# **Section 8: Pertussis**

# **BASIC EPIDEMIOLOGY**

#### **Infectious Agent**

Bordetella pertussis (B. pertussis), a fastidious gram-negative bacillus.

#### Transmission

Transmitted from person to person through direct contact with respiratory secretions, most commonly through direct contact with airborne droplets from infectious individuals.

#### **Incubation Period**

Average of 7-10 days (ranges 4-21 days).

#### Communicability

Pertussis is highly contagious. Persons with pertussis are most infectious during the catarrhal period and 21 days after cough onset.

#### **Clinical Illness**

The incubation period of pertussis is usually 7 to 10 days, with a range of 4 to 21 days. The clinical course of illness is divided into the following three stages:

- The **catarrhal stage** is characterized by the onset of a runny nose, sneezing, lowgrade fever, and a slight cough. The cough gradually becomes more severe and after 1-2 weeks, the next stage develops.
- The **paroxysmal stage** is characterized by coughing fits (paroxysms), which may be followed by an inspiratory whooping sound, apnea, or vomiting. This usually lasts 1-6 weeks, but may continue for 10 weeks.
- In the **convalescent stage**, there is a gradual resolution of the paroxysmal coughing. The coughing may resolve after a few weeks, but may continue for months.

Regardless of vaccination history, pertussis can occur at any age. In infants less than 6 months of age, apnea may be the initial or most important symptom. An indication to the diagnosis **in infants only** is an elevated white blood count (over 15,000/mm<sup>3</sup>). In infants pertussis symptoms can include apnea, pneumonia, pulmonary hypertension, seizures, and encephalopathy. Pertussis can cause serious complications and can even cause death in infants. Among older children, adolescents, and adults pertussis symptoms are usually milder.

# DEFINITIONS

## **Clinical Case Definition**

For endemic or sporadic cases, a cough illness lasting at least 14 days AND at least one of the following additional symptoms and without other apparent cause (as reported by a health professional):

- Paroxysmal coughing, or
- Inspiratory "whoop," or
- Post-tussive vomiting.

#### Laboratory Confirmation

- Isolation of Bordetella pertussis from a clinical specimen, or
- Positive PCR assay for *Bordetella pertussis*.

### Note:

- Because *B. pertussis* can be difficult to culture, a negative culture result does not rule out pertussis.
- Negative PCR results do not require investigation unless reported as a suspected case by a health professional.
- Direct fluorescent antibody (DFA) staining of a patient's specimen and serological laboratory results (pertussis IgA, IgG or IgM) are NOT considered confirmatory for pertussis, but should be investigated as soon as possible.

### **Case Classifications**

- **Confirmed**: Must meet one of the following criteria:
  - A person with an acute cough illness of any duration who is culture positive, or
  - o A person who meets the clinical case definition and is PCR positive, or
  - A person who meets the clinical case definition and is epidemiologically linked to a laboratory-confirmed case. (This does not include linkage to a patient with a positive laboratory result that does not meet the clinical criteria, i.e., classified as Not a Case.)
- **Probable**: Must meet all of the following criteria:
  - Meets the clinical case definition, and
  - Is not laboratory confirmed (not tested, tests are negative, or tested by serology or DFA), and
  - Is not epidemiologically linked to a laboratory-confirmed case.

#### **Outbreak Settings**

In outbreak settings of 3 or more cases including at least 1 that is laboratory confirmed (i.e. meets the confirmed case definition in addition to being either PCR or culture positive), the clinical case definition used can be modified to a "cough illness lasting at least 14 days".

# CASE INVESTIGATION & TREATMENT

# **Case Investigation**

• Investigate reports of suspected pertussis promptly.

