

Medical Education Systems, Inc.



Whooping Cough



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Whooping Cough (Pertusis): An Update

Learning Objectives

- Identify the recent rise in interest in whooping cough
- Identify the clinical features and etiology of whooping cough
- Identify who is at risk for being infected by whooping cough
- Identify the available treatments for whooping cough today
- Identify the key features of the history of whooping cough

Introduction

Whooping cough cases continue to rise in California [Updated]

June 3, 2010 |

Whooping cough cases have tripled in California, health officials said Thursday, with the Central Valley, the San Francisco Bay Area and the Los Angeles area seeing sizable increases.

There have been 584 confirmed cases of [whooping cough, also known as pertussis](#), between Jan. 1 to May 31, a threefold increase from the same time period last year, when there were 190 cases, said Ken August, a spokesman for the California Department of Public Health.

The illness can cause adults to experience severe spasms of coughing that, if left untreated, can last three or four months. At most risk are young infants, who are most vulnerable to the bacterial disease and can die after infection.

In the nine-county San Francisco Bay Area, there has been a six-fold increase, from 29 cases to 173 cases for the first five months of the year. In Fresno County, there are 76 cases so far this year, up from nine.

In Los Angeles County, there are 121 suspected and confirmed cases of pertussis, while during the same time period last year, there were 56 confirmed cases. Orange County has seen 41 suspected and confirmed cases so far this year, up from six during the same time last year.

“This may reflect the continuing outbreak that we’ve seen,” Los Angeles County health officer Jonathan Fielding said.

The outbreak in the Central Valley prompted the [U.S. Centers for Disease Control and Prevention to dispatch a team](#) to conduct a study to determine the best lab test to help diagnose pertussis.

California health officials [have warned physicians throughout the state that doctors often mistake pertussis](#) for another illness, causing a delay in diagnosis that can lead an ill patient to [become sicker and infect an infant](#).

Health officials urge anyone who will be in contact with infants to [get a booster shot protecting against pertussis](#). Immunization can begin to lose its effectiveness after five years.

So far this year, four infants – all younger than 3 months old – [have died of whooping cough in California](#), exceeding the total for 2009, when three infants died.

[**Update:** State officials said Thursday afternoon that a fifth infant death due to pertussis had been reported to them. The [infant died in San Bernardino County](#) more than a month ago, although state officials said they did not learn of the case until Thursday.]

Whooping cough still with us, still dangerous

The case of a new mom, who passed along the bacteria to her newborn son, who later died, is a cautionary tale. A booster vaccine is now recommended.

May 31, 2010|By Rong-Gong Lin II, Los Angeles Times

Two days after her second son, Dylan, was born in 2005, Mariah Bianchi let out yet another deep-chested cough, this time in the hospital, where she was recovering from the delivery.

She had been coughing for two weeks; she had coughed so badly that her contractions started early.

A pediatrician checking Dylan heard Bianchi's bark-like cough — and a subsequent whooping sound as she gasped for air. The doctor told Bianchi it sounded like [whooping cough, also called pertussis](#), and urged her to see her own doctor once she left the hospital.

She did so. But that physician listened to her lungs, she says, and then dismissed the possibility. Whooping cough was a disease of the past, the San Francisco woman recalls the doctor saying.

The doctor told her to keep breast-feeding and to wash her hands and gave her some inhalers to control lung spasms caused by what was believed to be a cold.

Two weeks later, Dylan was dead. He was 17 days old.

An autopsy found that Dylan died of a massive infection of the bacterium *Bordetella pertussis*, which causes whooping cough. Bianchi said she infected both Dylan and her older son, Cole, then 31/2. Cole too became seriously ill but survived.

Bianchi, a critical care nurse in San Francisco, doesn't know when, or from whom, she contracted the disease, only that she had been vaccinated as a child.

"It happened so fast," she says.

The death of Bianchi's son highlights one of the chief problems confronting [California health officials trying to stem a current upswing in the disease](#): Whooping cough is easily [misdiagnosed](#), especially in its early stages.

The disease is both highly infectious and can quickly kill infants exposed to it. Four newborns, all younger than 3 months, have died in California so far this year, an alarming number to health officials because it already exceeds last year's total of whooping cough-related deaths, three.

Rarely suspected

Bianchi encountered a variety of doctors and medical personnel in the latter days of her pregnancy — when she'd already developed a cough. Dylan encountered others after he was born. Only one, it seemed, suspected that his mother had pertussis. But even that suspicion failed to elicit corresponding preventive or treatment measures.

Pertussis

Clinical Features	Highly communicable, vaccine-preventable disease that lasts for many weeks and is typically manifested in children with paroxysmal spasms of severe coughing, whooping, and posttussive vomiting.
Etiologic Agent	<i>Bordetella pertussis</i> , a gram-negative coccobacillus.
Incidence	This disease results in high morbidity and mortality in many countries every year. In the United States, 5000-7000 cases are reported each year. Incidence of pertussis has increased steadily since the 1980s. The incidence in 2007 was 3.6/100,000 when

10,454, cases of pertussis were reported.

Complications Major complications are most common among infants and young children and include hypoxia, apnea, pneumonia, seizures, encephalopathy, and malnutrition. Young children can die from pertussis and 10 children died in the United States in 2007. Most deaths occur among unvaccinated children or children too young to be vaccinated.

Transmission Occurs through direct contact with discharges from respiratory mucous membranes of infected persons.

Risk Groups Children who are too young to be fully vaccinated and those who have not completed the primary vaccination series are at highest risk for severe illness. Like measles, pertussis is highly contagious with up to 90% of susceptible household contacts developing clinical disease following exposure to an index case. Adolescents and adults become susceptible when immunity wanes, but can receive a booster shot of the new combination vaccine (called Tdap).

Surveillance National reporting through the National Notifiable Diseases Surveillance System throughout the United States.

