Pertussis (Whooping Cough): Questions and Answers

INFORMATION ABOUT THE DISEASE AND VACCINES

What causes pertussis?

Pertussis, also known as whooping cough, is caused by a bacterium, *Bordetella pertussis.*

How does pertussis spread?

Pertussis is spread through the air by infectious droplets and is highly contagious.

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

The incubation period of pertussis is commonly 7 to 10 days, with a range of 4–21 days.

What are the symptoms of pertussis?

Pertussis disease can be divided into three stages:

Catarrhal stage: can last 1–2 weeks and includes a runny nose, sneezing, low-grade fever, and a mild cough (similar symptoms to the common cold).

Paroxysmal stage: usually lasts 1–6 weeks, but can persist for up to 10 weeks. The characteristic symptom is a burst, or paroxysm, of numerous, rapid coughs. At the end of the cough paroxysm, the patient can suffer from a long inhaling effort that includes a high-pitched whoop (hence the name, "whooping cough"). Infants and young children often appear very ill and distressed, and may turn blue and vomit. “Whooping” does not necessarily have to accompany the cough.

Convalescent stage: usually lasts 2–6 weeks, but may last for months. Although the cough usually disappears after 2–3 weeks, paroxysms may recur whenever the patient suffers any subsequent respiratory infection. The disease is usually milder in adolescents and adults, consisting of a lingering cough. However, these people are still able to transmit the disease to others, including unimmunized or incompletely immunized infants.

How serious is pertussis?

Pertussis can be a very serious disease, especially for infants. Infants (6 months of age and younger) are the children most likely to die from this disease. Rates of hospitalization and complications increase with decreasing age. The breathing difficulties associated with this disease can be very distressing and frightening for the patient and his or her family.

Although adults are less likely than infants to become seriously ill with pertussis, most adults make repeated visits for medical care and miss work, especially when pertussis is not initially considered as a reason for their long-term cough. In addition, adults with pertussis infection are a frequent source of infection to infants with whom they have close contact.

What are possible complications from pertussis?

Younger patients have a greater chance of complications from pertussis than older patients. The most common complication is secondary bacterial infection, which is the cause of most pertussis-related deaths. Pneumonia occurs in one out of 20 cases; this percentage is higher for infants younger than age 6 months.

Infants are also more likely to suffer from such neurologic complications as seizures and swelling of the brain, probably due to the reduction of oxygen supply to the brain. Other less serious complications include ear infection, loss of appetite, and dehydration.

Adults with pertussis can have complications such as pneumonia (up to 5% of cases) and rib fracture from coughing (up to 4% of cases). Other reported side effects include (among others), loss of consciousness, female urinary incontinence, hernias, angina, and weight loss.

How do I know if my child has pertussis?

The diagnosis of pertussis is usually made based on its characteristic history and physical examination. A laboratory test may be done, which involves taking a specimen from the back of the patient's throat (through the nose).

Is there a treatment for pertussis?

Antibiotics are necessary in treating pertussis cases.

How long is a person with pertussis contagious?

People with pertussis are most contagious during the catarrhal period and during the first two weeks after onset of the cough (approximately 21 days).

CONTINUED ON THE NEXT PAGE ▶

How common is pertussis in the United States?

Before a vaccine against pertussis was available, pertussis (whooping cough) was a major cause of childhood illness and death in the United States. From 1940–1945, over one million cases of pertussis were reported. With the introduction of a vaccine in the late 1940s, the number of reported pertussis cases in the U.S. declined from about 200,000 a year in the pre-vaccine era to a low of 1,010 cases in 1976.

Since the 1980s, the number of cases of pertussis has increased, especially among babies younger than 6 months and teenagers. In recent years, the United States has reported a significant increase in cases, with outbreaks of pertussis reaching epidemic levels in some states. In 2019, 18,617 cases of pertussis were reported to CDC, including 9 deaths. Rates of pertussis declined steeply during the COVID-19 pandemic, largely due to measures taken by many people to reduce the transmission of COVID-19. In 2022, 2,388 cases of pertussis were reported to CDC, including 3 deaths (see www.cdc.gov/pertussis/downloads/pertuss-surv-report-2022_provisional.pdf).

