Pertussis

Summary

Pertussis, or whooping cough, is a communicable respiratory disease which can cause severe illness, complications and even death, particularly in infants. Neither infection nor vaccination confer lifelong immunity. Adolescents and adults with mild or atypical disease can transmit pertussis to infants, young children, and other susceptible persons. Pertussis can be prevented and controlled with vaccinations, early recognition of signs and symptoms of illness, prompt diagnosis, treatment of cases and chemoprophylaxis of select close contacts.

Agent

The bacterium *Bordetella pertussis* is a fastidious Gram-negative bacillus. Several other *Bordetella* species are occasionally also associated with respiratory disease in humans including, *B. parapertussis*, *B. holmesii* and *B. bronchiseptica*.

Transmission

Reservoir:

Humans.

Mode of transmission:

Pertussis is transmitted person to person by direct contact with respiratory secretions or via respiratory droplets produced from a cough or sneeze of infectious individuals.

Period of communicability:

Pertussis is highly contagious. Persons with pertussis are infectious from the beginning of the catarrhal stage through the third week (21 days) of cough or until 5 days after the start of appropriate antimicrobial therapy. Factors affecting the length of communicability include age, vaccination status, previous pertussis infection and the timing of appropriate antimicrobial therapy.

Clinical Disease

Incubation period:

Usually 7-10 days with a range of 4-21 days.

Illness:

Classic pertussis is characterized by spasms of severe coughing (paroxysms) that lasts from 6-10 weeks. Pertussis should be suspected in anyone with a paroxysmal cough or a cough that lasts for more than two weeks, regardless of other symptoms. Pertussis classically progresses through three stages though not all cases have a classic presentation:

1. **Catarrhal** (approximately 1-2 weeks): rhinorrhea, no or low-grade fever, malaise, decreased appetite, and intermittent non-productive cough.
2. **Paroxsymal** (approximately 1-6 weeks which may extend to 10 weeks): spasms of cough that end with a gasp, whoop or vomiting (post-tussive emesis). Infants, however, may lack paroxysmal cough and instead may present with poor feeding, gagging, apnea and/or cyanosis. Adolescents and adults may have prolonged cough with spasms without whoop or post-tussive emesis.
3. **Convalescent** (approximately 2-3+ weeks): gradual resolution of paroxysmal coughing.

Infants are at the highest risk for complications, including pneumonia, seizures, encephalopathy and death. Other less serious complications include otitis media, anorexia and dehydration. Infection from *B. parapertussis* resembles whooping cough, although the illness may be milder. Differentiation between pertussis and parapertussis is based on isolation of the bacteria in culture or through polymerase chain reaction (PCR) identification. Co-infections of *B. pertussis* with *B. parapertussis, B. holmesii* or *B. bronchiseptica* species have been reported. Acellular pertussis vaccine is only effective in preventing *B. pertussis*.

Laboratory Diagnosis

Laboratory methods may differ depending on individual laboratory capabilities. For clarity, this section is organized by laboratory testing conducted at the New Mexico Department of Health (NMDOH) Scientific Laboratory Division (SLD) and laboratory testing conducted elsewhere. **Pertussis testing at SLD is not free.** A charge is generated for pertussis tests performed at SLD except in cases where the submitter is a NMDOH public health office.

Laboratory testing at SLD:

- PCR assay performed on a nasopharyngeal (NP) sample obtained via NP swab is the confirmatory diagnostic test that is currently used by SLD in the vast majority of cases. Healthcare providers considering pertussis testing who choose to have their clinical specimens tested at SLD should consult the SLD website at: http://www.sld.state.nm.us/index.aspx for details of proper specimen handling and submission as well as charges that will apply. PCR testing is the most sensitive and specific test available for pertussis diagnosis and is the most common diagnostic method. PCR may detect *Bordetella* DNA 3-4 weeks post cough onset, and has been known to detect DNA even shortly after starting antibiotics. PCR should only be performed on patients exhibiting a cough illness since false positive results may occur with this method in those without a cough.
- Despite the widespread use and superior sensitivity of PCR, bacterial culture for pertussis is still considered the diagnostic 'gold standard' and plays an important role in confirming the diagnosis, particularly during outbreaks. Culture is available through SLD on a limited basis as part of enhanced pertussis surveillance. Culture specimen collection and submission to SLD should be coordinated with the pertussis epidemiologist and the SLD General Microbiology Supervisor. Culture specimens require special collection kits, culture plates and a monitored incubator (contact Infectious Disease Epidemiology Bureau at 505.827.0006 for guidance).

