

PUBLIC HEALTH REFERENCE SHEET

Pertussis (Whooping Cough)



Name	<i>Bordetella pertussis</i>
Reservoir & Transmission	Humans Droplet transmission
Incubation Period	9–10 days on average with a range of 6–20 days.
Common Symptoms	Paroxysms of coughing or inspiratory “whoop”, post-tussive vomiting, apnea with or without cyanosis
Gold Standard Diagnostic Test	Culture, PCR
Risk Groups	Infants, non-immunized individuals
Geographic Significance	Worldwide

What is pertussis?

Pertussis, commonly known as whooping cough, is an acute infectious respiratory disease caused by *Bordetella pertussis* bacteria. The bacteria release toxins, which damage and paralyze the cilia that line part of the upper respiratory system, and cause airways to swell. Since *B. pertussis* are changing at a genetic level, public health continues to evaluate the impact of molecular changes.

What is the occurrence of pertussis?

In the 20th century, pertussis was one of the most common childhood diseases and a major cause of U.S. childhood mortality. Before the availability of a pertussis vaccine in the 1940s, more than 200,000 cases of pertussis were reported annually. Since widespread use of the vaccine began, incidence has decreased compared with the pre-vaccine era; however, since the COVID-19 pandemic in 2020, there has been an increase in the number of reported cases.

How is pertussis transmitted?

Pertussis is a human disease; no animal or insect source or vector is known to exist. Pertussis spreads from person-to-person by coughing and sneezing while in close contact with others. Infants may contract pertussis from siblings, parents, or caregivers who might not know that they are infectious. The most infectious time is up to 2 weeks after the cough begins.

Who is at risk for pertussis?

Unvaccinated or incompletely vaccinated infants younger than 12 months of age have the highest risk for severe complications and death. Some observational studies suggest that pertussis infection can provide immunity for 4 to 20 years.

What are the signs and symptoms of pertussis?

Pertussis symptoms usually develop within 5 to 10 days and up to 21 days after exposure. The three stages to the clinical course of pertussis are catarrhal, paroxysmal, and convalescent.

Stage 1, catarrhal lasts approximately 1–2 weeks and is characterized by inflammation of the mucous membranes (especially the nose (coryza)), low-grade fever, mild or occasional cough which becomes more severe, and apnea in infants. In infants, apnea may be the only symptom, and the cough may be minimal or absent.

Stage 2, paroxysmal lasts approximately 1–6 weeks, may extend up to 10 weeks, and is characterized by the traditional symptoms of pertussis to include paroxysms (fits) of many, uncontrollable, rapid coughs followed by a high-pitched “whoop” sound due to rapid inspiration;

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vomiting during or after coughing fits; and exhaustion after cough fits. Paroxysms of cough, which may occur more at night, usually increase in frequency and severity as the illness progresses.

Stage 3, convalescent lasts from weeks to months and is characterized by less persistent, paroxysmal coughs that resolve in 2–3 weeks. After paroxysms subside, a nonparoxysmal cough can continue for 2 to 6 weeks or longer.

What are potential complications of pertussis?

About one-third of infants less than 1 year old who get pertussis need to be hospitalized, and among those, 1% of the infants will die. Teens and adults can develop pneumonia, and the severe cough can cause problems such as rib fracture or loss of bladder control. Paroxysms often recur with subsequent respiratory infections for many months after the onset of pertussis.

How is pertussis diagnosed?

Culture of nasopharyngeal swab or aspirate specimen is the gold standard to confirm *Bordetella pertussis* because it is the only 100% specific method for identification. Culture is used during the first 2 weeks of illness following cough onset. Culture takes up to 7 days to obtain results but has better specificity than polymerase chain reaction (PCR). PCR is used up to 4 weeks following onset of cough. PCR is a rapid test and has excellent sensitivity; however, since PCR tests vary in specificity, results should be interpreted along with the clinical symptoms and epidemiological information.

The same nasopharyngeal swab or aspirate specimen can be used both for culture and PCR. In an outbreak situation, at least one case should be confirmed by culture.

A serologic assay used 2 to 8 weeks following cough onset, when antibody titers are at their highest, may be useful for confirming diagnosis during a suspected pertussis outbreak. Serologic tests are more useful for diagnosis in later phases of the disease, and testing may be performed on specimens collected up to 12 weeks following cough onset.

How is pertussis treated?

Isolate known cases, especially from infants, young children, and unvaccinated persons, until treated. Treatment with antibiotics is ideal during the first 1 to 2 weeks before coughing paroxysms occur. Early treatment is most effective for reducing symptoms' severity and may shorten the amount of time someone is contagious. Treatment after 3 weeks of illness is less effective as antibiotics will not alter the course of the illness or prevent transmission. Strongly consider treating prior to test results if any of the following are present:

- Clinical history is strongly suggestive of pertussis.
- The person is at risk for severe or complicated disease (e.g., infants).
- The person has or will soon have routine contact with someone that is considered at high risk of serious disease (e.g., pregnant women).

Macrolides are the recommended antimicrobial agents for treatment or chemoprophylaxis of pertussis. In infants 1 month of age and older, macrolides erythromycin, clarithromycin, and azithromycin are preferred for the treatment of pertussis. For persons 2 months of age and older, an alternative to macrolides is trimethoprim-sulfamethoxazole.

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How can pertussis be prevented?

Vaccination is the best way to protect against pertussis. Prevent exposure of infants and individuals at high risk for pertussis complications from those who are infected.

In the United States, DTaP (diphtheria toxoid, tetanus toxoid, and acellular pertussis) is the combination vaccine recommended for infants and children. DTaP provides approximately 5 years of protection, which fades over time.

The Tdap (Tetanus, Diphtheria, Pertussis) vaccine is for children 7 years and older, adolescents, women during early part of the third trimester of pregnancy, and adults. Adults should receive a booster dose of Tdap every 10 years.

Postexposure antimicrobial prophylaxis (PEP) may be indicated to prevent death and serious complications from pertussis in individuals at increased risk of severe disease. Currently, there are no data to indicate that widespread use of PEP among contacts effectively controls or limits the scope of pertussis outbreaks. Refer to the CDC's guidance on PEP for pertussis at <https://www.cdc.gov/pertussis/pep.html>.

What are some public health considerations?

- Document pertussis immunization history.
- Consider active screening for pertussis cases during outbreaks in settings such as schools, childcare centers, and hospitals. Refer to the CDC's letter of guidance for pertussis outbreak: <https://www.cdc.gov/pertussis/guidance-letter.html>.

References:

Defense Health Agency. 2022. *Armed Forces Reportable Medical Events: Guidelines and Case Definitions*.

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Heymann, David L. ed. 2022. *Control of Communicable Diseases Manual*. 21st Edition. Washington, DC: APHA Press.

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