

# Overcoming obstacles to vaccination

More parents are refusing vaccinations for their children. This article helps you break down the barriers that are putting these kids at risk.

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**TODAY, MANY OF THE DISEASES** that in past decades killed or sickened millions of people across the globe have faded from public memory. Many Americans—even many health-care providers—don't know of a single person who has been diagnosed with measles, tetanus, or polio.

In the developed world, vaccines have been so successful at eradicating or controlling disease that their occasional serious adverse effects get more attention than their ability to save lives. Based on reports of vaccine reactions and the spread of unfounded information, anti-vaccine sentiment has been growing, and some parents have refused to get their children immunized. This poses a serious threat that diseases we thought were virtually wiped out could make a comeback.

According to the World Health Organization (WHO), approximately 1.4 million children younger than age 5 died from vaccine-preventable diseases in 2002. The leading causes

of death were measles (38%), *Haemophilus influenzae* type b (Hib) (27%), and pertussis (20%). Others included tetanus (both neonatal and nonneonatal), polio, diphtheria, and yellow fever.

This article discusses major vaccine-preventable diseases, lists current immunization recommendations, explores reasons why some parents don't get their children immunized, and offers suggestions for overcoming such barriers. (See *Vaccine recommendations and reactions*.)

## Measles

A highly contagious viral respiratory infection, measles is the deadliest of the childhood illnesses involving rash and fever. In 2005, more than a half-million cases were reported worldwide, causing an estimated 345,000 deaths—mostly among children.

Although no longer endemic to the United States, measles can be brought here by foreign visitors or Americans returning from abroad. This problem underscores the importance of maintaining the highest possible vaccination coverage and adhering to vaccination recommendations. In 2005, 66 confirmed measles cases were reported to the Centers for Disease Control and Prevention (CDC), for an incidence rate of less than one case per 1 million. But in August 2008, the CDC announced that measles cases had reached their highest level in more than a decade, with 131 cases reported during the first 7 months of this year. Nearly half of those cases involved children whose parents had rejected vaccination.

CE: 1.6 contact  
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### LEARNING OBJECTIVES

1. Describe the transmission and incidence of influenza, measles, pertussis, poliovirus, and tetanus.
2. Identify ways to overcome barriers to vaccination.
3. Compare the schedules, risks, and contraindications for at least three of the vaccines discussed in this article.

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## Vaccine recommendations and reactions

This chart lists vaccines used for major vaccine-preventable diseases, summarizes vaccination schedules, and describes the reactions, contraindications, precautions, and special considerations for each vaccine. The serious allergic reactions listed have a frequency of less than 1 incident per 1 million doses; the other severe reactions are so rare that experts can't determine if they're definitively linked to the vaccine. Mild reactions are fairly common, moderate reactions are uncommon, and severe reactions are extremely rare. All vaccines listed are contraindicated in patients with a history of severe allergic reaction to any vaccine component or to a previous dose. In patients with moderate or severe illness, vaccinations should be delayed.

