

The Childhood Immunization Schedule

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➤ For more information on vaccines, vaccine-preventable diseases, and vaccine safety:
<http://www.cdc.gov/vaccines/conversations>

- The purpose of the recommended immunization schedule is to protect infants and children by providing immunity early in life, before they are exposed to potentially life-threatening diseases.
- Each vaccine is tested during the licensing process to be sure that it is safe and effective for children to receive at the recommended ages.
- Vaccines do not overload the immune system. Every day, a healthy baby's immune system successfully fights off millions of antigens—the parts of germs that cause the body's immune system to go to work. Vaccines contain only a tiny fraction of the antigens that babies encounter in their environment every day.
- Children do not receive any known benefits from following schedules that delay vaccines. We do know that delaying vaccines puts children at known risk of becoming ill with vaccine-preventable diseases.
- The Centers for Disease Control and Prevention (CDC) publishes a catch-up schedule designed to quickly get children back on schedule if they fall behind.
- The recommended and catch-up schedules can be found at www.cdc.gov/vaccines/recs/schedules/

“As a pediatrician, parent, and grandparent, I have seen the success of vaccines and the terrible toll of the diseases they prevent. When parents ask me about the vaccination schedule, I tell them that I believe following the schedule is the best thing to do for their baby or young child. I explain that getting the vaccines at the recommended ages means the best possible chance that their baby will be immune to diseases before they are most likely to be exposed. I tell them the vaccines have been tested at the recommended ages, so we know they're safe to get at those ages. Finally, I emphasize that we also know a great deal about the human immune system, and we know that a healthy baby's immune system can handle getting all vaccines when they are recommended.”

Dr. Larry Pickering, American Academy of Pediatrics and Centers for Disease Control and Prevention, Advisory Committee on Immunization Practices

Editor of The Red Book, the standard of care for preventing, diagnosing, and treating childhood infectious diseases

questions and answers

Who recommends vaccines and what is considered in the recommendation process?

The Centers for Disease Control and Prevention (CDC) sets the U.S. childhood immunization schedule based on recommendations from the Advisory Committee on Immunization Practices (ACIP)—a group of medical and public health experts. This schedule also is approved by the American Academy of Pediatrics (AAP) and the American Academy of Family Physicians (AAFP). To develop comprehensive recommendations for each vaccine, ACIP works throughout the year, reviewing available data on new and existing vaccines.

The information ACIP reviews for each vaccine always includes—

- The safety and efficacy of the vaccine when given at specific ages—only vaccines licensed by the Food and Drug Administration (FDA) are recommended, and vaccine makers must conduct rigorous tests to show that a vaccine is safe and effective at specific ages.
- The severity of the disease—vaccines recommended for children prevent diseases that can be serious for them, potentially causing long-term health problems or death.
- How many children get the disease if there is no vaccine—vaccines that do not provide benefit to many children may not be recommended.
- The differences in how well a vaccine works for children of different ages—the ability of vaccines to help the body produce immunity can vary depending on the age when the vaccine is given.

Why are there so many vaccines for children before they turn 2 years old?

Before 1985, the recommended immunization schedule included only seven vaccines. The good news is that today, we can protect children younger than 2 years of age from 14 potentially serious diseases with vaccines.

Every dose of a vaccine is important because they all protect against infectious diseases that are threats today. These diseases can be especially serious for infants and very young children. Parents may not have heard of some of today's vaccines or the serious diseases they prevent. For example, *Haemophilus influenzae* type b (Hib) vaccine prevents a serious bacterial infection that was a leading cause of mental retardation before the vaccine began to be used. Pneumococcal vaccine prevents today's leading cause of bacterial meningitis (infection of the fluid around the brain and spinal cord).



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Of course, besides the 14 vaccine-preventable diseases, there are serious diseases with no vaccines to prevent them. Health care professionals who treat seriously ill children are eager to offer even more potentially life-saving vaccines. The process of developing a vaccine is long and challenging, but the benefits can be enormous. For example, respiratory syncytial virus (RSV) causes around 100,000 infant hospitalizations each year in the United States. Scientists have been working for years to make a vaccine to prevent RSV. No safe and effective vaccine has been developed yet.

Comfort Measures Parents can comfort their babies when they are getting vaccines by making eye contact and smiling. They can also distract their babies by talking softly or singing. After the vaccine, parents can immediately soothe their child by breastfeeding or swaddling. At home, parents can use a cool, wet cloth to reduce soreness, redness, and swelling at the injection site.

When following the recommended immunization schedule, there are some visits when infants and children receive several shots. Won't that overload a child's immune system?