- Trends** Pertussis is an endemic illness. In the United States epidemics occur every 3-5 years. The most recent epidemic occurred in 2005 (25,616 reported cases). Overall increase in cases since 1990, with disproportionate increase in adolescents and adults.
- Challenges** Understanding pertussis pathogenesis and immunity; protecting infants from severe pertussis; control of pertussis outbreaks; diagnosing pertussis in a timely, accurate, and standardized fashion; understanding the true burden of disease in different age and socioeconomic groups; evaluating the impact of Tdap vaccine in persons ≥ 11 years of age; increasing coverage of Tdap among adolescents and adults; evaluating the impact of acellular vaccines on prevention programs; and determining the prevalence of erythromycin-resistant *B. pertussis*.
- Opportunities** Characterize strains using newly developed molecular typing methods (e.g., pulsed-field gel electrophoresis and gene-sequencing analysis) to elucidate epidemiology and virulence factors, examine isolates for antimicrobial susceptibility and to identify resistance mechanisms; study transmission of pertussis within populations (e.g., how adults/adolescents transmit

the organism to others);
study efficacy of Tdap
among persons ≥ 11 years of
age; study effectiveness of
acellular pertussis vaccines
to control outbreaks;
apply/evaluate new
diagnostic tests.

Whooping cough — or pertussis — is an infection of the respiratory system caused by the bacterium *Bordetella pertussis* (or *B. pertussis*). It's characterized by severe coughing spells that end in a "whooping" sound when the person breathes in. Before a vaccine was available, pertussis killed 5,000 to 10,000 people in the United States each year. Now, the pertussis vaccine has reduced the annual number of deaths to less than 30.

But in recent years, the number of cases has started to rise. By 2004, the number of whooping cough cases spiked past 25,000, the highest level it's been since the 1950s. It's mainly affected infants younger than 6 months old before they're adequately protected by immunizations, and kids 11 to 18 years old whose immunity has faded.

Signs and Symptoms

The first symptoms of whooping cough are similar to those of a common cold:

- ▶ runny nose
- ▶ sneezing
- ▶ mild cough
- ▶ low-grade fever

After about 1 to 2 weeks, the dry, irritating cough evolves into coughing spells. During a coughing spell, which can last for more than a minute, the child may turn red or purple. At the end of a spell, the child may make a characteristic whooping sound when breathing in or may vomit. Between spells, the child usually feels well.

Although it's likely that infants and younger children who become infected with *B. pertussis* will develop the characteristic coughing episodes with their accompanying whoop, not everyone will. However, sometimes infants don't cough or whoop as older kids do.

They may look as if they're gasping for air with a reddened face and may actually stop breathing for a few seconds during particularly bad spells.

Adults and adolescents with whooping cough may have milder or atypical symptoms, such as a prolonged cough without the coughing spells or the whoop.

Contagiousness

Pertussis is highly contagious. The bacteria spread from person to person through tiny drops of fluid from an infected person's nose or mouth. These may become airborne when the person sneezes, coughs, or laughs. Others then can become infected by inhaling the drops or getting the drops on their hands and then touching their mouths or noses.

Infected people are most contagious during the earliest stages of the illness up to about 2 weeks after the cough begins. Antibiotics shorten the period of contagiousness to 5 days following the start of antibiotic treatment.

Prevention

Whooping cough can be prevented with the pertussis [vaccine](#), which is part of the DTaP (diphtheria, tetanus, acellular pertussis) immunization. DTaP immunizations are routinely given in five doses before a child's sixth birthday. To give additional protection in case immunity fades, the AAP now recommends that kids ages 11-18 get a booster shot of the new combination vaccine (called Tdap), ideally when they're 11 or 12 years old, instead of the Td booster routinely given at this age. As is the case with all immunization schedules, there are important exceptions and special circumstances. Your doctor will have the most current information.

Experts believe that up to 80% of nonimmunized family members will develop whooping cough if they live in the same house as someone who has the infection. For this reason, anyone who comes into close contact with someone who has pertussis should receive antibiotics to prevent spread of the disease. Young kids who have not received all five doses of the vaccine may require a booster dose if exposed to an infected family member.

Incubation

The incubation period (the time between infection and the onset of symptoms) for whooping cough is usually 7 to 10 days, but can be as long as 21 days.

Duration

Pertussis can cause prolonged symptoms. The child usually has 1 to 2 weeks of common cold symptoms, followed by approximately 2 to 4 weeks of severe coughing, though the coughing spells can sometimes last even longer. The last stage consists of another several weeks of recovery with gradual resolution of symptoms. In some children, the recovery period may last for months.

Professional Treatment

Call the doctor if you suspect that your child has whooping cough. To make a diagnosis, the doctor will take a medical history, do a thorough physical exam, and take nose and throat mucus samples that will be examined and cultured for *B. pertussis* bacteria. [Blood tests](#) and a chest X-ray may also be done.

If your child has whooping cough, it will be treated with antibiotics, usually for 2 weeks. Many experts believe that the medication is most effective in shortening the infection when it's given in the first stage of the illness, **before** coughing spells begin. But even if antibiotics are started later, they're still important because they can stop the spread of the pertussis infection to others. Ask your doctor whether preventive antibiotics or vaccine boosters for other family members are needed.

Some kids with whooping cough need to be treated in a hospital. Infants and younger children are more likely to be hospitalized because they're at greater risk for complications such as [pneumonia](#), which occurs in about 1 in 5 children under the age of 1 year who have pertussis. Up to 75% of infants younger than 6 months old with whooping cough will receive hospital treatment. In infants younger than 6 months of age, whooping cough can even be life-threatening.

While in the hospital, a child may need suctioning of thick respiratory secretions. Breathing will be monitored and oxygen given, if needed. Intravenous (IV) fluids might be required if the child shows signs of dehydration or has difficulty eating. Precautions will be taken to prevent the infection from spreading to other patients, hospital staff, and visitors.

Home Treatment

If your child is being treated for pertussis at home, follow the schedule for giving antibiotics exactly as your doctor prescribed. Giving cough medicine probably will not help, as even the strongest usually can't relieve the coughing spells of whooping cough.

During recovery, let your child rest in bed and use a cool-mist vaporizer to help loosen respiratory secretions and soothe irritated lungs and breathing passages. (Be sure to follow directions for keeping it clean and mold-free.) In addition, keep your home free of irritants that can trigger coughing spells, such as aerosol sprays, tobacco smoke, and smoke from cooking, fireplaces, and wood-burning stoves.

Kids with whooping cough may vomit or not eat or drink much because of frequent coughing. So offer smaller, more frequent meals and encourage your child to drink lots of fluids. Watch for signs of dehydration, too, including thirst, irritability, restlessness, lethargy, sunken eyes, a dry mouth and tongue, dry skin, crying without tears, and fewer trips to the bathroom to urinate (or in infants, fewer wet diapers).

When to Call the Doctor

Call the doctor if you suspect that your child has whooping cough or has been exposed to someone with whooping cough, even if your child has already received all scheduled pertussis immunizations.

