.

In developing countries, rotavirus causes more than 500,000 deaths each year in children younger than age five years.

What are possible complications from rotavirus?
Rotavirus infection in infants and young children can lead to severe diarrhea and dehydration. The dehydration may be severe. Immunodeficient children may have more severe or persistent disease.

How do I know if my child has rotavirus?
Rotavirus disease is difficult to differentiate from diarrheal illness caused by other pathogens. As a result, laboratory testing of the stool is needed to confirm a diarrheal illness as rotavirus disease.

Is there a treatment for rotavirus?
Children are typically treated by replacing lost body fluids through drinking liquids specifically made for rehydration; these liquids are called oral rehydration solutions. These products contain specific amounts of water, sugars, and salts. In severe cases, body fluids are replaced with fluids given directly through the veins by use of an intravenous line in the hospital.

How long is a person with rotavirus contagious?
Infected persons shed large quantities of virus in their stool beginning 2 days before the onset of diarrhea and for up to 10 days after onset of symptoms. Rotavirus may be detected in the stool of persons with immune deficiency for more than 30 days after infection.

Can you get rotavirus more than once?
A person may develop rotavirus disease more than once because there are many different rotavirus types, but second infections tend to be less severe than the first infections. After a single natural infection, 40% of children are protected against a subsequent rotavirus illness. Persons of all ages can get repeated rotavirus infections, but symptoms may be mild or not occur at all in repeat infections.

Wouldn't good hygiene be enough to prevent rotavirus disease?
Better hygiene and sanitation have not been very effective in reducing rotavirus disease. This is illustrated by the fact that virtually everyone in the world is infected by rotavirus disease by age five years, despite differences in sanitation between countries.

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Can adults be infected with rotavirus?
Yes. Rotavirus infection of adults is usually asymptomatic but may cause diarrheal illness. Outbreaks of diarrheal illness caused by rotavirus have been reported, especially among elderly persons living in retirement communities.

When did a rotavirus vaccine become available?
A vaccine to prevent rotavirus gastroenteritis was first licensed in 1998 but was withdrawn in 1999 because of its association with an uncommon type of bowel obstruction called "intussusception."

In 2006, the U.S. Food and Drug Administration (FDA) approved a new rotavirus vaccine, RotaTeq (by Merck). In 2008, FDA approved a second rotavirus vaccine, Rotarix (by GlaxoSmithKline).

What kind of vaccine are they?
RotaTeq and Rotarix are both live attenuated (weakened) viral vaccines.

How is this vaccine given?
Both RotaTeq and Rotarix are given to babies orally.

Who should get this vaccine?
National experts on immunization (such as the Centers for Disease Control and Prevention and the American Academy of Pediatrics) recommend routine vaccination of all infants with rotavirus vaccine.

What is the recommended schedule for getting this vaccine?
Both vaccines require multiple doses. RotaTeq vaccine is given in a 3-dose series with doses at ages 2, 4, and 6 months; Rotarix vaccine is given in a 2-dose series with doses at ages 2 and 4 months.

The first dose of either vaccine can be given as early as age 6 weeks or as late as age 14 weeks, 6 days. Vaccination should not be started for infants once they reach their 15 week birthday. There must be at least 4 weeks between doses and all doses must be given by age 8 months. Rotavirus vaccine may be given at the same time as other childhood vaccines.

Should an infant who has already been infected with rotavirus still be vaccinated?
Yes. Infants who have recovered from a rotavirus infection may not be immune to all of the virus types present in the vaccine. So infants who have previously had rotavirus disease should still complete the vaccine series if they can do so by age 8 months.

How safe is this vaccine?
Before being licensed by the Food and Drug Administration both rotavirus vaccines were studied in clinical trials involving more than 60,000 infants. Adverse reactions reported among vaccinated infants in the trials included vomiting, diarrhea, irritability and fever. However, children who received a placebo developed the same symptoms at a similar rate. No serious adverse reactions were identified in the prelicensure trials.

