

UPDATE:

Bordetella pertussis

Whooping cough is a highly contagious respiratory disease caused by the gram negative coccobacillus *Bordetella pertussis*. In 2010, 27,550 cases were reported in the U.S. Outbreaks are most common in fall and winter, but may occur any time of the year.

AFTER EXPOSURE TO ORGANISM:

Incubation Period: 4 to 21 days

Classic Symptoms:

Catarrhal Stage: runny nose, sneezing, mild cough, low grade fever:
1 to 2 weeks

Paroxysmal Stage: Staccato cough, whoop, post-tussive vomiting: 1 to 10 weeks

Convalescent Stage: 2 to 4 weeks or more (may last for months)

Atypical Presentation:

Patients may also be asymptomatic or have a prolonged nondescript cough and infants may present with choking and apnea. Differential diagnosis of atypical symptoms includes Adenovirus, Parainfluenza and Respiratory syncytial virus, *Chlamydia pneumoniae* and *Mycoplasma pneumoniae*.

Testing for *B. pertussis* is an important public health issue. Identification of people infected with the organism allows the Public Health Department to identify and prophylax contacts of the patient, some of whom may be in high risk groups.

- Populations most at risk for serious infections are infants and older adults, with complications which include seizures, pneumonia, encephalopathy, or death.
- *B. pertussis* is a strictly human pathogen with a high attack rate infecting 80-90% of susceptible contacts. It is spread by respiratory droplets and requires close contact (less than 3 feet) or direct contact, such as touching, to transmit disease. Masks and frequent hand washing by both caregivers and patients help prevent transmission of the disease.
- Pertussis occurs in persons at any age regardless of immunization status. Immunization protects young children from the serious side effects of disease, but does not prevent infection. Immunity to pertussis wanes after 5 to 12 years.

- Hospitalized patients with suspected or documented *B. pertussis* infection should be placed in Droplet Precautions until considered noninfectious (e.g., after 5 days of appropriate antibiotic therapy). Patients presenting to outpatient areas, e.g., clinical offices or the hospital for testing, should wear a mask.

LABORATORY TESTING:

- **Asymptomatic patients should not be tested because the likelihood of obtaining a false-positive result is increased.**
- PCR is the recommended testing method for patients who have symptoms consistent with *B. pertussis* infection.
- Serology is **NOT** recommended for diagnosis because:
 - Serologic tests are not standardized between laboratories.
 - Most serologic tests are not approved for diagnostic use.
 - They are difficult to interpret because antibody response differs due to age, and previous exposure to organism or its antigens.
 - They require comparison of an acute and convalescent specimen for maximum specificity.
 - Asymptomatic people can have rises in titer after exposure.
- The sensitivity and specificity of all laboratory testing for *B. pertussis* depends on a variety of factors including:

*Prior antibiotic therapy	*Specimen transport conditions
*Duration of symptoms	*Specimen collection technique
*Age of Patient	*Vaccination status
- For best results; collect the specimen properly, early in disease, before antibiotics, and transport promptly.

Previously, the laboratory requested that all samples be tested by PCR and culture in parallel in order to provide material for epidemiologic studies. However, given that the vast majority of persons tested are negative, this practice was extremely low yield. The CDC only recommends submitting cultures in one or more suspected cases when there is suspicion of an outbreak. Therefore, the laboratory has discontinued the practice of performing culture in parallel as a routine. **We recommend culture only in select cases after a patient has had a positive PCR, and where material is needed for epidemiologic studies or to confirm the specificity of the assay in an outbreak situation.** Culture is more likely to be positive if collected early in the disease, and prior to antibiotic administration.

SPECIMEN COLLECTION:

- The best specimen is a posterior nasopharyngeal specimen obtained using a Dacron minitip swab slowly inserted into a nostril and pushed back until posterior nasopharynx is reached. Leave swab in place for 15-30 seconds and rotate in place to collect cells. Repeat procedure with other nostril. Alternately, an aspirate may be obtained. These procedures can be done at the hospital by a respiratory therapist. The pertussis kit with instructions can be obtained from the laboratory.

TREATMENT:

- Antibiotic therapy is administered for the purpose of preventing the spread of the organism to other persons or as prophylaxis to prevent disease. It may or may not modify symptoms in patients with disease. Patients are considered non-infectious after a full 5 days of appropriate antibiotics.
- Initiating laboratory testing, treatment, or prophylaxis after three weeks of onset of cough is of limited value in cases or their contacts and is not routinely recommended.

Exceptions to this include:

- Pregnancy -treatment up to 6 weeks after cough onset
 - Infants - prophylaxis given up to 6 weeks after exposure
- The anti-microbial agents and dosages used for chemoprophylaxis of contacts are the same as that recommended for treatment of clinical cases.

1. Azithromycin

Recommended regimen:

- Infants aged <6 months: 10 mg/kg per day for 5 days.
- Infants and children aged ≥ 6 months: 10 mg/kg (maximum: 500 mg) on day 1, followed by 5 mg/kg per day (maximum: 250 mg) on days 2—5.
- Adults: 500 mg on day 1, followed by 250 mg per day on days 2—5.

2. Erythromycin

Recommended regimen:

- Infants aged <1 month: not preferred because of risk for infantile hypertrophic pyloric stenosis (IHPS). Azithromycin is recommended antimicrobial agent. If azithromycin is unavailable and erythromycin is used, the dose is 40—50 mg/kg per day in 4 divided doses. These infants should be monitored for IHPS.*
- Infants aged ≥ 1 month and older children: 40—50 mg/kg per day (maximum: 2 g per day) in 4 divided doses for 14 days.
- Adults: 2 g per day in 4 divided doses for 14 days.

*Health-care providers who prescribe erythromycin rather than azithromycin to newborns should inform parents about the possible risks for IHPS and counsel them about signs of IHPS.

3. Clarithromycin

Recommended regimen:

- Infants aged <1 month: not recommended.
- Infants and children aged ≥ 1 month: 15 mg/kg per day (maximum: 1 g per day) in 2 divided doses each day for 7 days.
- Adults: 1 g per day in two divided doses for 7 days.

4. Alternate agent (TMP-SMZ). TMP-SMZ is used as an alternative to a macrolide antibiotic in patients aged ≥ 2 months who have contraindication to or cannot tolerate macrolide agents, or who are infected with a macrolide-resistant strain of *B. pertussis*. Macrolide-resistant *B. pertussis* is rare.

Recommended regimen:

- Infants aged 2 months: contraindicated.
- Infants aged ≥ 2 months and children: trimethoprim 8 mg/kg per day, sulfamethoxazole 40 mg/kg per day in 2 divided doses for 14 days

- Adults: trimethoprim 320 mg per day, sulfamethoxazole 1,600 mg per day in 2 divided doses for 14 days.
- Initiating laboratory testing, treatment or prophylaxis after three weeks of onset of cough is of limited value in cases or their contacts and is not routinely recommended (except in pregnancy and infancy).

LABORATORY INFORMATION:

- Please order PCR for *B. pertussis*.
- PCR should ideally be tested from NP specimens taken at 0-3 weeks following cough onset, but may provide accurate results for up to 4 weeks of cough in infants or unvaccinated persons.
- Serology is not recommended for diagnosis of *B. pertussis*.
- Turnaround time after specimen is received:
 - *PCR: 24 hours

REFERENCES:

1. CDC 2011 “Best Practices for Health Care Professionals on the Use of Polymerase Chain Reaction (PCR) for Diagnosing Pertussis.”
2. Douglas County Health Department (DCHD)
3. American Academy of Pediatrics 2009 Red Book

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