Your child should be examined by a doctor if he or she has prolonged coughing spells, especially if these spells:

- ▶ make your child turn red or purple
- ▶ are followed by vomiting
- ▶ are accompanied by a whooping sound when your child breathes in after coughing

If your child has been diagnosed with whooping cough and is being treated at home, seek immediate medical care if he or she has difficulty breathing or shows signs of dehydration.

Whooping Cough

Definition

By Mayo Clinic staff

Whooping cough (pertussis) is a highly contagious respiratory tract infection. In advanced stages, it's marked a severe, hacking cough followed by a high-pitched intake of breath that sounds like "whoop."

In the first half of the 20th century, whooping cough was a leading cause of childhood illness and death in the United States. But after the introduction of a vaccine, the number of cases gradually declined, reaching a low in the mid-1970s.

Since then, however, the incidence of whooping cough has been increasing, primarily among children too young to have completed the full course of vaccinations and teenagers and adults whose immunity has faded.

Symptoms

Once you become infected with whooping cough, it takes three to 12 days for signs and symptoms to appear. They're usually mild at first and resemble those of a common cold:

- Runny nose
- Nasal congestion
- Sneezing
- Red, watery eyes
- A mild fever
- Dry cough

After a week or two, signs and symptoms worsen. Severe and prolonged coughing attacks may:

- Bring up thick phlegm
- Provoke vomiting
- Result in a red or blue face
- Cause extreme fatigue
- End with a high-pitched "whoop" sound during the next breath of air

However, many people — particularly infants, adolescents and adults — don't develop the characteristic whoop. Sometimes, a persistent hacking cough is the only sign that an adolescent or adult has whooping cough.

When to see a doctor

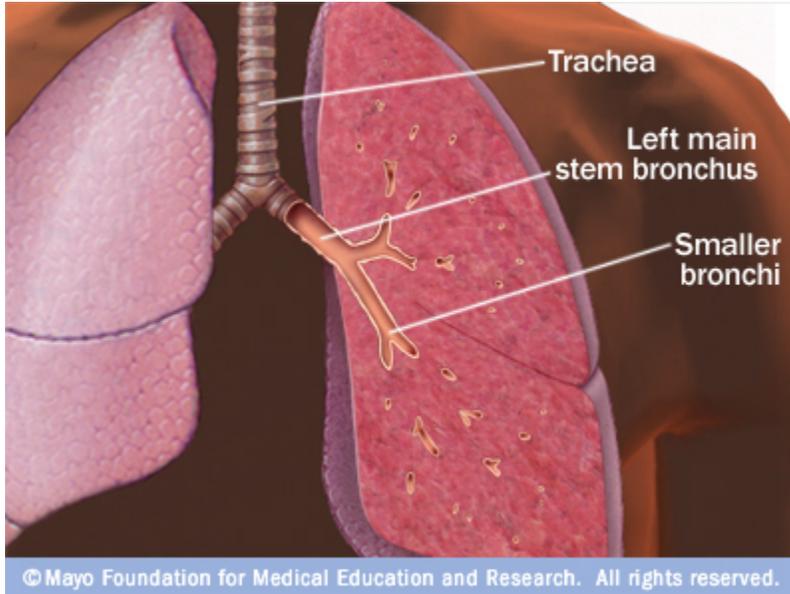
Call your doctor if prolonged coughing spells cause you or your child to:

- Vomit
- Turn red or blue

- Inhale with a whooping sound

Causes

By Mayo Clinic staff



Your lungs draw air through your nose, mouth and throat into the tube-shaped trachea (windpipe), which passes into your chest cavity. At the level of your breastbone, your trachea splits into two primary bronchi, the left bronchus and the right bronchus. Each bronchus goes to the lung on the same side.

Whooping cough is caused by bacteria. When an infected person coughs or sneezes, tiny germ-laden droplets are sprayed into the air and breathed into the lungs of anyone who happens to be nearby.

Once inside your airways, the bacteria multiply and produce toxins that interfere with your respiratory tract's ability to sweep away germs. Thick mucus accumulates inside your airways, causing uncontrollable coughing.

The bacteria also cause inflammation that narrows breathing tubes in your lungs. This narrowing leaves you gasping for air — sucking in air with a high-pitched "whoop" — after a fit of coughing.

Risk factors

Whooping cough is thought to be on the rise for two main reasons. The whooping cough vaccine you receive as a child eventually wears off, leaving most teenagers and adults susceptible to the infection during an outbreak — and there continue to be regular outbreaks. In addition, children aren't fully immune to whooping cough until they've received at least three shots, leaving those 6 months and younger at greatest risk of contracting the infection.

Complications

By Mayo Clinic staff

Most people recover from whooping cough with no problems. When complications occur, they tend to be side effects of the strenuous coughing, such as:

- Bruised or cracked ribs
- Abdominal hernias
- Broken blood vessels in the skin or the whites of your eyes

Infants

In infants — especially those under 6 months of age — complications from whooping cough are more severe and may include:

- Ear infections
- Pneumonia
- Slowed or stopped breathing
- Dehydration
- Seizures
- Brain damage

Because infants and toddlers are at greatest risk of complications from whooping cough, they're more likely to need treatment in a hospital. Complications can be life-threatening for infants less than 6 months old.

Preparing for your appointment

By Mayo Clinic staff

If you think you or your child has whooping cough, make an appointment with your family doctor or pediatrician. Severe symptoms may warrant a visit to an urgent care center or a hospital's emergency department.

What you can do

You may want to write a list that includes:

- Detailed descriptions of the signs and symptoms
- Information about past medical problems
- Information about the medical problems of parents or siblings
- Questions you want to ask the doctor

What to expect from your doctor

Your doctor will conduct a physical exam and will use a stethoscope to listen closely to the lungs. Questions your doctor may ask include:

- When did the cough start?
- How long does a coughing spell generally last?
- Does anything trigger the cough?
- Does the cough ever cause gagging or vomiting?
- Has the cough ever resulted in a red or blue face?

Tests and diagnosis

By Mayo Clinic staff

Diagnosing whooping cough in its early stages can be difficult because the signs and symptoms resemble those of other common respiratory illnesses, such as a cold, the flu or bronchitis.