The prelicensure clinical trials of both RotaTeq and Rotarix did not find an increased risk for intussusception (a type of bowel obstruction) among vaccine recipients. A large postlicensure study of more than 1.2 million rotavirus vaccine recipients found a very small increased risk of intussusception (1 to 1.5 additional cases of intussusception per 100,000 vaccinated infants) in the 7 to 21 days following the first dose. No increased risk of intussusception was found after the second or third doses. A study conducted by the CDC Vaccine Safety Datalink found no increased risk of intussusception following RotaTeq but found an increased risk following the first and second doses of Rotarix. Based on this study, one case of intussusception would be expected for approximately each 20,000 children, who are fully vaccinated.

CDC and the Food and Drug Administration (FDA) continue to believe that the benefits of rotavirus vaccination outweigh the risks associated with vaccination and that routine vaccination of infants should continue.

How effective is rotavirus vaccine?
Rotavirus vaccine is very effective against rotavirus disease. Studies show the vaccine to be highly effective (85% to 98%) against severe rotavirus disease and effective against rotavirus disease of any severity (74% to 87%) through approximately the first rotavirus season after vaccination. Chances that children will need to be hospitalized for rotavirus disease are also greatly decreased (96%) by the vaccine. Neither vaccine will prevent diarrhea or vomiting caused by other germs.

Who should <u>not</u> receive rotavirus vaccine?
Any child who has had a severe (life-threatening) allergic reaction to a previous dose of rotavirus vaccine should not get another dose. A child with a severe (life-threatening) allergy to any component of rotavirus vaccine should not get the vaccine. Because the oral applicator for Rotarix contains latex rubber, infants with a severe (anaphylactic) allergy to latex should not be given Rotarix; the RotaTeq dosing tube is latex-free. Rotavirus vaccine should not be given

to an infant diagnosed with the rare genetic disorder severe combined immune deficiency (SCID). Infants who have had intussusception are more likely to develop it again compared to infants who have never had intussusception. As noted above the first dose of rotavirus vaccine has been associated with a small increased risk of intussusception (1 to 1.5 cases per 100,000 first doses). So rotavirus vaccine should not be given to an infant with a previous history of intussusception.

Children who are moderately or severely ill at the time the vaccination is scheduled should probably wait until they recover, including children who are experiencing diarrhea or vomiting. Healthcare providers will decide on a case-by-case basis whether to vaccinate a child with an ongoing digestive problem, an immune system weakened because of HIV/AIDS or another disease that affects the immune system, or a child who is receiving treatment with drugs such as long-term steroids or treatment for cancer.

Chickenpox

also known as varicella

"Everyone said don't worry—natural immunity is better": A True Story

Zoe was 13 months old when her mom, Amy, first noticed the blister on her cheek. "I never imagined that within a few short days, my baby would be in the hospital fighting for her life."

At first, Amy did not think the blister was anything to worry about. But by the next day, there were blisters on her trunk, scalp, and face. Amy took Zoe to the pediatrician who said that Zoe had chickenpox. For her age—13 months—Zoe was up to date on all her vaccinations, but had not yet received the chickenpox vaccine. Her doctor, who followed the recommended schedule for giving the chickenpox vaccine during age 12 through 15 months, had set Zoe to get the vaccine at her 15-month check-up.

"We have no idea where Zoe was exposed to chickenpox," Amy said. "It was summertime and we were everywhere, doing lots of activities where there were a lot of kids."

At first, other than being a little itchy, Zoe seemed fine and was acting like her normal, happy self. "Everyone told me not to worry—she'd be fine. Some told me we were lucky that Zoe caught chickenpox, because they thought natural immunity is better than getting the vaccine," Amy recalled. "So, I didn't worry."