- A close contact is defined as being within close proximity (2 feet) for 2 hours or longer at any one period of time. Identify all exposed contacts including the following:
  - Household contacts
  - Other persons having direct prolonged exposure to the case while case was contagious.
- Antibiotic prophylaxis is recommended if initiated within 21 days of exposure. Initiating antibiotic treatment more than 3 weeks after exposure has limited benefit and is not recommended, except for high-risk contacts that may benefit from antibiotic prophylaxis up to 6 weeks after exposure.
- Exposed children should be observed for 14 days after last contact with the exposed person.
- Close contacts younger than seven (7) years who are unvaccinated or who have fewer than four (4) doses of DTaP vaccine should be vaccinated according to the recommended schedule. Children who received their third dose of DTaP vaccine six (6) months or more before exposure should be given a fourth dose at this time. Those who have had at least four (4) doses of DTaP should receive a booster dose of DTaP unless a dose has been given within the last three (3) years or they are seven (7) years of age or older.
- Adolescents 11 through 18 years of age should get one booster dose of Tdap. A dose of Tdap is recommended for adolescents who have not yet gotten a dose of Td. Adolescents who have already gotten a booster dose of Td are encouraged to get Tdap as well, for protection against pertussis. Waiting at least 5 years between Td and Tdap is encouraged, but not required. Adolescents who did not get all their scheduled doses of DTaP or DTP as children should complete the series using a combination of Td and Tdap.
- Adults aged 19 through 64 years of age should substitute Tdap for one booster dose of Td. Td should be used for later booster doses. Adults who expect to have close contact with an infant younger than 12 months of age should get a dose of Tdap. Healthcare workers who have direct patient contact in hospitals or clinics should also get a dose of Tdap. Waiting at least 2 years since the last dose of Td is suggested, but not required.

# Exclusion

Until completion of five (5) days of antibiotic therapy if cough onset is within 21 days.

The current CDC guidelines for treatment and postexposure prophylaxis of pertussis are summarized in the table below and can also be found at <a href="http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5414a1.htm">http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5414a1.htm</a>.

| Primary Agents  |  |  |   | Alternate Agent*   |
|---|--|--|---|--|
| Age<br>Group  | Azithromycin   | Erythromycin   | Clarithromycin  | TMP-SMZ  |
| <1 month  | Recommended agent<br>10 mg/kg per day in<br>a single dose for 5<br>days (only limited<br>safety data<br>available) | Not preferred.<br>Erythromycin is<br>associated with infantile<br>hypertrophic pyloric<br>stenosis. Use if<br>azithromycin is<br>unavailable, 40 to 50<br>mg/kg per day in 4<br>divided doses for 14 days. | Not recommended (safety<br>data unavailable)                                | Contraindicated for infants aged<br><2months (risk for kernicterus)  |
| 1-5<br>months   | 10 mg/kg per day in<br>a single dose for 5<br>days   | 40 to 50 mg/kg per day in<br>4 divided doses for 14<br>days  | 15 mg/kg per day in 2<br>divided doses for 7 days                           | Contraindicated at age <2<br>months. For infants aged ≥2<br>months, TMP 8 mg/kg per day,<br>SMZ 40 mg/kg per day in 2<br>divided doses for 14 days |
| Infants<br>(aged <u>&gt;6</u><br>months)<br>and<br>children | 10 mg/kg in a single<br>dose on day 1 then 5<br>mg/kg per day<br>(maximum: 500 mg)<br>on days 2-5                  | 40 to 50 mg/kg per day<br>(maximum: 2 g per day)<br>in 4 divided doses for 14<br>days  | 15 mg/kg per day in 2<br>divided doses (maximum:<br>1 g per day) for 7 days | TMP 8 mg/kg per day, SMZ 40<br>mg/kg per day in 2 divided<br>doses for 14 days   |
| Adults  | 500 mg in a single<br>dose on day 1 then<br>250 mg per day on<br>days 2-5  | 2 g per day in 4 divided<br>doses for 14 days  | 1 g per day in 2 divided<br>doses for 7 days                                | TMP 320 mg per day, SMZ<br>1,600 mg per day in 2 divided<br>doses for 14 days  |

Recommended Antimicrobial Treatment and Postexposure Prophylaxis for Pertussis, by Age Group

\* Trimethoprim sulfamethoxazole (TMP-SMZ) can be used as an alternative agent to macrolides in patients aged  $\geq 2$  months who are allergic to macrolides, who cannot tolerate macrolides, or who are infected with a rare macrolide-resistant strain of *Bordetella pertussis* 

# **REPORTING AND DATA ENTRY REQUIREMENTS**

# Provider, School & Child-Care Facilities, and General Public Reporting Requirements

Suspect cases of pertussis are required to be reported within 1 work day to the local or regional health department or the Texas Department of State Health Services (DSHS), Infectious Disease Control Unit (IDCU) at (800) 252-8239 or (512) 776-7676.