Disease, recommended vaccine, and schedule summary	Vaccine-associated reactions	Special considerations
<p><b>Haemophilus influenzae type b (Hib)</b>  <b>Hib type b conjugate vaccine</b></p> <ul style="list-style-type: none"> <li>Two or three doses during infant's first 6 months</li> <li>Booster at age 12 to 15 months</li> </ul>	<p><b>Mild reactions:</b>                      Redness, warmth, or swelling at injection site; fever</p>	<ul style="list-style-type: none"> <li>Contraindicated in children younger than age 6 weeks</li> </ul>
<p><b>Hepatitis A</b>  <b>Hepatitis A (HepA) vaccine</b></p> <ul style="list-style-type: none"> <li>Two doses at least 6 months apart</li> <li>Minimum age for first dose: 12 months</li> </ul>	<p><b>Mild reactions:</b>                      Injection-site soreness, headache, appetite loss, fatigue</p> <p><b>Severe reactions:</b>                      Serious allergic reaction</p>	<ul style="list-style-type: none"> <li>Contraindicated in hypersensitivity to alum or 2-phenoxyethanol preservative</li> <li>Safety during pregnancy not established</li> </ul>
<p><b>Hepatitis B</b>  <b>Hepatitis B (HepB) vaccine</b></p> <ul style="list-style-type: none"> <li>First dose given to newborn before hospital discharge</li> <li>Second dose: age 1 to 2 months</li> <li>Final dose: age 24 weeks or older</li> <li>Infant may receive extra dose at 4 months if given as part of combination vaccine; if given separately, 4-month dose may be skipped.</li> </ul>	<p><b>Mild reactions:</b>                      Injection-site soreness, temperature of 99.9° F (37.7° C) or higher</p> <p><b>Severe reactions:</b>                      Serious allergic reaction</p>	
<p><b>Human papillomavirus</b>  <b>HPV vaccine</b></p> <ul style="list-style-type: none"> <li>First dose: females ages 11 to 12</li> <li>Second dose: 2 months after first dose</li> <li>Third dose: 6 months after first dose</li> <li>In females not previously vaccinated, series is given at ages 13 to 18.</li> </ul>	<p><b>Mild reactions:</b>                      Redness, swelling, soreness, or itching at injection site; fever</p> <p><b>Severe reactions:</b>                      Serious allergic reaction</p>	<ul style="list-style-type: none"> <li>Not recommended during pregnancy</li> </ul>
<p><b>Influenza</b>  <b>Trivalent inactivated influenza vaccine (TIV)</b>  <b>Live attenuated influenza vaccine (LAIV)</b></p> <p><b>TIV or LAIV</b></p> <ul style="list-style-type: none"> <li>Minimum age: 6 months</li> <li>Minimum age: 2 years</li> <li>Given yearly to all close contacts of children ages 0 to 59 months, persons with certain risk factors, healthcare workers, and others in close contact with persons in high-risk groups.</li> <li>Two doses separated by at least 4 weeks in children younger than age 9 who are receiving vaccine for first time or were vaccinated for first time last season but received only one dose</li> </ul>	<p><b>TIV</b></p> <p><b>Mild reactions:</b>                      Soreness, redness, or swelling at injection site; fever; aches</p> <p><b>Severe reactions:</b>                      Life-threatening allergic reaction, Guillain-Barré syndrome</p> <p><b>LAIV</b></p> <p><b>Mild reactions:</b>                      Runny nose, nasal congestion, cough, fever; chills, headache, muscle aches, tiredness, wheezing, sore throat, abdominal pain, diarrhea</p> <p><b>Severe reactions:</b>                      Life-threatening allergic reaction</p>	<ul style="list-style-type: none"> <li>Contraindicated in severe allergy to chicken eggs, history of severe reaction to influenza vaccine, history of Guillain-Barré syndrome within 6 weeks of previous dose, and children younger than age 6 months</li> <li>Delay vaccination in patients with moderate to severe illness accompanied by fever.</li> </ul>
<p><b>Measles</b>  <b>Measles, mumps, rubella (MMR) vaccine</b></p> <ul style="list-style-type: none"> <li>First dose at age 12 to 15 months</li> <li>Second dose at age 4 to 6 years</li> </ul>	<p><b>Mild reactions:</b>                      Fever, mild rash, lymphadenopathy</p> <p><b>Moderate reactions:</b>                      Seizures, arthralgia, thrombocytopenia</p>	<ul style="list-style-type: none"> <li>Not recommended for pregnant or severely immunocompromised patients</li> <li>Delay vaccination for 3 months after administration of prophylactic immune globulin.</li> </ul>

(continued)

## Disease, recommended vaccine, and schedule summary

## Vaccine-associated reactions

## Special considerations

### Measles (continued)

**Severe reactions:**  
Serious allergic reaction; deafness; long-term seizures, coma, altered consciousness, permanent brain damage

### Meningitis (meningococcal)

#### Meningococcal conjugate vaccine (MCV4)

- Minimum age: 2 years
- Children ages 2 to 10 years with terminal complement deficiencies or anatomic or functional asplenia and certain other high-risk groups. (MPSV4 [described below] also is acceptable for these persons.)
- Persons who received MPSV4 at least 3 years previously and remain at increased risk for meningococcal disease