Within a few days of noticing that first blister, Amy thought a few of the blisters looked infected. Worried, Amy called the pediatrician, who gave her instructions to continue treating Zoe at home with medicine to reduce her fever and relieve her itching. "Although she had a slight fever, Zoe was still pretty playful. I gave her some Tylenol and an oatmeal bath and put her to bed," Amy said. "But the next morning, I had a hard time waking her up. More blisters were infected and huge chunks of her skin on her back and belly were literally falling off," Amy recalled. She took Zoe to the pediatrician, who immediately rushed her to the hospital. "Within 4 hours of getting Zoe out of bed and to the doctor, the area of affected skin had doubled. It was the scariest thing I had ever seen."

"When we first arrived at the hospital, Zoe's fever had reached 104 degrees and she barely had energy to move." At the hospital, doctors determined that Zoe's chickenpox blisters were infected with the Staphylococcus aureus (staph) bacteria. The hospital doctors immediately started her on antibiotics. It took 12 hours of antibiotics before Zoe began to get better. Plus, Zoe was so uncomfortable that she was given morphine to control her pain.

Zoe spent a week in isolation at the hospital. Doctors limited Zoe's contact with the family to prevent the infection from spreading.

Thankfully the treatment during her hospital stay worked. Six days later, Zoe was able to go home,but she was bandaged from head to toe to protect her healing skin.

To ensure Zoe was not exposed to anything that could cause another infection, she had to stay home from child care until all of the chickenpox blisters healed. In total, Amy missed more than 2 weeks of work due to Zoe's illness.

Fortunately, Zoe made a full recovery. But a year later, Zoe still has a few scars—on her face, back and above her knee—that serve as a constant reminder of her life-threatening experience with chickenpox.

"It never occurred to me just how serious chickenpox could be," Amy said. "Zoe was very lucky because she could have very easily died from her infection,but thank goodness we still have our precious girl. Other children are not so lucky. I encourage all parents to get their kids vaccinated for chickenpox."

While staph infections of the skin are common in infants and young children, they usually are mild. However, chickenpox blisters can provide a place for staph bacteria to enter the skin, and a serious infection can develop quickly. It's common for chickenpox blisters to be close together and when the staph infection penetrates the skin, the skin around the infected area simply dies and falls off.

Chickenpox Symptoms

Chickenpox is a very contagious disease caused by the varicella-zoster virus. In an unvaccinated child, the first symptom of chickenpox is usually an itchy, uncomfortable rash. The rash usually first appears on the head, then spreads to the rest of the body. As many as 250 to 500 blisters and bumps may appear on the skin. Chickenpox can also cause tiredness, headache, and a fever that lasts several days. If the blister becomes infected, lifelong scarring can result.

You can still get chickenpox if you have been vaccinated against the disease. However, the symptoms are usually milder with fewer blisters and little or no fever.

Chickenpox is very contagious and spreads easily from infected people. It can spread from either a cough or a sneeze.

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It can also spread by touching or breathing in the virus particles that come from the blisters on the skin.

Chickenpox Can Be Serious

Most children with chickenpox completely recover in one week. But, chickenpox can be serious. Serious complications include infected blisters, pneumonia, bleeding disorders, and swelling of the brain (encephalitis). Some of these complications can result in death. Chickenpox can be particularly serious for children younger than 1 year old, adolescents, adults, pregnant women, and people with weakened immune systems.

"You may recall having chickenpox when you were young, and not really being very sick," said Dr. Jane Seward of the Centers for Disease Control and Prevention (CDC). "However, chickenpox can be very serious. I talked with the parent of a 5-year-old child who died after getting chickenpox. One day, this family had a healthy child attending kindergarten, and within a few days, the child had died of a serious complication of chickenpox." According to Dr. Seward, "The chickenpox vaccine had just come out at the time and was not widely available."

Before the chickenpox vaccine was widely used, nearly 11,000 people were hospitalized each year and about 50 children and 50 adults died every year from chickenpox. Most people who died from chickenpox were completely healthy before they got the disease, with no known conditions that put them at higher risk for a severe case of chickenpox.

Thanks to vaccination, serious cases and deaths from chickenpox have declined dramatically. Since the United States started using the vaccine in 1995, the number of hospitalizations and deaths from chickenpox has gone down more than 90 %.