# Local and Regional Reporting and Follow-up Responsibilities

Promptly investigate any reported cases of pertussis. Identify and evaluate close contacts. Implement control measures and provide education to prevent further spread of disease. Completed pertussis case investigation forms must be submitted to DSHS IDCU. In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be sent to DSHS IDCU. Records must be faxed within 30 days of initial report to (512) 776-7616 or mailed to the following address:

Infectious Disease Control Unit, Texas Department of State Health Services Mail Code: 1960 PO Box 149347 Austin, TX 78714-9347

### **Data Entry**

The principle investigator (Local or Regional health department) is required to enter all pertussis investigations with a confirmed or probable case status and submit notification in the NEDSS Base System (NBS) within 30 days of initial report. Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

If using or applying 'Outbreak' case definition (refer to Outbreak Settings), the outbreak must be named in NBS. Outbreak names must be requested through the NEDSS (NBS) office.

# LABORATORY PROCEDURES

# SPECIFIC LABORATORY PROCEDURES

Isolation of the organism by culture is ideal; however, it is not readily available. Culture is highly specific, but relatively insensitive. Culture confirmation is recommended for outbreaks. Contact IDCU for further information during outbreaks. Direct fluorescent antibody (DFA) testing of nasopharyngeal secretions has been shown to have low sensitivity and variable specificity; therefore, it should only be used for screening and not relied upon for laboratory confirmation. DFA is not available from the DSHS Laboratory. The preferred laboratory test for pertussis is Polymerase Chain Reaction (PCR). PCR testing can be a rapid, sensitive, and specific method for diagnosing pertussis

To obtain pertussis testing kits, contact the DSHS Laboratory at (512) 776-7661.

# **Specimen Collection**

#### Nasopharyngeal Swab for PCR Testing

### Appropriate positioning of a nasopharyngeal swab

- Use a Rayon or Dacron nasopharyngeal swab with aluminum or plastic handles.
  - If you are not using swabs provided through the DSHS testing kit, be sure the swab you are using is a "mini-tip" Rayon or Dacron swab.
- Immobilize the patient's head.
- Gently insert nasopharyngeal swab into a nostril until the posterior nares is reached.
- Leave the swab in place for up to 10 seconds. This procedure may induce coughing and tearing.



- If resistance is encountered during insertion of the swab, remove it and attempt insertion on the opposite nostril.
- Remove the swab slowly.
- After collection, the swab should be inserted back into the dry transport tube. Store at 2-8°C until shipment at refrigerated temperature (2-8°C).

# **Submission Form**

- Use a G-2B Specimen Submission Form.
- Make sure the patient's name and date of birth or social security number match exactly what is written on the transport tubes.
- On the DSHS Specimen Submission Form G-2B, in section 7: Molecular Studies, check PCR for and write in Pertussis (☑ PCR for: Pertussis)
- Fill in the date of collection, date of onset, and diagnosis/symptoms.

# **Specimen Shipping**

- Transport temperature: Keep at 2-8°C (refrigerated)
- Ship specimens via overnight delivery on cold packs or wet ice (double bagged) within 48 hours of collection.
- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947 Texas Department of State Health Services Attn. Walter Douglass (512) 776-7569 1100 West 49th Street Austin, TX 78756-3199

# **Causes for Rejection:**

- Discrepancy between name on tube and name on form.
- Incorrect swab (must use nasopharyngeal swab).
- Obvious contamination with blood.
- Tube broken in transport.
- Received at ambient temperature.