Sometimes, doctors can diagnose whooping cough simply by asking about symptoms and listening to the cough. Medical tests may be needed to confirm the diagnosis. Such tests may include:

- **A nose or throat culture and test.** Your doctor takes a nose or throat swab or suction sample. The sample is then sent to a lab and cultured or otherwise tested for whooping cough bacteria.
- **Blood tests.** A blood sample may be drawn and sent to a lab to check for a high white blood cell count. White blood cells help the body fight infections, such as whooping cough. A high white blood cell count typically indicates the presence of infection or inflammation. This is a general test and not specific for whooping cough, however.

- **A chest X-ray.** Your doctor may order an X-ray to check for the presence of inflammation or fluid in the lungs, which can occur when pneumonia complicates whooping cough and other respiratory infections.

Treatments and drugs

By Mayo Clinic staff

Infants are typically hospitalized for treatment, because whooping cough is more dangerous for that age group. If your child can't keep down liquids or food, intravenous fluids may be necessary. In some cases, prescription sedatives will help your child rest. Your child will also be isolated from others to prevent the infection from spreading.

Treatment for older children and adults usually can be managed at home.

Medications

- **Antibiotics.** Antibiotics kill the bacteria causing whooping cough and help speed recovery. Family members may be given preventive antibiotics.
- **Cough relief.** Unfortunately, not much is available to relieve the cough. Over-the-counter cough medicines, for instance, have little effect on whooping cough and are discouraged.

Lifestyle and home remedies

By Mayo Clinic staff

The following tips on dealing with coughing spells apply to anyone being treated for whooping cough at home:

- **Get plenty of rest.** A cool, quiet and dark bedroom may help you relax and rest better.
- **Drink plenty of fluids.** Water, juice and soups are good choices. In children, especially, watch for signs of dehydration, such as dry lips, crying without tears and infrequent urination.
- **Eat smaller meals.** To avoid vomiting after coughing, eat smaller, more-frequent meals rather than large ones.
- **Vaporize the room.** Use a mist vaporizer to help soothe irritated lungs and to help loosen respiratory secretions. If you use a vaporizer, follow directions for keeping it clean. If you don't have a vaporizer, a warm shower or bath also can temporarily help clear the lungs and ease breathing.

- **Clean the air.** Keep your home free of irritants that can trigger coughing spells, such as tobacco smoke and fumes from fireplaces.
- **Prevent transmission.** Cover your cough and wash your hands often; if you must be around others, wear a mask.

Prevention

By Mayo Clinic staff

The best way to prevent whooping cough is with the pertussis vaccine, which doctors often give in combination with vaccines against two other serious diseases, diphtheria and tetanus. Doctors recommend beginning vaccination during infancy.

The vaccine consists of a series of five injections, typically given to children at these ages:

- 2 months
- 4 months
- 6 months
- 12 to 18 months
- 4 to 6 years

Vaccine side effects

Side effects of the vaccine may include fever, crankiness or soreness at the site of the injection. In rare cases, severe side effects may occur, including:

- Persistent crying, lasting more than three hours
- High fever
- Seizures, shock or coma

Booster shots

- **Adolescents.** Because immunity from the pertussis vaccine tends to wane by age 11, doctors recommend a booster shot at that age to protect against whooping cough (pertussis), diphtheria and tetanus.

- Adults. Some varieties of the every-10-year tetanus and diphtheria vaccine also include protection against whooping cough (pertussis). In addition to protecting you against whooping cough, this vaccine will also reduce the risk of your transmitting whooping cough to infants.

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Whooping Cough (Pertussis)



Medical Author: [Melissa Conrad Stöppler, MD](#)

What is whooping cough? What is the history of whooping cough?

The disease is named for the characteristic sound produced when affected individuals attempt to inhale; the *whoop* originates from the inflammation and swelling of the laryngeal structures that vibrate when there is a rapid inflow of air during inspiration. The first outbreaks of whooping cough were described in the 16th century. The bacterium responsible for the infection, *Bordetella pertussis*, was not identified until 1906. In the prevaccination era (during the 1920s and 30s), there were over 250,000 cases of whooping cough per year in the U.S., with up to 9,000 deaths. In the 1940s, the pertussis vaccine, combined with [diphtheria](#) and [tetanus](#) toxoids (DTP), was introduced. By 1976, the incidence of whooping cough in the U.S. had decreased by over 99%.

During the 1980s, however, the incidence of whooping cough began to increase and has risen steadily, with epidemics typically occurring every three to five years in the U.S. In the last epidemic, which occurred in 2005, 25,616 cases were reported according to the U.S. Centers for Disease Control and Prevention (CDC). In 2008, over 13,000 cases of whooping cough were reported in the U.S., resulting in 18 deaths.

In 2010, a pertussis epidemic was declared in California. The California Department of Public Health warned in June 2010 that the state was on pace to suffer the most illnesses and deaths due to whooping cough in the past 50 years. In the previous epidemic of 2005, California recorded 3,182 cases and eight deaths.

Unimmunized or incompletely immunized young [infants](#) are particularly vulnerable to the infection and its complications, which can include [pneumonia](#) and [seizures](#).

Can whooping cough be prevented with a vaccine?

Whooping cough commonly affects infants and young [children](#) but can be prevented by [immunization](#) with pertussis vaccine. Pertussis vaccine is most commonly given in combination with the vaccines for [diphtheria](#) and [tetanus](#). (Pertussis is the "P" in the [DTaP](#) combination inoculation routinely given to children, and the "p" in the Tdap [vaccine](#) administered to adolescents and adults.) Since immunity from the pertussis vaccine wears off with time, many [teenagers](#) and adults get whooping cough.

For maximum protection against pertussis, children need five DTaP shots. The first three vaccinations are given at 2, 4, and 6 months of age.

The fourth vaccination is given between 15 and 18 months of age, and a fifth is given when a child enters school, at 4-6 years of age. Preteens going to the doctor for their regular checkup at 11 or 12 years of age should get a dose of the Tdap booster, and adults who didn't get Tdap as a preteen or teen should get one dose of Tdap. The easiest way for adults to ensure immunity is to get the Tdap vaccine instead of their next regular tetanus booster. (The Td shot is recommended every 10 years.)

To protect their infants, most pregnant women who were not previously vaccinated with Tdap should get one dose of Tdap postpartum before leaving the hospital or birthing center. Getting vaccinated with Tdap is especially important for mothers and families with new infants as well as all people caring for newborns. Women planning [pregnancy](#) may also choose to get vaccinated with Tdap prior to becoming pregnant.