Benefits of Chickenpox Vaccine

Getting the chickenpox vaccine as recommended—

- Prevents serious cases of chickenpox.
- Prevents hospitalizations and death from chickenpox.
- Protects very young children and adults, for whom this disease can be particularly serious.
- Prevents discomfort, missed days from school and work.
- Prevents chickenpox pneumonia.

Risks of Chickenpox Vaccine

- Mild side effects include soreness where the shot was given, fever and mild rash, which can occur in up to 1 out of every 25 vaccinated children.
- It is possible for the vaccinated person with a rash to infect other members of the household, but this is extremely rare.
- Febrile seizures (seizures caused by fever) are rare, but children who receive the MMRV vaccine are at higher risk than those who receive separate MMR and varicella vaccines. CDC recommends that MMR vaccine and varicella vaccine be administered as separate injections for the first dose.

The Chickenpox Vaccine Prevents Serious Disease and Complications

"The most important thing to remember is that we cannot predict which child will get a serious case or have complications from the chickenpox," explained Dr. Stephanie Bialek at the CDC. "The chickenpox vaccine is very safe and nearly 100 % effective in preventing serious cases of chickenpox. Therefore, we recommend that children get vaccinated."

Some children get chickenpox even after they are vaccinated, but it's usually milder. Children who get chickenpox after vaccination typically have a mild rash with fewer than 50 spots or bumps. In fact, chickenpox after vaccination is so mild that sometimes it's not recognized as chickenpox, because the rash looks more like insect bites than blisters. Children who get chickenpox after vaccination rarely have a high fever or complications and they recover quickly.

"When the chickenpox vaccine was developed, experts knew that some kids would develop chickenpox after receiving the vaccine. That's OK, because the vaccine does what we need it to do—it prevents serious illness and death," explained Dr. Meg Fisher of the American Academy of Pediatrics. "Getting the vaccine is far safer than catching chickenpox."

Chickenpox Vaccine: Two Doses Needed for Maximum Protection

Two doses of the chickenpox vaccine are recommended: The first dose is recommended at age 12 through 15 months old and the second at age 4 through 6 years. "Although there is much less chickenpox disease in the United States today," said Dr. Seward, "chickenpox is still out there and children can become infected very easily if exposed. It is important that children receive two doses of the vaccine for maximum protection against chickenpox."

"We most often see outbreaks of chickenpox in school-aged kids, so getting the second dose at age 4 through 6 years will protect kids from chickenpox before they are most likely to catch it," said Dr. Fisher.

The second dose helps protect children from chickenpox into adulthood as well. This is important because chickenpox can cause severe disease in adults.

Selected References:

Centers for Disease Control and Prevention. Varicella. In: Atkinson W, Hamborsky J, McIntyre L, Wolfe S, eds. Epidemiology and Prevention of Vaccine-Preventable Diseases (The Pink Book). 11th ed., Washington DC: Public Health Foundation, 2009. p. 283–303. http://www.cdc.gov/vaccines/Pubs/pinkbook/default.htm

CDC. Prevention of Varicella: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recommendations and Reports. 2007;56(RR04);1–40. http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5604a1.htm

Gershon AA, Arvin AM, Levin MJ, Seward JF, Schmid DS, eds. Varicella Vaccine in the United States: A Decade of Prevention and the Way Forward. Journal of Infectious Diseases. 2008;197(S2). http://www.journals.uchicago.edu/toc/jid/197/s2

Marin MH, Meissner C, Seward JF. Varicella Prevention in the United States: A Review of Success and Challenges. Pediatrics 2008;122(No.3): e744–e751. http://pediatrics.aappublications.org/cgi/content/full/122/3/e744

The Centers for Disease Control and Prevention, the American Academy of Family Physicians, and the American Academy of Pediatrics strongly recommend vaccines.