Can you get pertussis more than once?

Reinfection is uncommon but does occur. With natural infection, immunity to pertussis will likely wane as soon as seven years following disease; reinfection may begin as a persistent cough, rather than typical pertussis.

When did vaccine first become available for diphtheria, tetanus, and pertussis?

The first inactivated toxin, or toxoid, against diphtheria was developed around 1921, but it was not widely used until the 1930s. In 1924, the first tetanus toxoid (inactivated toxin) was produced and was used successfully to prevent tetanus in the armed services during World War II. The first pertussis vaccine was developed in the 1930s and was in widespread use by the mid-1940s, when pertussis vaccine was combined with diphtheria and tetanus toxoids to make the combination DTP vaccine. In 1991, concerns about DTP safety and side effects led to the development of more purified (acellular) pertussis vaccines that are associated with fewer side effects. These acellular pertussis vaccines have replaced the whole cell DTP vaccines in the U.S.

In 2005, two vaccine products were licensed adolescents and adults that combine the tetanus and diphtheria toxoids with acellular pertussis (Tdap) vaccine.

How are vaccines made that prevent diphtheria, tetanus and pertussis?

These vaccines are made by chemically treating the diphtheria, tetanus, and pertussis toxins to render them nontoxic yet still able to produce an immune response in the vaccinated person. They are known as “inactivated” vaccines because they do not contain live bacteria.

What’s the difference between all the vaccines containing diphtheria and tetanus toxoids and pertussis vaccine?

It’s like alphabet soup! Here is a listing of the various products:

- DTaP: Diphtheria and tetanus toxoids and acellular pertussis vaccine; given to infants and children ages 6 weeks through 6 years. In addition, several childhood combination vaccines include DTaP as a component.
- Tdap: Tetanus and diphtheria toxoids with acellular pertussis vaccine; given to adolescents and adults. Pregnant people should receive Tdap during each pregnancy.
- Td: Tetanus and diphtheria toxoids; licensed for ages 7 years and older. The small “d” indicates a smaller quantity of diphtheria toxoid than in the pediatric DTaP formulation. CDC recommends use of Td in children younger than age 7 years who have developed a contraindication to pertussis vaccination.

How are these vaccines given?

The DTaP preparations (or Td when the pertussis component is contraindicated) are given as an injection in the anterolateral thigh muscle (for infants and young toddlers) or in the deltoid muscle (for older children). Tdap and Td are given in the deltoid muscle for children and adults age 7 years and older.

Who should get these vaccines?

All children, beginning at age 2 months, adolescents, and adults need protection against these three diseases—diphtheria, tetanus, and pertussis (whooping cough). Routine booster doses are also needed throughout life.

How many doses of vaccine are needed?

The usual schedule for infants is a series of four doses of DTaP given at 2, 4, 6, and 15–18 months of age. A fifth shot, or booster dose, is recommended between age 4 and 6 years, unless the fourth dose was given late (after the fourth birthday).

CONTINUED ON THE NEXT PAGE ▶

For people who were never vaccinated or who may have started but not completed a series of shots, a 3-dose series of tetanus-toxoid containing vaccine should be given with 1 to 2 months between dose #1 and #2, and 6 to 12 months between dose #2 and #3. At least one of the doses, preferably the first, should be Tdap, with either Td or Tdap used for doses #2 and #3.

Because immunity to diphtheria and tetanus wanes with time, boosters of Td or Tdap are needed every ten years.

When adolescents and adults are scheduled for their routine tetanus and diphtheria booster, should they get vaccinated with Td or Tdap?

Immunization experts recommend that a dose of Tdap be given to all adolescents at age 11–12 years as a booster during the routine adolescent immunization visit if the adolescent has finished the childhood DTaP schedule and has not already received a dose of Td or Tdap. If a child age 7–9 years did not complete a primary series in childhood, a dose of Tdap should be given as part of the catch-up schedule, followed by the routine adolescent dose at age 11–12 years. If the catch-up dose is given at age 10, it can be counted as the adolescent dose.

All adults should receive a single dose of Tdap as soon as feasible. Then, subsequent booster doses of Td or Tdap should be given every ten years. Pregnant people should receive Tdap during each pregnancy. Adolescents and adults who have recently received Td vaccine can be given Tdap without any waiting period.