**Mild reactions:**  
Injection-site redness; fever  
**Severe reactions:**  
Serious allergic reaction; Guillain-Barré syndrome (with MCV4)

#### Meningococcal polysaccharide vaccine (MPSV4)

- Minimum age: 2 years

### Pertussis

#### Diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP)

- Ages 2, 4, 6, and 15 to 18 months; subsequent dose at age 4 to 6 years

#### Tetanus toxoid and acellular pertussis (Tdap) vaccine

- Age 11 to 12 years in children who've completed recommended childhood DTP/DTaP vaccination series and haven't received tetanus and diphtheria toxoids (Td) booster
- One Tdap dose 5 years after last Td/DTaP dose in adolescents ages 13 to 18 who missed Tdap at ages 11 to 12 or received Td only

**Mild reactions:**  
Fever; redness, swelling, or soreness at injection site; fussiness; fatigue; vomiting  
**Moderate reactions:**  
Seizures, nonstop crying for 3 hours or longer, high fever  
**Severe reactions:**  
Serious allergic reaction; long-term seizures, coma, altered consciousness, and permanent brain damage (with DTaP)

#### DTaP

- Contraindicated in unexplained encephalopathy within 7 days of previous dose
- The following adverse vaccine reactions are precautions for subsequent doses: unexplained temperature of 105° F (40.5° C) or higher; collapse or shocklike state or inconsolable crying lasting 3 hours or longer within 48 hours of vaccination; seizures with or without fever within 3 days of vaccination.

#### Tdap

- Contraindicated in unexplained encephalopathy within 7 days of previous DTaP dose
- **Precautions:** history of Guillain-Barré syndrome within 6 weeks of previous dose of any tetanus toxoid-containing vaccine; progressive neurologic disorder (until condition stabilizes); history of severe local reaction to previous dose of tetanus toxoid-containing vaccine; moderate to severe acute illness

### Poliovirus

#### Inactivated poliovirus vaccine (IPV)

- Ages 2, 4, and 6 to 18 months and 4 to 6 years

**Mild reactions:**  
Soreness at injection site  
**Severe reactions:**  
Serious allergic reaction

- Allergic reactions may occur in patients who are sensitive to streptomycin, neomycin, or polymyxin B.

### Rotavirus

#### Oral rotavirus vaccine (Rota)

- Ages 2, 4, and 6 months
- First dose must be given at age 6 to 12 weeks.
- Final dose should be given no later than age 32 weeks.

**Mild reactions:**  
Mild, temporary diarrhea or vomiting

#### Precautions (for any dose)

- Altered immunocompetence
- Recent receipt of blood products
- Acute moderate to severe GI or other disease
- Preexisting chronic GI disease
- History of intussusception

### Tetanus

See *Pertussis* (above).

**Mild reactions:**  
Redness, swelling, or soreness at injection site  
**Severe reactions:**  
Serious allergic reaction; deep, aching pain and muscle wasting in upper arms



## Wiping out polio around the world

The single largest internationally coordinated public health project, the Global Polio Eradication Initiative has greatly reduced polio's global incidence. It was spearheaded by the World Health Organization, Rotary International, the U.S. Centers for Disease Control and Prevention, UNICEF, national governments of multiple countries, and private foundations.

When the initiative launched in 1988, wild poliovirus was endemic in more than 125 countries on five continents. More than 30,000 cases were reported, and the disease paralyzed at least 1,000 children every day. By 2005, just 2,033 cases were reported and the disease was endemic in only six countries—India, Pakistan, Afghanistan, Nigeria, Niger, and Egypt.

In 2006, polio incidence dropped to fewer than 2,000 cases and Niger and Egypt were removed from the endemic-countries list. For more information on the initiative, visit [www.polioeradication.org](http://www.polioeradication.org).

Measles is transmitted mainly from person to person by large respiratory droplets or by contact with direct secretions. Also, aerosolized droplet nuclei in a closed area can transmit the disease for up to 2 hours after a person with measles has left the area.