800-CDC-INFO *(800-232-4636)* **http://www.cdc.gov/vaccines**

Shingles (Zoster): Questions and Answers

Information about the disease and vaccine

What causes shingles?
Both chickenpox and shingles are caused by the same virus, the varicella zoster virus (VZV). After a person has had chickenpox, the virus rests in the body's nerves permanently. Approximately 30% of all people who have been infected with chickenpox will later develop herpes zoster, commonly known as zoster or shingles.

Why do some people develop shingles and others don't?
Shingles occurs when VZV reactivates and causes recurrent disease. It is not well understood why this happens in some people and not others. The risk of getting shingles increases as a person gets older. People who have medical conditions that keep the immune system from working properly, or people who receive immunosuppressive drugs are also at greater risk to get shingles.

What are the symptoms of shingles?
Shingles usually starts as a rash with blisters that scab after 3 to 5 days. The most frequently mentioned symptom is pain. The rash and pain usually occur in a band on one side of the body, or clustered on one side of the face. The rash usually clears within 2 to 4 weeks.

Before the rash develops, there is often pain, itching, or tingling in the area where the rash will develop. Other symptoms of shingles can include fever, headache, chills, and upset stomach.

What are possible complications from shingles?
Very rarely, shingles can lead to pneumonia, hearing problems, blindness, scarring, brain inflammation (encephalitis), or death.

For about one person in five, severe pain can continue even after the rash clears up, a situation called post-herpetic neuralgia (PHN). As people get older, they are more likely to develop PHN, and it is more likely to be severe and long lasting. The pain may be sharp or throbbing, and it may extend beyond the area of the original rash. The skin may be unusually sensitive to touch and to changes in temperature. PHN can last for months, or even years.

Is there a treatment for shingles?
Several antiviral medicines can be used to treat shingles. These medications should be started as soon as possible after the rash appears. They can help shorten the length and severity of the episode. Antiviral treatment is most effective if administered within 24 to 72 hours of the appearance of the rash. Pain medicine may also help with pain caused by shingles.

Is there a test for shingles?
Yes. Shingles is usually diagnosed based on symptoms and the appearance of the rash. Definite diagnosis is made by growing the varicella virus from a skin lesion.

Can you catch shingles from an infected person?
No, shingles cannot be passed from one person to another such as through sneezing, coughing, or casual contact. While it is possible for the VZV virus to be spread from a person with active shingles to a person who has never had chickenpox or never been vaccinated against chickenpox (if they have direct contact with the rash), the person exposed would develop chickenpox, not shingles.

How common is shingles in the United States?
It is estimated that one million cases of shingles occur annually.

Can you get shingles more than once?
Yes, but rarely. Most people will have only one occurrence of shingles in their lifetime, but second and third occurrences have been reported.

When did zoster vaccine first become available?
Zoster vaccine (Zostavax by Merck) was licensed on May 25, 2006.

What kind of vaccine is it?
The zoster vaccine is a live, attenuated vaccine. This means the live, disease-producing virus was modified, or weakened, in the laboratory to produce an organism that can grow and produce immunity in the body without causing illness.

How is this vaccine given?
This vaccine is given by an injection, usually in the fat into the back of the upper arm.

Who should get this vaccine?
The Advisory Committee on Immunization Practices recommends that all adults age 60 years and older

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www.immunize.org/catg.d/p4221.pdf • Item #P4221 (12/13)

receive one dose of zoster vaccine, including persons who have already had an episode of shingles. Vaccination can be done during a routine healthcare visit.

In 2011, the Food and Drug Administration (FDA) approved the use of the zoster vaccine for the prevention of shingles in individuals 50 to 59 years of age. ACIP does not recommend routine zoster vaccination of people age 50 through 59 years, but a clinician may give it to people in this age group if desired.

How effective is this vaccine?
Zoster vaccine was studied in approximately 38,000 individuals throughout the United States who were age 60 years and older as part of its pre-licensure testing. Half received the vaccine and half received a placebo. Study participants were followed for an average of three years to see if they developed shingles and, if they did, how long the pain lasted.