In some cases, pregnant women may desire vaccination with the Tdap vaccine or may be at risk for acquiring whooping cough. Although the U.S. CDC states that pregnancy is not a contraindication for receiving the Tdap vaccine, data on the safety of the vaccine in pregnant women are limited. The tetanus and diphtheria (Td) components of the vaccine are considered safe for pregnant women. If the Tdap vaccine is given in pregnancy, the CDC recommends that it be given in the second or third trimester. Pregnant women should consult their health-care provider for a discussion their individual situation regarding the pertussis vaccine.

What are whooping cough symptoms, signs, and stages?

The **first stage** of whooping cough is known as the catarrhal stage. In the catarrhal stage, which typically lasts from one to two weeks, an infected person has symptoms characteristic of an [upper respiratory infection](#), including

[runny nose](#),
sneezing,
low-grade [fever](#),
mild, occasional [cough](#), similar to the [common cold](#).

The cough gradually becomes more severe, and after one to two weeks, the second stage begins. It is during the **second stage** (the paroxysmal stage) that the diagnosis of whooping cough usually is suspected. The following characteristics describe the second stage:

There are bursts ([paroxysms](#)) of coughing, or numerous rapid coughs, apparently due to difficulty expelling thick [mucus](#) from the airways in the lungs. Bursts of coughing increase in frequency during the first one to two weeks, remain constant for two to three weeks, and then gradually begin to decrease in frequency.

At the end of the bursts of rapid coughs, a long inspiratory effort (breathing in) is usually accompanied by a characteristic high-pitched "whoop" sound.

During an attack, the individual may become cyanotic (turn blue) from lack of oxygen. Children and young infants appear especially ill and distressed. Vomiting (referred to by doctors as post-tussive vomiting) and exhaustion commonly follow the episodes of coughing.

The person usually appears normal between episodes. Paroxysmal attacks occur more frequently at night, with an average of 15-24 attacks per 24 hours. The paroxysmal stage usually lasts from one to six weeks but may persist for up to 10 weeks. Infants under 6 months of age may not have the strength to have a whoop, but they do have paroxysms of coughing.

The **third stage** of whooping cough is the recovery or convalescent stage. In the convalescent stage, recovery is gradual. The cough becomes less paroxysmal and usually disappears over two to three weeks; however, paroxysms often recur with subsequent respiratory infections for many months.

How is whooping cough transmitted?

Whooping cough is highly contagious and is spread among people by direct contact with fluids from the nose or mouth of infected people. People contaminate their hands with respiratory secretions from an infected person and then touch their own mouth or nose. In addition, small bacteria-containing droplets of mucus from the nose or lungs enter the air during coughing or sneezing. People can become infected by breathing in these drops.

Can adults get whooping cough?

Although whooping cough is considered to be an illness of childhood, adults may also develop the disease. The illness usually is milder in adults than in children, but the duration of the paroxysmal cough is just as long as in children. The characteristic whoop that occurs after paroxysmal bouts of coughing is recognized in only 20%-40% of adults with whooping cough.

Because immunity from the pertussis vaccine decreases over time but does not necessarily disappear, adults who do become infected may have retained a partial degree of immunity against the infection that results in a milder illness. Whooping cough in adults is more common than usually appreciated, accounting for up to 7% of adult illnesses that cause coughing each year. Infected adults are a reservoir (source) of infection for children, so it is particularly important that all family members and caregivers of young infants be properly vaccinated.

How is whooping cough diagnosed?

When a patient has the typical symptoms of whooping cough, the diagnosis can be made from the clinical history. However, the disease and its symptoms, including its severity, can vary among affected individuals. In cases in which the diagnosis is not certain or a doctor wants to confirm the diagnosis, laboratory tests can be carried out. Culture of the bacterium *Bordetella pertussis* from nasal secretions can establish the diagnosis.

Another test that has been used to successfully identify the bacterium and diagnose whooping cough is the [polymerase chain reaction \(PCR\)](#) test that can identify genetic material from the bacterium in nasal secretions.

What is the treatment for whooping cough?

Antibiotics directed against *Bordetella pertussis* can be effective in reducing the severity of whooping cough when administered early in the course of the disease. Antibiotic therapy can also help reduce the risk of transmission of the bacterium to other household members as well as to others who may come into contact with an infected person. Unfortunately, most people with whooping cough are diagnosed later with the condition in the second (paroxysmal) stage of the disease. Treatment with antibiotics is recommended for anyone who has had the disease for less than three to four weeks. [Azithromycin](#) (Zithromax), [clarithromycin](#) (Biaxin), [erythromycin](#) (E-Mycin, Eryc, Ery-Tab, PCE, Pediazole, Ilosone), and [trimethoprim and sulfamethoxazole](#) (Bactrim, Septra) are antibiotics which have been shown to be effective in treating whooping cough. It is unclear whether antibiotics have any benefit for people who have been ill with whooping cough for longer than three to four weeks, although antibiotic therapy still is often considered for this group. There is no proven effective treatment for the paroxysms of coughing that accompany whooping cough.

Antibiotics also are routinely administered to people who have had close contact with an infected person, regardless of their vaccination status.

What are possible complications of whooping cough?

The most common complication and the cause of most whooping cough-related deaths is secondary bacterial [pneumonia](#). (Secondary bacterial pneumonia is bacterial pneumonia that follows another infection of the lung, be it viral or bacterial. Secondary pneumonia is caused by a different virus or bacterium than the original infection.) Young infants are at highest risk for whooping cough and also for its associated complications, including secondary pneumonia. Other possible complications of whooping cough, particularly in infants less than 6 months of age, include seizures, [encephalopathy](#) (abnormal function of the brain due to decreased oxygen delivery to the brain caused by the episodes of coughing), reactive airway disease ([asthma](#)), [dehydration](#), hearing loss, and malnutrition.

Data indicate that secondary pneumonia occurs in about one out of every 20 infants with whooping cough, and one out of 100 affected infants develop convulsions.

Whooping cough can cause serious illness and even death in young children; 10 children died from the infection in 2007. From 2004-2005, 66 deaths due to whooping cough were reported to the CDC, and 56 of these were children under 3 months of age. In 2008, 18 deaths due to whooping cough were reported in the U.S. Most deaths from whooping cough have occurred in children who have not been vaccinated or who are too young to have received the vaccine.

Where can people find more information about whooping cough (pertussis)?

A recording of the classic "whooping" sounds of whooping cough can be heard at the [web site](#) for the Utah Department of Public Health.