Measles complications include blindness, ear infections, pneumonia, encephalitis, seizures, and death. About 20% of children develop complications, and one or two of every 1,000 dies. In developing countries where malnutrition and vitamin A deficiency are prevalent, measles is fatal in about 25% of cases.

### **Haemophilus influenzae type b**

A bacterium, Hib may cause several types of serious infections, including pneumonia, meningitis, sepsis, and epiglottitis. Hib pneumonia is especially prevalent in developing countries. Rare in adults, Hib infections affect mostly children younger than age 5, especially those ages 6 months to 2 years. Globally, Hib-related disease causes approximately 3 million cases of serious illness and 400,000 deaths in young children annually.

Transmission occurs by droplets. Hib commonly is found in the noses and throats of children who either are infected or are carriers. Although treatable with antibiotics, Hib infection carries high rates of mortality and complications. Hib meningitis is fatal in 5% to 10% of cases; of children who survive, 15% to 30% suffer permanent neurologic disability.

### **Pertussis**

A highly communicable bacterial respiratory illness, pertussis (also called whooping cough) is unique among diseases for which universal childhood vaccination is recommended: It's the only one whose incidence has persistently increased—from 1,730 U.S. cases in 1980 to 25,827 in 2004. Rates are highest among young infants and adolescents.

Looking at the global picture, WHO reports that in 2003, 90% of the estimated 17.6 million pertussis

cases and 279,000 deaths occurred in developing countries—and could have been prevented by the pertussis vaccine. (That same year, the pertussis vaccine *did* prevent an estimated 38.3 million additional cases and 607,000 more deaths.)

The causative bacterium, *Bordetella pertussis*, spreads by respiratory droplets or airborne droplets of respiratory secretions, and occasionally by contact with objects recently contaminated by an infected person.

Complications include hypoxia, apnea, pneumonia, seizures, encephalopathy, and malnutrition. Most significant complications occur in infants and young children. Death occurs most often in children too young to be vaccinated. From 2000 to 2004, 76% of pertussis deaths in the United States occurred in infants younger than 2 months, and 90% in infants younger than 4 months.

Efficacy of the pertussis vaccine wanes in late childhood, so adults may become infected and transmit pertussis to unvaccinated children. Older pertussis vaccines were licensed only for infants and young children; two new vaccines were licensed in 2005 for older children and adults.

### **Tetanus**

Tetanus results from exposure to spores of the bacterium *Clostridium tetani*, which is present in soil and transmitted through an open wound,

such as a deep puncture wound caused by a dirty nail, knife, or splinter or by an animal bite. A potentially deadly neurologic disease, tetanus occurs when *C. tetani* bacteria grow in the tissue and produce a potent neurotoxin. Although infectious, tetanus isn't contagious from person to person.

Tetanus occurs in all age-groups and is especially dangerous (and almost always fatal) in newborns. In 2005, neonatal tetanus cases accounted for 63% (9,782) of global tetanus cases (15,561). From 2000 to 2003, approximately 89% of total global deaths from tetanus (290,000) occurred in neonates (257,000).

Immunizing females before or during pregnancy is critical in preventing neonatal tetanus, as the mother's antibodies transfer to the fetus. Another key to prevention is to ensure hygienic practices during delivery and newborn care. Tetanus can be transmitted if the newborn is delivered with unclean hands, the umbilical cord is cut with a dirty knife or other instrument, or the cord is covered with a contaminated dressing.

Tetanus complications include laryngospasm, fractures, nosocomial infections, hypertension, pulmonary embolus, aspiration pneumonia, coma, and death.

### **Polio**


Polio (poliomyelitis) is a highly infectious viral disease that spreads from the intestine to the bloodstream, dam-




## Reliable vaccine resources on the Web

The websites listed below offer a wealth of information to enhance both your own and your patients' knowledge of vaccines.