Researchers found that the vaccine reduced the occurrence of shingles by about 50% among persons age 60 years and older. In this study the vaccine was most effective for those age 60–69 years (64%); effectiveness declined with increasing age to 41% for those age 70–79 years and 18% for those age 80 years and older. A later study showed the vaccine to be about 70% effective in preventing shingles among persons age 50–59 years.

In individuals vaccinated with zoster vaccine who still developed shingles, the duration of pain was shorter than for those who received a placebo. The severity of the pain did not appear to differ among the two groups.

Does the vaccine help prevent post-herpetic neuralgia?
In people who were age 70 years and older who still developed shingles after being vaccinated, the vaccine reduced the frequency of post-herpetic neuralgia. However, the primary benefit of the vaccine in preventing post-herpetic neuralgia is by reducing the risk of developing shingles in the first place.

Who recommends this vaccine?
The vaccine has been recommended by CDC's Advisory Committee on Immunization Practices, the American Academy of Family Physicians, the American College of Obstetricians and Gynecologists, and the American College of Physicians.

How safe is this vaccine?
In a clinical trial involving more than 38,000 adults, zoster vaccine was administered to about half of the study participants. The other half received a placebo. The occurrence of possible side effects was similar in the vaccine and placebo groups (1.9% and 1.3%, respectively).

As with all vaccines, the manufacturer, CDC, and the FDA will continue to monitor the vaccine to provide additional safety information.

What side effects have been reported with this vaccine?
The most commonly reported side effects are redness (36%), pain or tenderness (35%), swelling (26%), and itchiness (7%) at the injection site.

Who should NOT receive zoster vaccine?
- People who are allergic to the antibiotic neomycin, or any component of the vaccine (including gelatin) should not receive this vaccine.
- Zoster vaccine is a live vaccine and should not be given to individuals who have a weakened immune system caused by treatments that they are taking such as radiation or corticosteroids, or due to conditions such as HIV/AIDS, cancer of the lymph, bone, or blood.
- Pregnant women should not receive this vaccine.

Is the cost of shingles vaccine covered by Medicare?
All Medicare Part D plans cover the shingles vaccine, meaning that a pharmacy can bill Medicare for the cost of the vaccine. Your share of payment varies by plan. Medicare Part B does not cover the shingles vaccine. If you have private insurance, your plan may or may not cover the vaccine; contact your insurer to find out.

If you get the vaccine at a pharmacy, it is very important that it be administered in the pharmacy. Shingles vaccine should NEVER be transported from a pharmacy to a doctor's office. It must be given as soon as it is removed from storage in a pharmacy freezer.

Does the zoster vaccine cause shingles?
No.

Can a person who has received the vaccine infect others with this virus?
No. It is safe to be around infants and young children, pregnant women, or people with weakened immune systems after you get the shingles vaccine. Transmission of the chickenpox virus from a person who has received the shingles vaccine has never been documented. Some people who get the shingles vaccine will develop a chickenpox-like rash near the place where they were vaccinated. As a precaution, this rash should be covered until it disappears.

Need help responding to vaccine-hesitant parents?

Science-based materials are available from these respected organizations

American Academy of Pediatrics (AAP)

Healthcare providers can find numerous resources on the AAP's website to help with parents and caregivers who have questions about vaccinating their child at www2.aap.org/immunization/families/deciding.html. When parents cannot be convinced, consider using AAP's Refusal to Vaccinate form at www2.aap.org/immunization/pediatricians/pdf/RefusaltoVaccinate.pdf.