For immunization information on whooping cough for children, adolescents, and adults, please visit the following areas.

[Immunizations \(Vaccination\) for Adolescents and Adults](#)
[Immunizations \(Vaccinations\) for Infants and Children](#)

Whooping Cough (Pertussis) At A Glance

Whooping cough (pertussis) is an acute, highly contagious respiratory infection that is caused by the bacterium *Bordetella pertussis*.

Whooping cough commonly affects infants and young children but can be prevented by immunization with pertussis vaccine.

Adults may develop whooping cough as their immunity from childhood vaccines wears off over time.

Clinical symptoms occur in three stages; the characteristic bursts of coughing are observed in the second, or paroxysmal, stage.

Antibiotics can help reduce the severity of the disease when administered early in the course of the disease.

Secondary bacterial pneumonia is the most common complication of whooping cough.

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Whooping Cough (Pertussis) Glossary of Terms

Abnormal: Not normal. Deviating from the usual structure, position, condition, or behavior. In referring to a growth, abnormal may mean that it is cancerous or premalignant (likely to become [cancer](#)).

Acute: Of abrupt onset, in reference to a disease. Acute often also connotes an illness that is of short duration, rapidly progressive, and in need of urgent care.
See the entire [definition of Acute](#)

Airway: The path air follows to get into and out of the lungs. The mouth and nose are the normal entry and exit ports. Entering air then passes through the back of the throat (pharynx), continues through the voice box (larynx), down the trachea, and finally out the branching tubes known as bronchi.

Antibiotic: A drug used to treat infections caused by bacteria and other microorganisms. Originally, an antibiotic was a substance produced by one microorganism that selectively inhibits the growth of another. Synthetic antibiotics, usually chemically related to natural antibiotics, have since been produced that accomplish comparable tasks.
See the entire [definition of Antibiotic](#)

Asthma: A common disorder in which chronic inflammation of the bronchial tubes (bronchi) makes them swell, narrowing the airways. Asthma involves only the bronchial tubes and does not affect the air sacs (alveoli) or the lung tissue (the parenchyma of the lung) itself.
See the entire [definition of Asthma](#)

Bacterial: Of or pertaining to [bacteria](#). For example, a bacterial lung [infection](#).

Bacterium: The singular of [bacteria](#).

Brain: That part of the [central nervous system](#) that is located within the [cranium](#) ([skull](#)). The brain functions as the primary receiver, organizer and distributor of information for the body. It has two (right and left) halves called "hemispheres."

Breathing: The process of respiration, during which air is inhaled into the lungs through the mouth or nose due to muscle contraction, and then exhaled due to muscle relaxation.

CDC: The Centers for Disease Control and Prevention, the US agency charged with tracking and investigating public health trends. The stated mission of the CDC is "To promote health and quality of life by preventing and controlling disease, injury, and disability." The CDC is a part of the U.S. Public Health Services (PHS) under the Department of Health and Human Services (HHS).
See the entire [definition of CDC](#)

Centers for Disease Control and Prevention: The US agency charged with tracking and investigating public health trends. The stated mission of the Centers for Disease Control and

Prevention, commonly called the CDC, is "To promote health and quality of life by preventing and controlling disease, injury, and disability."

See the entire [definition of Centers for Disease Control and Prevention](#)

Common cold: A viral upper respiratory tract infection. This contagious illness can be caused by many different types of viruses, and the body can never build up resistance to all of them. For this reason, colds are a frequent and recurring problem. In fact kindergarten children average 12 colds per year, while adolescents and adults have around seven colds per year.

See the entire [definition of Common cold](#)

Complication: In medicine, an additional problem that arises following a procedure, treatment or illness and is secondary to it. A complication complicates the situation.

Contraindication: A condition which makes a particular treatment or procedure inadvisable. A contraindication may be absolute or relative.

An absolute contraindication is a situation which makes a particular treatment or procedure absolutely inadvisable. In a baby, for example, aspirin is absolutely contraindicated because of the danger that aspirin will cause Reye syndrome.

A relative contraindication is a condition which makes a particular treatment or procedure somewhat inadvisable but does not rule it out. For example, X-rays in pregnancy are relatively contraindicated (because of concern for the developing fetus) unless the X-rays are absolutely necessary.

See the entire [definition of Contraindication](#)

Cough: A rapid expulsion of air from the lungs typically in order to clear the lung airways of fluids, mucus, or material. Also called tussis.

Cyanotic: Showing cyanosis (bluish discoloration of the skin and mucous membranes due to not enough oxygen in the blood). See: [Cyanosis](#).

Dehydration: Excessive loss of body water. Diseases of the gastrointestinal tract that cause vomiting or diarrhea may, for example, lead to dehydration. There are a number of other causes of dehydration including heat exposure, prolonged vigorous exercise (e.g., in a marathon), kidney disease, and medications (diuretics).

See the entire [definition of Dehydration](#)

Diagnosis: **1** The nature of a disease; the identification of an illness. **2** A conclusion or decision reached by diagnosis. The diagnosis is rabies. **3** The identification of any problem. The diagnosis was a plugged IV.

See the entire [definition of Diagnosis](#)

Diphtheria: An acute infectious disease that typically strikes the upper respiratory tract including the throat. It is caused by infection with the bacteria *Corynebacterium diphtheriae*. Symptoms include sore throat and mild fever at first. As the disease progresses, a membranous substance forms in the throat that makes it difficult to breathe and swallow. See the entire [definition of Diphtheria](#)

DTaP: Diphtheria-Tetanus-acellular [Pertussis](#) vaccine.

DTP: [Diphtheria](#)-Tetanus-Pertussis vaccine.

Encephalopathy: Disease, damage, or malfunction of the brain. In general, [encephalopathy](#) is manifested by an altered mental state that is sometimes accompanied by physical changes. Although numerous causes of encephalopathy are known, the majority of cases arise from infection, liver damage, anoxia, or [kidney failure](#). The term encephalopathy is very broad and, in most cases, is preceded by various terms that describe the reason, cause, or special conditions of the patient that leads to brain malfunction. For example, anoxic encephalopathy means brain damage due to lack of oxygen, and hepatic encephalopathy means brain malfunction due to [liver disease](#). Depending upon the cause and severity of the condition, symptoms may range from mild alterations in mental status to severe and potentially fatal manifestations such as [dementia](#), [seizures](#), and [coma](#).

