



State of Louisiana

Department of Health and Hospitals
Office of Public Health

Pertussis Health Alert

Pertussis cases across the country are at record highs. States adjoining Louisiana are currently experiencing outbreaks. Louisiana physicians are being asked to be alert for Pertussis cases, test when it is suspected, report cases to the Louisiana State Epidemiology Hotline (800) 256-2748, and recommend vaccination to unprotected persons.

Organism, Causative Agent, or Etiologic Agent: *Bordetella pertussis*

Transmission

Pertussis is a very contagious disease spread through aerosolized droplets from person to person. People with pertussis usually spread the disease by coughing or sneezing while in close contact with others, who then breathe in the pertussis bacteria.

Symptoms

Pertussis (whooping cough) can cause serious illness in infants, children and adults. The disease usually starts with cold-like symptoms and maybe a mild cough or fever. After one to two weeks, severe coughing can begin. Unlike the common cold, pertussis can become a series of coughing fits that continues for weeks.

In infants, the cough can be minimal or nonexistent. Infants may have a symptom known as "apnea." Apnea is a pause in the child's breathing pattern. Pertussis is most dangerous for babies. More than half of infants younger than 1 year of age who get the disease must be hospitalized.

Pertussis can cause violent and rapid coughing (paroxysms), over and over, until the air is gone from the lungs and you are forced to inhale with a loud "whooping" sound. This extreme coughing can cause you to throw up (posttussive vomiting) and be very tired. The "whoop" is often not there and the infection is generally milder (less severe) in teens and adults, especially those who have been vaccinated.

Early symptoms can last for one to two weeks and usually include:

- Runny nose
- Low-grade fever (generally minimal throughout the course of the disease)
- Mild, occasional cough
- Apnea – a pause in breathing (in infants)

Since pertussis in its early stages appears to be nothing more than the common cold, it is often not suspected or diagnosed until the more severe symptoms appear. Those infected are most contagious during this time, up to about two weeks after the cough begins. Antibiotics may shorten the amount of time someone is contagious.

As the disease progresses, the traditional symptoms of pertussis appear and include:

- Paroxysms of many, rapid coughs followed by a high-pitched "whoop"
- Vomiting
- Exhaustion after coughing fits

The coughing fits can go on for up to 10 weeks or more. In China, pertussis is known as the "100-day cough."

Although you are often exhausted after a coughing fit, you usually appear fairly well in-between. Coughing fits generally become more common and severe as the illness continues, and can occur more often at night. The illness can be milder and the typical "whoop" absent in children, teens, and adults who have been vaccinated.

Recovery from pertussis can happen slowly. The cough becomes less severe and less common. However, coughing fits may return with other respiratory infections for many months after symptom onset.

Timing

B. pertussis is most frequently recovered in the catarrhal or early paroxysmal stage of illness. Once cough has been present for >3 weeks, recovering the organism is unlikely.

Laboratory Diagnosis

The preferred methods for the laboratory diagnosis of pertussis are culture and polymerase chain reaction (PCR), and it is recommended in most cases that both tests be performed. These tests are the basis for the Centers for Disease Control and Prevention (CDC) definition of a confirmed case of pertussis.

Culture of B. pertussis is the gold standard and the preferred laboratory test for pertussis; however, the organism can be difficult to isolate. Culture is less sensitive than PCR, but is 100% specific (no false positives). A negative culture result does not rule out pertussis infection. Confirm outbreaks with >1 culture confirmed case. B. pertussis usually grows after three to four days; however, cultures cannot be considered negative for pertussis until after 10 days.

The primary reasons for failure to isolate B. pertussis are bacterial or fungal contamination, lack of fresh media, and specimen collection too late in illness. Cultures can also be negative if taken from a previously immunized person or if antimicrobial therapy has been started.

PCR assay provides rapid results and is more sensitive (less likely to be falsely negative) than culture. False positive test results can be a problem with PCR though.

A person with a positive PCR who does not have a cough is not considered a case.

PCR tests are less sensitive in previously immunized individuals, but are more sensitive than cultures in such patients. PCR tests are also more likely than cultures to be positive in patients who have received antimicrobial treatment. Length of PCR positivity is similar to that for cultures. Delay in specimen collection is the main reason for a negative PCR test result in a patient with pertussis.

No PCR product has been approved by the Food and Drug Administration (FDA), and there are no standardized protocols, reagents, or reporting formats for pertussis PCR testing. Consequently, PCR assays vary widely among laboratories.

Specificity can be poor, with high rates of false-positive results in some laboratories. Like culture, PCR is also affected by specimen collection. An inappropriately obtained nasopharyngeal swab will likely be negative by both culture and PCR. PCR is less affected by prior antibiotic therapy, since the organism does not need to be viable to be positive by PCR. Continued use of culture is essential for confirmation of PCR results.

Alternative when culture or PCR is not available or when it has been > 3 weeks since cough onset

There is no FDA-approved diagnostic test. The currently available serologic tests measure antibodies that could result from either infection or vaccination, so a positive serologic response simply means that the person has been exposed to pertussis by either recent or remote infection, or by recent or remote vaccination. Serologic assays cannot differentiate infection from vaccine response because vaccination can induce both IgM and IgA antibodies (in addition to IgG antibodies). At this time, serologic test results should not be relied upon for case confirmation of pertussis infection.

Commercially available serologic tests to detect IgG and IgA antibodies to pertussis toxin

Such tests have not been clinically validated and are not generally recommended; however, one serologic enzyme-linked immunosorbent assay (ELISA) like test (Focus Technologies, Cypress, CA) for detection of IgG and IgA antibodies to pertussis toxin may be useful for diagnosis. Diagnosis of pertussis on the basis of a high single serum titer from this test is expected to be reasonably sensitive and specific in persons >10 years of age if it has been >2 years since the last dose of pertussis containing vaccine was received.