  Collection/handling of specimens for SLD: Proper specimen collection and handling is imperative. Only use materials approved by SLD when submitting a specimen for testing. Collection kits and methods for PCR and culture specimens are NOT the same (for details, see specific specimen collection instructions in Appendix A that follow this chapter). Specimens collected during the catarrhal or early paroxysmal stage of illness have the highest yield for PCR and culture. After 2 weeks of cough, yield on PCR and culture decreases significantly.

Laboratory testing conducted elsewhere:

- PCR or culture may be performed for diagnostic purposes.
- Direct fluorescent antibody (DFA) tests may provide preliminary evidence of infection; however, a high proportion of false-positive and false-negative results occur with DFA. Results should be interpreted with caution. PCR or culture confirmation should be performed on patients who are positive by DFA.

- Serology tests (e.g., IgA, IgM and IgG antibody tests) are available in commercial laboratories. These tests, however, have not been validated or standardized. They are not recommended for diagnostic purposes at this time.
- **Collection/handling of specimens:** Check with the commercial or reference laboratory that will be performing testing to assure that specimens are being collected, packaged and shipped in accordance with the laboratory's specifications.

Treatment

- ***Bordetella* genus results from SLD will be available prior to species results. Investigations should begin immediately to identify high-risk susceptible individuals. Treatment and prophylaxis will generally be delayed until species results are available; however, treatment and/or prophylaxis may be indicated prior to speciation in some situations (e.g., young infant, pregnant woman in the 3rd trimester, immunosuppressed individual). Those decisions will be made on a case-by-case basis.**
- Confirmed, probable and PCR positive suspect cases (refer to case definitions below) of pertussis should be treated with an antimicrobial agent. Treat persons aged >1 year within 3 weeks of cough onset and infants aged ≤1 year within 6 weeks of cough onset. Antimicrobials given during the catarrhal stage may reduce duration and severity of signs and symptoms. Antimicrobials given during the paroxysmal stage may have no effect on the course of illness but are recommended to limit transmission to others. Initiating treatment more than 3 weeks after onset of cough in those > 1 year is unlikely to be beneficial but may be considered in situations where there is ongoing contact with an infant or a pregnant woman in the third trimester.
- Treatment of PCR negative suspect cases (refer to case definitions below) of pertussis may be indicated based on clinical and epidemiologic data related to the case. Consult with the Epidemiology and Response Division (505.827.0006) for these circumstances.
- The treatment and chemoprophylaxis regimens for pertussis are the same (see Appendix B at the end of this chapter).
- Infantile hypertrophic pyloric stenosis (IHPS) has been reported in neonates following the use of erythromycin (see MMWR 1999;48:1117-1120). IHPS is hypertrophy of the pyloric muscle that usually results in non-bilious projectile vomiting. Although the risk of IHPS is likely to be low, azithromycin is recommended for infants < 1 month. If azithromycin is not available and erythromycin is used, the healthcare provider should counsel parents about possible risks of IHPS.
- If a person is allergic to macrolides or has poor tolerance to them, trimethoprim-sulfamethoxazole (TMP-SMZ) is an effective alternative. TMP-SMZ is contraindicated for infants less than 2 months or for pregnant women and nursing mothers. See Appendix B at the end of this chapter for recommended dosage.

Surveillance

Clinical Case Definition: A cough illness lasting ≥2 weeks with at least one of the following: paroxysms of coughing, inspiratory "whoop," and/or posttussive vomiting.

***Confirmed case*:**

- An acute cough illness of any duration, with isolation of *B. pertussis* from a culture specimen; ***OR***
- A case that meets the clinical case definition and is confirmed by PCR; ***OR***
- A case that meets the clinical definition and is epidemiologically linked directly to a laboratory-confirmed case.

***Probable case*:** A case that meets the clinical case definition, is not laboratory-confirmed by culture or PCR (this includes if testing not done or testing negative) and is not epidemiologically linked directly to a laboratory-confirmed case.

***Suspect case*:**

- A PCR positive case exhibiting a cough illness who does not meet the clinical case definition for pertussis; ***OR***
- Any case with an equivocal PCR, positive smear DFA, or positive serology result exhibiting a cough illness who does not meet the clinical case definition for pertussis; ***OR***
- A contact to a confirmed or probable case exhibiting a cough illness but who does not meet the clinical case definition for pertussis.

Reporting:

Report all confirmed, probable and suspect cases of pertussis immediately (24/7/365) to the Epidemiology and Response Division (ERD) at 505-827-0006. Required information includes: patient's name, age, sex, race, ethnicity, home address, home phone number, occupation and healthcare provider. Enter case into New Mexico-Electronic Disease Surveillance System (NM-EDSS) or call (505-827-0006) or FAX (505-827-0013) information as soon as it is available.