Vaccines do not overload the immune system. Every day, a healthy baby's immune system successfully fights off millions of antigens—the parts of germs that cause the body's immune system to go to work.

The antigens in vaccines come from the germs themselves, but the germs are weakened or killed so they cannot cause serious illness. Vaccines contain only a tiny fraction of the antigens that babies encounter every day in their environment, even if they receive several vaccines on one day.

What's wrong with following an alternative schedule, like spreading out shots so that immunizations are done when a child is ready to start school?

Infants and young children who follow immunization schedules that spread out shots—or leave out shots—are at risk of developing diseases during the time that shots are delayed. Following the recommended immunization schedule protects infants and children by providing immunity early in life, before they are exposed to potentially life-threatening diseases. If a young child falls behind the recommended schedule, parents and health care professionals should use the catch-up immunization schedule to quickly get the child up-to-date, reducing the amount of time the child is left vulnerable to vaccine-preventable diseases.

Some vaccine-preventable diseases, like pertussis and chickenpox, remain common in the United States, and children may be exposed to these diseases during the time they are not protected by vaccines. Unvaccinated children who do not get ill are fortunate. Others who are not so lucky end up with an illness that could have been prevented, placing them at risk for a serious case of disease that might cause hospitalization or death.

In addition, the only way to keep some children safe is by ensuring that others around them are vaccinated. For example, some children with weakened immune systems—such as children undergoing chemotherapy—cannot safely receive certain vaccines. Other vaccines are safe for these children, but do not work well because their immune systems do not respond normally.

Children do not receive any known benefits from following schedules that delay vaccines. Delaying vaccines puts children at known risk of becoming ill with diseases that could have been prevented.

Parents who are concerned about the number of shots given at one time can reduce the number given at a visit by using the flexibility built into the current recommended immunization schedule. For example, the third dose of Hepatitis B vaccine can be given at 6 through 18 months of age. Parents can work with their child's health care professional to have their child receive this dose at any time during this recommended age range.

Why do vaccines for babies and young children require more than one dose?

Depending on the vaccine, more than one dose is needed to build high enough immunity to prevent disease, boost immunity that fades over time, make sure people who did not get immunity from a first dose are protected, or protect against germs that change over time, such as flu.

Are there some children who shouldn't receive some vaccines?

Nearly all children can be safely vaccinated. There are some exceptions including children with allergies to something in a vaccine, like a small amount of chicken egg protein left from the manufacturing process for flu vaccine. Children with very serious egg allergies should not receive flu vaccine. Children with weakened immune systems due to an illness or a medical treatment, such as chemotherapy, may not be able to safely receive some vaccines.

| the science |

These six articles discuss the recommended U.S. childhood immunization schedule, including how it is developed, why it is important to follow, and how it has improved children's health.

Immunization Policy Development in the United States: The Role of the Advisory Committee on Immunization Practices by Jean C. Smith et al. *Annals of Internal Medicine*. January 2009. Vol 150: pages 45-49. <http://www.annals.org/content/150/1/45.full.pdf+html>.

Development of Pediatric Vaccine Recommendations and Policies by Larry K. Pickering et al. *Seminars in Pediatric Infectious Diseases*. July 2002. Vol 13: pages 148-154. <http://www.cdc.gov/vaccines/spec-grps/hcp/conversations-refs.htm>.

Historical Comparisons of Morbidity and Mortality for Vaccine-Preventable Diseases in the United States by Sandra W. Roush et al. *Journal of the American Medical Association*. November 14, 2007. Vol. 298: pages 2155-2163. <http://jama.ama-assn.org/cgi/reprint/298/18/2155>.

Rota and Pneumococcus Vaccine Success Stories: Pediatric Emergency Practitioners Wonder "Where Have the Kids Gone?" by M. McKenna. *Annals of Emergency Medicine*. April 2009. Vol 53: pages 23A-25A. <http://download.journals.elsevierhealth.com/pdfs/journals/0196-0644/PIIS0196064409001371.pdf>.

The Problem with Dr. Bob's Alternative Vaccine Schedule by Paul A. Offit and Charlotte A. Moser. *Pediatrics*. January 2009. Vol 123: pages e164-e169. <http://pediatrics.aappublications.org/cgi/reprint/123/1/e164>.

Addressing Parents' Concerns: Do Multiple Vaccines Overwhelm or Weaken the Infant's Immune System? by Paul A. Offit et al. *Pediatrics*. January 2002. Vol 109: pages 124-129. <http://pediatrics.aappublications.org/cgi/reprint/109/1/124>.

For more information on vaccines call 800-CDC-INFO (800-232-4636) or visit <http://www.cdc.gov/vaccines>.