Tests that are not recommended

Commercial ELISA tests that use whole *B. pertussis* or *B. pertussis* antigens rather than pertussis toxin (i.e., FHA tests) have high false positive rates and are not recommended.

Testing for pertussis IgM antibody is also not recommended.

Direct fluorescent antibody (DFA) tests on smears made from nasopharyngeal specimens are not recommended for pertussis diagnosis, nor does a positive DFA test meet the CDC criteria for laboratory confirmation of a pertussis case. The sensitivity of these tests is low and they are performed reliably only by experienced technologists

Complications

Infants and Children

Pertussis (whooping cough) can cause serious and sometimes life-threatening complications in infants and young children, especially those who are not fully vaccinated.

In infants younger than 1 year of age who get pertussis, more than half must be hospitalized. The younger the infant, the more likely hospital treatment will be needed. Of those infants who are hospitalized with pertussis about:

- 1 in 5 get pneumonia (lung infection)
- 1 in 100 will have convulsions (violent, uncontrolled shaking)
- Half of the pertussis cases will have apnea (slowed or stopped breathing)
- 1 in 300 will have encephalopathy (disease of the brain)
- 1 in 100 will die

Teens and Adults

Teens and adults can also get complications from pertussis. They are usually less serious in this older age group, especially in those who have been vaccinated. Complications in teens and adults are often caused by the cough itself. For example, you may pass out or fracture a rib during violent coughing fits.

In one study, less than 5% of teens and adults with pertussis were hospitalized. Pneumonia was diagnosed in 2% of those patients. The most common complications in another study of adults with pertussis were:

- Weight loss (33%)
- Loss of bladder control (28%)
- Passing out (6%)
- Rib fractures from severe coughing (4%)

(Reference: Cortese MM, Bisgard KM. Pertussis. In: Wallace RB, Kohatsu N, Kast JM, ed. Maxcy-Rosenau-Last Public Health & Preventive Medicine, Fifteenth Edition. The McGraw-Hill Companies, Inc.; 2008:111-14.)

Prevention

The best way to prevent pertussis (whooping cough) among infants, children, teens and adults is to get vaccinated. Also, keep infants and other people at high risk for pertussis complications away from infected people.

In the United States, the recommended pertussis vaccine for infants and children is called DTaP. This is a combination vaccine that protects against three diseases: diphtheria, tetanus and pertussis. For maximum protection against pertussis, children need five DTaP shots. The first three shots are given at 2, 4, and 6 months of age. The fourth shot is given at 12-15 months of age, and a fifth shot is given before a child enters school, at 4–6 years of age. Administering DTaP doses at shorter than recommended intervals using an approved accelerated schedule might be necessary when an infant or child is behind schedule and needs to be brought up-to-date quickly. By completing the 4-dose primary DTaP series by age 24 months, the vaccine will offer optimal protection and efficacy for infants and children. An accelerated schedule should also be used when the child is unlikely to return for the 12-15 month visit. Parents can help protect infants by keeping them away, as much as possible, from anyone who has cold symptoms or is coughing.

Vaccine protection for pertussis, tetanus and diphtheria fades with time. Before 2005, the only booster available contained protection against tetanus and diphtheria (called Td), and was recommended for teens and adults every 10 years. Today there are boosters for pre-teens, teens and adults that contain protection against tetanus, diphtheria and pertussis (Tdap). Pre-teens going to the doctor for their regular check-up at age 11 or 12 years should get a dose of Tdap. Teens who did not get this vaccine at the 11 or 12-year-old check-up should get vaccinated at their next visit. Adults who did not get Tdap as a pre-teen or teen should get one dose of Tdap. Pregnant women who have not been previously vaccinated with Tdap should get one dose of Tdap for each pregnancy, or postpartum before leaving the hospital or birthing center. Adults 65 years and older (grandparents, child care providers, and healthcare providers) who have close contact with infants should get a dose of Tdap, following the newest vaccine recommendations. **Getting vaccinated with Tdap is especially important for families with and caregivers of new infants.**

The easiest thing for adults to do is to get Tdap instead of their next regular tetanus booster—that Td shot they were supposed to get every 10 years. The dose of Tdap can be given earlier than the 10-year mark, so it is a good idea for adults to talk to a healthcare provider about what is best for their specific situation.

School Exclusion

Children with suspected or confirmed pertussis should be kept out of school or childcare until they have completed five days of antibiotic therapy. Louisiana Sanitary Code Title 51 provides exclusion authority for non-compliant and ill children to prevent the spread of contagious diseases.

Recent Louisiana Trends

Pertussis in Louisiana has historically occurred in waves--with peaks every 2-5 years followed by a subsequent sharp decline in cases. Outbreaks were seen in 2005 and 2009. In 2012, the cycle appeared to be starting over again as there were 72 cases, which is more than triple the 2011 count (n=20). The outbreak that started in 2012 continued on in 2013 with 213 cases and then began to decrease again in 2014 (n=90).

There are several important factors leading to the increased reporting of pertussis cases, including waning immunity in adults and adolescents; incompleteness of infant vaccination series; heightened awareness of the disease among clinicians, school nurses, parents, and the general public; better laboratory testing methodologies; and enhanced disease surveillance capabilities.

From 2000-2013, a total of 56 deaths were attributed to pertussis in the United States. Most of the deaths occurred in infants under 1 year of age--most in children too young to be vaccinated. The provisional report for 2014 currently lists 9 deaths attributed to pertussis.

Please be on the alert for and report suspected Pertussis cases to the Louisiana State Epidemiology Hotline (800) 256-2748, and recommend vaccination to any person who is unprotected.