### Centers for Disease Control and Prevention: Autism Information Center: Vaccines and autism

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

### Centers for Disease Control and Prevention: Some common misconceptions about vaccination and how to respond to them

 [www.cdc.gov/vaccines/vac-gen/6mishome.htm](http://www.cdc.gov/vaccines/vac-gen/6mishome.htm)

### Centers for Disease Control and Prevention: Vaccine safety

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

### Centers for Disease Control and Prevention: Vaccines & preventable diseases

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

### Children's Hospital of Philadelphia: Vaccine Education Center

 [www.chop.edu/consumer/jsp/division/generic.jsp?id=75807](http://www.chop.edu/consumer/jsp/division/generic.jsp?id=75807)

### Immunization Action Coalition

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

### Nemours Foundation: Kids Health for Parents: Measles

 <http://kidshealth.org/parent/infections/lung/measles.html>

aging or destroying nerve cells. At one time, the disease crippled 13,000 to 20,000 children annually in the United States. However, polio vaccines have virtually eliminated the disease from the Western Hemisphere. (Nonetheless, if American children went unvaccinated, a single case of imported polio could reintroduce the disease in this country.) Globally, the polio incidence dropped from more than 30,000 in 1998 to about 2,000 cases in 2006. (See *Wiping out polio around the world*.)

Polio is transmitted from person to person by the fecal-oral route or through ingestion of contaminated food or water. Up to 95% of cases may be asymptomatic—but infected persons can spread the virus.

Polio can affect any body area and may cause total paralysis within hours. Irreversible paralysis of the lower extremities occurs in 1 of every 200 cases. In 5% to 10% of those paralyzed, death results from respiratory muscle paralysis.

## Influenza

Influenza is a highly infectious viral illness characterized by fever, myalgia, sore throat, cough, and headache. Every year, it leads to hospitalization of more than 20,000 American children younger than age 5. Annually, the disease kills an estimated 300,000 to 500,000 worldwide.

Influenza viruses spread from person to person by large droplets, by contact with surfaces contaminated with droplets, or possibly by small particles suspended in the air. Because these viruses undergo frequent surface-antigen changes, new vaccines must be developed every year. Immunity from one influenza virus doesn't protect fully against the new strain; as the virus changes, a new potential for an epidemic emerges.

## Barriers to vaccination

Reasons why a child might go unvaccinated are myriad. They include:

- lack of parental knowledge about vaccinations

- lack of motivation to have the child vaccinated
- forgetting to make vaccination appointments
- fears about vaccine safety and adverse effects
- a belief that sources of information about vaccines can't be trusted, the risk of vaccine-preventable diseases is low, the risk-benefit ratio is too high, infants are too fragile to handle vaccinations, or too many shots at once can harm a child
- logistical issues, such as complicated vaccination schedules, financial problems, confusing clinic policies, and transportation problems.

Parental misconceptions about vaccine safety are a growing problem. Some parents consider vaccinations unnecessary, believing their children won't be exposed to vaccine-preventable diseases. Ironically, this belief probably arose because vaccines have been so effective in wiping out many diseases in the United States.

In fact, every day around the world, several million children *avoid* vaccine-preventable illnesses because

they've been immunized against them. Yet unsupported claims that vaccines can cause health problems get widespread media attention.

For instance, a possible link between autism and the measles-mumps-rubella (MMR) vaccine has been extensively reported in the media, even though scientific evidence doesn't support this claim. Concern about such a link stemmed from a 1998 study involving 12 children; its findings suggested that the MMR vaccine caused bowel problems, which then led to autism. However, the sample size was extremely small and the researchers' interpretation wasn't well-supported (some of the children had autism before the bowel problems arose). What's more, 10 of the 13 study authors later retracted their interpretation of the data. Since then, numerous studies with large samples have found no link between the MMR vaccine and autism.

## Breaking down the barriers

If you encounter parents who are reluctant to have their children immunized, first acknowledge their con-

cerns. Then provide education to correct misconceptions, and offer accurate information about the benefits and risks of vaccines. Explain that serious vaccine reactions are rare and that vaccines are approved for use only if the evidence shows their benefits significantly outweigh their risks. For additional information about the purported link between vaccines and autism, mitochondrial disease, or other health concerns, refer parents to accurate Internet resources. (See *Reliable vaccine resources on the Web*.)

