

## **Bordetella pertussis**

Whooping cough is caused by the gram negative coccobacilli, *Bordetella pertussis*. It enters the body through the mouth and nose and preferentially infects the ciliated respiratory epithelium in the nasopharynx and bronchial tree. However, it has been identified in blood and thus can cause invasive infection as well.

### **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

#### **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, 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.

**LABORATORY TESTING:**

At the present time, the CDC and the Nebraska Public Health officials are recommending both culture and PCR testing in patients who have symptoms consistent with Bordetella infection. Our laboratory will discontinue direct fluorescent antibody testing. It will be replaced by PCR. This combination will give maximum sensitivity, specificity and speed of diagnosis. **Asymptomatic patients should not be tested.**

- The sensitivity and specificity of all laboratory testing for *B. pertussis* depends on a variety of factors including:
  - \* Prior antibiotic therapy
  - \* Duration of symptoms
  - \* Age of Patient
  - \* Vaccination status
  - \* Specimen transport conditions
  - \* Growth media type/quality
  - \* Specimen collection technique

For best results; collect the specimen properly, early in disease, before antibiotics, and transport promptly.

**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. Remove swab and inoculate growth media at patient's side. Repeat procedure with other nostril. Alternately an aspirate may be obtained. These procedures can be done at the hospital by respiratory therapy or at the Methodist laboratory. The on-site pertussis kit with instructions can be obtained from the laboratory.
- If the distance from the hospital is an issue, then posterior nasopharyngeal swabs can be collected bilaterally and placed in specialized transport media obtained from the laboratory ahead of time and transported immediately to the laboratory at 4° centigrade. The off-site pertussis kit with instructions can be obtained by calling the laboratory.
- Both the culture and PCR testing can be done from the same specimen.
- Serology is **NOT** recommended for diagnosis.
  - \* Tests are not standardized between laboratories.
  - \* 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.

**TREATMENT:**

- Antibiotic therapy is administered for the purpose of preventing the spread of the organism to other persons or 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.
- The anti-microbial agents and dosages used for chemo prophylaxis of contacts are the same as that recommended for treatment of clinical cases.

**Table 1: Dosages of Antibiotics Used for the Treatment and Prevention of Pertussis**

DRUG	CHILDREN	ADULTS
Azithromycin	10 to 12 mg/kg/day p.o. in a single dose for 5 days; maximum 600 mg/day	500 mg p.o. in a single dose; then 250 mg p.o. in single doses, on days 2 through 5
Clarithromycin	15 to 20 mg/kg/day p.o. in two divided doses; maximum 1 g/d for 7 days	500 mg p.o. twice daily for 10 days
Trimethoprim-Sulfamethoxazole (TMP-SMX)	8 mg (TMP) and 40 mg (SMX) p.o. per kg/day in two divided doses for 14 days; maximum 320 mg/d (TMP) and 1600 mg/d (SMX)	320 mg/day (TMP) and 1600 mg/day (SMX) p.o. divided twice daily for 14 days
Erythromycin estolate*	40 to 50 mg/kg/day p.o. in 4 divided doses for 14 days; maximum 2 g/day	500 mg p.o. QID four times daily for 14 days

\* When prescribing erythromycin to newborns, providers should inform parents about the possible risks for infantile hypertrophic pyloric stenosis (IHPS) and counsel them about signs of developing IHPS.

- 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

**LABORATORY INFORMATION:**

- Please order both PCR and culture for *B. pertussis*
- Turnaround time after specimen is received
  - \* PCR: 24 hours
  - \* Culture: 7 to 12 days
- Culture and PCR tests may still yield useful information up to 5 days after antibiotic treatment started.

**REFERENCES:**

Centers for Disease Control (CDC) [www.cdc.gov](http://www.cdc.gov)  
 Douglas County Health Department (DCHD)  
 American Academy of Pediatrics 2003 Red Book

**SCIENTIFIC INFORMATION CONTACT:**

Dr. Nancy Cornish, Pathologist, Director of Microbiology (402) 354-4540  
 Dr. Robert Penn, Infectious Disease Associates P.C. (402) 354-8155  
 Drs. Romero, Chatterjee, and Varman, Pediatric Infectious Disease (402) 280-1230  
 Dr. Adi Pour, Douglas County Health Department (402) 444-7471  
 Dr. Tom Safranek, State Epidemiologist (402)471-0550