California Immunization Coalition

The California Immunization Coalition (CIC) has developed several excellent provider pieces that discuss common questions many parents may have regarding vaccines for their children. These include

- "Responding to Parents' Top 10 Concerns" www.cdph.ca.gov/programs/immunize/Documents/IMM-917.pdf
- "Talking with Parents About Vaccine Safety" www.cdph.ca.gov/programs/immunize/Documents/IMM-915.pdf
- "Alternate Vaccine Schedules: Helping Parents Separate Fact From Fear" http://eziz.org/assets/docs/IMM-988.pdf

Centers for Disease Control and Prevention (CDC)

Among CDC's many online immunization resources is the "Parent's Guide to Childhood Immunization," a 64-page booklet that can be ordered or printed at www.cdc.gov/vaccines/pubs/parents-guide. In addition, visit CDC's "Provider Resources for Vaccine Conversations with Parents" web section at www.cdc.gov/vaccines/hcp/patient-ed/conversations/index.html

Other CDC materials, designed to help healthcare providers work with hesitant parents, include the following:

- "If You Choose Not to Vaccinate Your Child, Understand the Risks and Responsibilities" www.cdc.gov/vaccines/hcp/patient-ed/conversations/downloads/not-vacc-risks-color-office.pdf
- "Infant Immunizations FAQs" www.cdc.gov/vaccines/parents/parent-questions.html
- "Talking with Parents about Vaccines for Infants" www.cdc.gov/vaccines/hcp/patient-ed/conversations/downloads/talk-infants-color-office.pdf

Every Child by Two (ECBT)

Created by Every Child by Two, www.vaccinateyourbaby.org focuses on answering parents' commonly asked questions about vaccines. It features video clips and links to current vaccine news stories.

Immunization Action Coalition (IAC)

IAC's Talking about Vaccines web section provides healthcare professionals with top vaccination resources from trusted sources such as CDC, AAP, IAC, VEC, and many more. Visit www.immunize.org/concerns. Refer parents to IAC's website for the public at www.vaccineinformation.org

IAC has developed several patient handouts for vaccine-hesitant parents. These include:

- "Clear Answers & Smart Advice About Your Baby's Shots," an excerpt from the popular book "Baby 411" by Dr. Ari Brown. www.immunize.org/catg.d/p2068.pdf
- "Decision to Not Vaccinate My Child" www.immunize.org/catg.d/p4059.pdf
- "Reliable Sources of Immunization Information: Where to go to find answers!" www.immunize.org/catg.d/p4012.pdf
- "Vaccines Work!" www.immunize.org/catg.d/p4037.pdf

Institute for Vaccine Safety, Johns Hopkins University

The Institute for Vaccine Safety collects vaccine-specific safety information. Of particular interest is its "Components of Vaccines" section, which contains tables specifying the contents of various vaccines: www.vaccinesafety.edu/components.htm.

Vaccine Education Center (VEC) Children's Hospital of Philadelphia

VEC offers handouts in English and Spanish as well as four colorful booklets covering immunization of infants, teens, and adults, as well as one about vaccine safety. These educational materials can be downloaded at www.chop.edu/service/vaccine-education-center/order-educational-materials/order-educational-materials.html. VEC has developed a number of patient handouts covering vaccine topics of interest. These include the following

- "Too Many Vaccines? What you should know" at: www.chop.edu/export/download/pdfs/articles/vaccine-education-center/too-many-vaccines.pdf
- "Vaccine Ingredients: What you should know" at: www.chop.edu/export/download/pdfs/articles/vaccine-education-center/vaccine-ingredients.pdf

For parents with concerns about vaccines and autism

AAP has issued a statement that can be printed at www2.aap.org/advocacy/releases/autismparentfacts.htm. Parents may wish to investigate further at www.healthychildren.org/English/health-issues/conditions/developmental-disabilities/Pages/Autism-Spectrum-Disorders.aspx. IAC also recommends these books:

- *Autism's False Prophets: Bad Science, Risky Medicine, and the Search for a Cure,* by Paul A. Offit, MD
- *Unstrange Minds: Remapping the World of Autism,* by Roy Richard Grinker, PhD

And, here are three well-researched handouts from IAC and one from VEC:

- "MMR Vaccine Does Not Cause Autism: Examine the Evidence!" www.immunize.org/catg.d/p4026.pdf
- "Evidence shows vaccines unrelated to autism" www.immunize.org/catg.d/p4028.pdf
- "Vaccines and Autism: What you should know" www.chop.edu/export/download/pdfs/articles/vaccine-education-center/autism.pdf

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