Also tell parents they can obtain vaccine information statements at [www.cdc.gov/vaccines/Pubs/vis/default.htm](http://www.cdc.gov/vaccines/Pubs/vis/default.htm). These statements contain up-to-date vaccine recommendations and information, as well as facts about the National Vaccine Injury Compensation Program, which maintains a forum for persons found to be injured by certain vaccines.

If parents don't understand the importance of childhood vaccinations, point out that with global travel so prevalent, the need to maintain immunizations is critical. Otherwise, the vaccine-preventable diseases that still plague other countries could be reintroduced here—with disastrous consequences. Mention the 2005 U.S. measles outbreak as an example: More than half the 66 cases reported to the CDC were linked to one unvaccinated person who'd traveled to Europe and brought back the infection to the United States; 94% of cases were linked to importations (internationally imported or U.S-acquired

but import-linked).

Logistical issues can be especially frustrating for parents, who may need help navigating the healthcare system for vaccination appointments. Consider giving them a simplified chart showing the ages at which their child needs to come back for vaccinations. Another idea: send vaccination reminder cards to parents. Also, be sure to find out what resources are available in your community to help parents cope with transportation and financial issues.

### Nurse's role

Your role is to provide accurate information about vaccine-preventable diseases to parents and to advocate that all children receive appropriate vaccinations at the appropriate times. To provide accurate information and accurately answer parents' questions about vaccines and their safety, you must be familiar with the current status and global and local prevalence of vaccine-preventable diseases, current vaccination recommendations, and vaccines' risks and benefits. ★

### Selected references

- Centers for Disease Control and Prevention. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. 10th ed. Atkinson W, Hamborsky J, McIntyre L, Wolfe S, eds. Washington, DC: Public Health Foundation; 2007.
- Centers for Disease Control and Prevention. Vaccines & preventable diseases, 2007. [www.cdc.gov/vaccines/vpd-vac/](http://www.cdc.gov/vaccines/vpd-vac/). Accessed September 1, 2008.
- Dayan G, Redd S, Rota P, Rota J, Bellini W, Gould P. Measles—United States 2005.

*MMWR*. 55(50):1348-1351.

Eggers P, Austin D, Hathcock L, et al. Pertussis outbreak in an Amish community: Kent County, Delaware, September 2004–February 2005. *MMWR*. 2006;55(30):817-821.

Hib initiative: taking action to prevent childhood pneumonia & meningitis. [www.hibaction.org/aboutdisease.php](http://www.hibaction.org/aboutdisease.php). Accessed September 1, 2008.

National Association of Pediatric Nurse Practitioners. Disease overview. [www.pertussis.com/diseaseoverview.html](http://www.pertussis.com/diseaseoverview.html). Accessed September 1, 2008.

Niederhauser VP, Markowitz JW. Barriers to immunizations: multiethnic parents of under- and unimmunized children speak. *J Am Acad Nurse Pract*. 2007;19:15-23.

Pan American Health Organization. Neonatal Tetanus Elimination: Field Guide. Washington, DC: Pan American Health Organization; 2005. Scientific and Technical Publication No. 602.

World Health Organization. Pertussis vaccines: WHO position paper. *Wkly Epidemiol Rec*. 2005;80:31-39.

World Health Organization. Tetanus vaccines: WHO position paper. *Wkly Epidemiol Rec*. 2006;81:198-208.

World Health Organization. Vaccine-preventable diseases. [www.who.int/immunization\\_monitoring/diseases/en/](http://www.who.int/immunization_monitoring/diseases/en/). Accessed September 1, 2008.

World Health Organization. *WHO Vaccine-Preventable Disease Monitoring System. 2006 Global Summary*. Geneva, Switzerland: WHO Department of Immunization, Vaccines, and Biologicals; 2006.

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## CE POST-TEST — Overcoming obstacles to vaccination

### Instructions

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If you are unable to take the post-test online, complete the print form and mail it to the address at the bottom of the next page. (Mail-in test fee: ANA members \$20; nonmembers \$25.)

**Please allow 4 to 6 weeks for CE processing.**

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Expiration: 12/31/2010 Pharmacology contact hours: 1.0

**Purpose/goal:** To provide registered nurses with information to help them administer vaccines safely and educate the public about vaccines