Epidemic: The occurrence of more cases of a disease than would be expected in a community or region during a given time period. A sudden severe outbreak of a disease such as SARS. From the Greek "epi-", "upon" + "demos", "people or population" = "epidemos" = "upon the population." See also: Endemic; Pandemic.

Erythromycin: [Erythromycin](#) is a common antibiotic for treating bacterial infection. Sold under many brand names, including EES, Erycin and Erythromia.

Fever: Although a fever technically is any body temperature above the normal of 98.6 degrees F. (37 degrees C.), in practice a person is usually not considered to have a significant fever until the temperature is above 100.4 degrees F (38 degrees C.). See the entire [definition of Fever](#)

Genetic: Having to do with genes and genetic information.

Immunity: The condition of being immune. Immunity can be innate (for example, humans are innately immune to canine distemper) or conferred by a previous infection or immunization.

Immunization: Vaccination. [Immunizations](#) work by stimulating the immune system, the natural disease-fighting system of the body. The healthy immune system is able to recognize invading bacteria and viruses and produce substances (antibodies) to destroy or disable them. Immunizations prepare the immune system to ward off a disease. To immunize against viral diseases, the virus used in the vaccine has been weakened or killed. To immunize against bacterial diseases, it is generally possible to use only a small portion of the dead bacteria to stimulate the formation of antibodies against the whole bacteria. In addition to the initial

immunization process, it has been found that the effectiveness of immunizations can be improved by periodic repeat injections or "boosters." Also see Immunizations (in the plural) and Immunization of a specific type (such Immunization, Polio).

Incidence: The frequency with which something, such as a disease, appears in a particular population or area. In disease epidemiology, the incidence is the number of newly diagnosed cases during a specific time period. The incidence is distinct from the [prevalence](#) which refers to the number of cases alive on a certain date.

Indicate: In medicine, to make a treatment or procedure advisable because of a particular [condition](#) or circumstance. For example, certain medications are indicated for the treatment of [hypertension](#) during [pregnancy](#) while others are [contraindicated](#).

Infection: The growth of a parasitic organism within the body. (A parasitic organism is one that lives on or in another organism and draws its nourishment therefrom.) A person with an infection has another organism (a "germ") growing within him, drawing its nourishment from the person. See the entire [definition of Infection](#)

Inflammation: A basic way in which the body reacts to infection, irritation or other injury, the key feature being redness, warmth, swelling and pain. Inflammation is now recognized as a type of nonspecific immune response. See the entire [definition of Inflammation](#)

Laboratory: A place for doing tests and research procedures and preparing chemicals, etc. Although "laboratory" looks very like the Latin "laboratorium" (a place to labor, a work place), the word "laboratory" came from the Latin "elaborare" (to work out, as a problem, and with great pains), as evidenced by the Old English spelling "elaboratory" designating "a place where learned effort was applied to the solution of scientific problems."

Laryngeal: Having to do with the larynx (the voice box).

Lungs: The lungs are a pair of breathing organs located with the chest which remove carbon dioxide from and bring oxygen to the blood. There is a right and left lung.

Malnutrition: A term used to refer to any condition in which the body does not receive enough nutrients for proper function. Malnutrition may range from mild to severe and life-threatening. It can be a result of starvation, in which a person has an inadequate intake of calories, or it may be related to a deficiency of one particular nutrient (for example, [vitamin C](#) deficiency). Malnutrition can also occur because a person can not properly digest or absorb nutrients from the food they consume, as may occur with certain medical conditions. Malnutrition remains a significant global problem, especially in developing countries.

Mouth: 1. The upper opening of the digestive tract, beginning with the lips and containing the teeth, gums, and tongue. Foodstuffs are broken down mechanically in the mouth by chewing and saliva is added as a lubricant. Saliva contains amylase, an enzyme that digests starch. **2.** Any

opening or aperture in the body. The mouth in both senses of the word is also called the os, the Latin word for an opening, or mouth. The o in os is pronounced as in hope. The genitive form of os is oris from which comes the word oral.

Mucus: A thick slippery fluid produced by the membranes lining certain organs such as the nose, mouth, throat, and vagina. Mucus is the Latin word for "a semifluid, slimy discharge from the nose." Note that mucus is a noun while the adjective is mucous.

Nasal: Having to do with the nose. Nasal drops are intended for the nose, not (for example) the eyes. The word "nasal" came from the Latin "nasmus" meaning the nose or snout.

Nose: The external midline projection from the face.
See the entire [definition of Nose](#)

Oxygen: A colorless, odorless and tasteless gas that makes up about 20% of the air we breathe (and at least half the weight of the entire solid crust of the earth) and which combines with most of the other elements to form oxides. Oxygen is essential to human, animal and plant life.
See the entire [definition of Oxygen](#)

Pertussis: Whooping cough, a communicable, potentially deadly illness characterized by fits of coughing followed by a noisy, "whooping" indrawn breath. It is caused by the bacteria *Bordetella pertussis*. The illness is most likely to affect young children, but sometimes appears in teenagers and adults, even those who have been previously immunized. Immunization with DPT (diphtheria-pertussis-tetanus) vaccine provides protection, although that immunity may wear off with age. When teenagers and adults get pertussis, it appears first as coughing spasms, and then a stubborn dry cough lasting up to eight weeks.
See the entire [definition of Pertussis](#)

Pneumonia: Inflammation of one or both lungs with consolidation. [Pneumonia](#) is frequently but not always due to infection. The infection may be bacterial, viral, fungal or parasitic. Symptoms may include fever, chills, cough with sputum production, chest pain, and shortness of breath.

Postpartum: In the period just after delivery, as with postpartum depression. Postpartum refers to the mother and postnatal to the baby. From the Latin post, after + partum, birth.

Pregnancy: The state of carrying a developing embryo or fetus within the female body. This condition can be indicated by positive results on an over-the-counter urine test, and confirmed through a blood test, ultrasound, detection of fetal heartbeat, or an X-ray. Pregnancy lasts for about nine months, measured from the date of the woman's last menstrual period (LMP). It is conventionally divided into three trimesters, each roughly three months long.
See the entire [definition of Pregnancy](#)

Pregnant: The state of carrying a developing fetus within the body.
See the entire [definition of Pregnant](#)

Public health: The approach to medicine that is concerned with the health of the community as a whole. Public health is community health. It has been said that: "Health care is vital to all of us some of the time, but public health is vital to all of us all of the time."

See the entire [definition of Public health](#)

Recur: To occur again. To return. Any symptom (such as fatigue), any sign (such as a [heart murmur](#)), or any disease can recur.