If someone experiences a deep or puncture wound, or a wound contaminated with dirt, an additional booster dose of either Td or Tdap may be given if the last dose was more than five years ago. If both Td and Tdap are available and the person has not received a dose of Tdap since their 7th birthday, give Tdap. It is important to keep an up-to-date record of all immunizations so that repeat doses don't become necessary. Although it is vital to be adequately protected, receiving more doses than recommended can lead to increased local reactions, such as painful swelling of the arm.

Who supports the use of these vaccines?

The use of these vaccines is recommended by the Advisory Committee on Immunization Practices and approved by the CDC, American Academy of Pediatrics, American Academy of Family Physicians, American College of Obstetricians and Gynecologists, American College of Nurse-Midwives, American Academy of Physician Associates, American College of Physicians, National Association of Pediatric Nurse Practitioners, American Pharmacists Association, and the Society for Healthcare Epidemiology of America.

What side effects have been reported with these vaccines?

Local reactions, such as redness and swelling at the injection site, soreness and tenderness where the shot was given, as well as mild systemic reactions such as fever, are not uncommon in children and adults.

Side effects following Td or Tdap in older children and adults include redness and swelling at the injection site (following Td) and generalized body aches, and tiredness (following Tdap). Older children and adults who received more than the recommended doses of Td/Tdap vaccine can experience increased local reactions, such as painful swelling of the arm. This is due to high levels of tetanus antibody in their blood.

How effective are these vaccines?

After a properly spaced primary series of DTaP or Td/Tdap, approximately 95% of people will have protective levels of diphtheria antitoxin and 100% will have protective levels of tetanus antitoxin in their blood. However, antitoxin levels decrease with time so routine boosters with Td or Tdap are recommended every 10 years. Short-term protection from pertussis illness after vaccination is about 80–85% but protection begins to decline after about a year.

Can a pregnant person receive Tdap vaccine?

Yes. All pregnant people should receive Tdap during each pregnancy, preferably early in the time period between 27 and 36 weeks' gestation. Studies show that vaccination during pregnancy reduces a baby's risk of getting pertussis in early infancy by 90 percent. Infants are not adequately protected against pertussis until they have received at least 3 doses of DTaP. If a new mother hasn't ever been vaccinated with Tdap, it should be administered before hospital discharge.

Who should not receive these vaccines?

Generally, any person who has had a serious allergic reaction to a vaccine component or a prior dose of the vaccine should not receive another dose of the same vaccine. People who had a serious allergic reaction to a previous dose of DTaP or Tdap vaccine should not receive another dose.

CONTINUED ON THE NEXT PAGE ▶

A person younger than 7 years who develops encephalopathy (e.g., coma, decreased level of consciousness, prolonged seizures) not due to another identifiable cause within 7 days of administration of a previous dose of DTP or DTaP should not receive another dose of DTaP. To complete timely tetanus and diphtheria vaccination of these young children, CDC recommends off-label use of Td (tetanus-reduced diphtheria) vaccine (licensed for age 7 years and older), following the same schedule that would be used for DTaP in this age group. If the person whose encephalopathy followed a previous dose of DTP, DTaP, or Tdap, is currently age 7 or older, they should receive Td instead of Tdap.

Certain conditions are precautions to DTaP and Tdap vaccines. A precaution means that a person would usually not receive the vaccine but there may be occasions when the benefit of immunization outweighs the risk, for instance during a community-wide outbreak of pertussis.

Precautions include: Guillain-Barré syndrome (a rare type of neurological condition) within 6 weeks after a previous dose of tetanus toxoid; a severe local reaction (called an Arthus reaction) after a previous dose of tetanus or diphtheria toxoid-containing vaccine (defer vaccination until at least 10 years have elapsed since the last dose of vaccine that caused the reaction); and a moderate or severe acute illness with or without fever. A person with a mild illness may be vaccinated.

A person with a recognized, possible, or potential neurologic condition should delay receiving DTaP or Tdap vaccine until the condition is evaluated, treated, and/or stabilized.

Can the vaccine cause the disease?

No.