Reservoir: 1. A place where something such as water is kept in reserve.

2. The part of a device in which something is kept in reserve or stored, as an [Ommaya reservoir](#).

3. For an infectious agent, an animal, person, plant, soil, or other substance in which the agent normally abides. See: [Reservoir of infection](#).

From the French reservoir, from reserver meaning to reserve.

Respiratory: Having to do with respiration, the exchange of oxygen and carbon dioxide. From the Latin re- (again) + spirare (to breathe) = to breathe again.

Runny nose: Rhinorrhea is the medical term for this common problem. From the Greek words "rhinos" meaning "of the nose" and "rhoia" meaning "a flowing."

Stage: As regards [cancer](#), the extent of a cancer, especially whether the disease has spread from the original site to other parts of the body. See also: [Staging](#).

Tetanus: An often fatal infectious disease caused by the bacteria Clostridium tetani (C. tetani) which usually enters the body through a puncture, cut, or open wound. Tetanus is characterized by profoundly painful spasms of muscles, including "locking" of the jaw so that the mouth cannot open (lockjaw). C. tetani releases a toxin that affects the motor nerves, (the nerves which stimulate the muscles).

See the entire [definition of Tetanus](#)

Therapy: The treatment of disease.

See the entire [definition of Therapy](#)

Trimester: The nine months of pregnancy is traditionally divided into three trimesters: distinct periods of roughly three months in which different phases of fetal development take place.

See the entire [definition of Trimester](#)

Upper respiratory infection: An infection of the upper part of the respiratory system which is above the lungs. An upper respiratory infection can be due to any number of viral or bacterial infections. These infections may affect the throat (pharyngitis), nasopharynx (nasopharyngitis), sinuses (sinusitis), larynx (laryngitis), trachea (tracheitis) or bronchi (bronchitis).

See the entire [definition of Upper respiratory infection](#)

Vaccination: Injection of a killed microbe in order to stimulate the immune system against the microbe, thereby preventing disease. Vaccinations, or [immunizations](#), work by stimulating the immune system, the natural disease-fighting system of the body. The healthy immune system is

able to recognize invading bacteria and viruses and produce substances (antibodies) to destroy or disable them. Immunizations prepare the immune system to ward off a disease. To immunize against viral diseases, the virus used in the vaccine has been weakened or killed. To only immunize against bacterial diseases, it is generally possible to use a small portion of the dead bacteria to stimulate the formation of antibodies against the whole bacteria. In addition to the initial immunization process, it has been found that the effectiveness of immunizations can be improved by periodic repeat injections or "boosters." Also see Vaccines (in the plural) and Vaccine of a specific type (such Vaccine, Polio).

Vaccines: Microbial preparations of killed or modified microorganisms that can stimulate an immune response in the body to prevent future infection with similar microorganisms. These preparations are usually delivered by injection.

Viral: Of or pertaining to a virus. For example, "My daughter has a viral [rash](#)."

Virus: A microorganism smaller than a bacteria, which cannot grow or reproduce apart from a living cell. A virus invades living cells and uses their chemical machinery to keep itself alive and to replicate itself. It may reproduce with fidelity or with errors (mutations)-this ability to mutate is responsible for the ability of some viruses to change slightly in each infected person, making treatment more difficult.

See the entire [definition of Virus](#)

Whooping cough: Also known as [pertussis](#), this is a feared infectious disease that can strike the respiratory system and affect other organs of the body. It has three stages-an initial stage with watery runny nose and eyes, a progressive cough stage with characteristic (sometimes severe) coughing spells, and (if the child survives) a recovery stage. The disease may last for 2-6 weeks. Therapy is supportive and many young infants need hospitalization if the coughing becomes severe. Immunization with DPT (diphtheria-pertussis-tetanus) vaccine provides protection. With pertussis, an ounce of prevention is worth a pound of cure (or, if you are metrically inclined, a gram of prevention is worth a kilo of cure). Have your child immunized!

Examination

Select the *best* answer to each of the following items. Mark your responses on the Answer form.

1. Whooping cough (pertussis) is highly communicable, vaccine-preventable disease that lasts for _____ and is typically manifested in children with paroxysmal spasms of severe coughing, whooping, and posttussive vomiting.

- a. 2-5 days
- b. 1-2 weeks
- c. many weeks
- d. None of the above

2. The etiological agent for pertussis is *Bordetella pertussis*, a gram-negative coccobacillus.

- a. True
- b. False

3. Regarding incidence, This disease results in high morbidity and mortality in many countries every year. In the United States, 5000-7000 cases are reported each year. Incidence of pertussis has increased steadily since the 1980s. The incidence in 2007 was _____/100,000 when 10,454, cases of pertussis were reported.

- a. 2.1
- b. 2.8
- c. 3.1
- d. 3.6

4. The disease is primarily transmitted through _____.

- a. breathing particles in the air around infected persons
- b. direct contact with discharges from respiratory mucous membranes of infected persons.
- c. hand shaking or other types of touching an infected person
- d. None of the above

5. Groups at risk for being infected include _____.

- a. children who are too young to be fully vaccinated
- b. those who have not completed the primary vaccination
- c. adolescents and adults become susceptible when immunity wanes,
- d. All of the above

6. Whooping cough — or pertussis — is an infection of the respiratory system caused by the bacterium *Bordetella pertussis* (or *B. pertussis*). It's characterized by severe coughing spells that end in a "whooping" sound when the person breathes in. Before a vaccine was available, pertussis killed 5,000 to 10,000 people in the United States each year. Now, the pertussis vaccine has reduced the annual number of deaths to less than _____.

- a. 500
- b. 100
- c. 30
- d. None of the above

7. The first symptoms of whooping cough are similar to those of a common cold: _____.

- a. runny nose
- b. sneezing and mild cough
- c. low-grade fever
- d. All of the above

8. Experts believe that up to _____% of nonimmunized family members will develop whooping cough if they live in the same house as someone who has the infection.

- a. 20
- b. 50
- c. 80
- d. None of the above

9. Side effects of the vaccine may include _____.

- a. fever
- b. crankiness
- c. soreness at the site of the injection
- d. All of the above

10. The disease is named for the characteristic sound produced when affected individuals attempt to inhale; the *whoop* originates from the inflammation and swelling of the laryngeal structures that vibrate when there is a rapid inflow of air during inspiration.

- a. True
- b. False

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