Case Investigation:

Use the Pertussis Investigation Form to complete your investigation. Enter information collected during investigation into NM-EDSS per established procedures.

Control Measures

1. Case management
   - 1.1. Isolation: Confirmed, probable or PCR positive suspect cases of pertussis should remain in isolation (household contact only) until 5 days of appropriate antimicrobial therapy have been completed, except when the non-infant case has been coughing for > 3 weeks or the infant case has been coughing for > 6 weeks.
     - 1.1.a For hospitalized patients, droplet precautions should be used until 5 days of appropriate antibiotic therapy has been completed.

1.2. Prophylaxis: Not applicable.

2. Surveillance activities for pertussis evaluation:
   - Interview case using pertussis case report form and enter information into NM-EDSS.
   - Identify high-risk close contacts and, if asymptomatic, assure prophylaxis as indicated, or refer to healthcare provider (see below).
   - Test, isolate and treat symptomatic contacts presumptively if pertussis a likely diagnosis and determine if those contacts meet pertussis clinical case definition.
   - Contact the institution (e.g., child care facility, school, or workplace) where case and symptomatic contacts are located.

3. Contact management

   3.1. Close contact is defined as follows:
   - Direct contact with respiratory, oral, or nasal secretions (e.g., cough or sneeze in the face, kissing, mouth-to-mouth resuscitation, performing a full examination of the nose and throat)
   - Shared confined space in close proximity for a minimum of ≥1 consecutive hour with a symptomatic case

   3.1.1 **High-risk close contacts** are:
   - Infants (<1 year old)
   - Pregnant women in the third trimester of pregnancy
   - Household members. Household members are defined as persons living in the primary household of a case >50% of the time during the case's infectious period as measured in days. The days need not be consecutive. The following would not be considered a household member:
     - A relative or friend who spent <50% of the infectious period measured in days with the case

   3.2. Isolation: **Symptomatic** (i.e., cough illness) close contacts of confirmed, probable or PCR positive suspect cases of pertussis should remain in isolation until 5 days of appropriate antibiotic therapy have been completed or negative PCR results and clinical findings suggest an alternative diagnosis.

   3.3. Prophylaxis:

   3.3.a The following **close contacts** of confirmed, probable and PCR positive suspect cases of pertussis require chemoprophylaxis, regardless of their vaccination status:
   - Infants (< 1year old)
   - Pregnant women in the third trimester of pregnancy
   - Household members
   - All those attending or working in a childcare setting (e.g., same infant room or same classroom) of a case **IF** there is an infant or a woman in the third trimester of pregnancy in the setting

   3.3.b Other close contacts who require chemoprophylaxis if exposed include:
   - Healthcare providers who provide direct care for infants or pregnant women (e.g., OB/GYNs, pediatricians, family practice physicians, nurse practitioners and physician assistants, nurses, medical assistants, emergency room, EMS personnel)

- Other contacts at the discretion of the Regional Health Officer or Epidemiology and Response Division (e.g., close contacts who are vaccine exemptors, other pregnant women)

Prophylaxis should be recommended for the contacts listed above who have been exposed within 21 days (1 maximum incubation period).

Note: Data supporting the use of antimicrobials to prevent secondary cases are weak. Over-reliance on antimicrobials for pertussis post-exposure prophylaxis can provide a false sense of security. Prophylaxis of contacts does not replace the need for ongoing surveillance. Monitor all settings where confirmed and probable cases have been identified for additional cases for 21 days after last contact with a case.

3.3.b If a symptomatic contact is identified, that symptomatic person needs to be evaluated for pertussis. If s/he meets the pertussis case definition, a case report form needs to be completed, the case needs to be entered in NM-EDSS, high-risk and household contacts need to be identified, evaluated, and receive prophylaxis as indicated. Ongoing surveillance of the household for secondary cases is necessary for a minimum of 21 days following the case's last day of antimicrobials or 21 days after the last day the case was believed to be infectious in situations where antibiotics were not prescribed.

3.3.c Assess the vaccination status of all contacts. Exposed children less than 7 years of age who have received their third dose of DTaP 6 months or more before exposure to pertussis should be given a 4th dose. Children less than 7 years of age who received all four primary doses before their fourth birthday should receive a fifth (booster) dose of DTaP before entering school. Persons 7-9 years of age who have not been fully vaccinated against pertussis should receive Tdap. Those 10 years of age or older who have not received Tdap should get it. There is no need to observe any minimum interval between doses of Td and Tdap. It is preferred that pregnant women who have not previously received Tdap be vaccinated with Tdap during the late 2nd or 3rd trimester ($\geq$ 20 weeks gestation) to prevent infant pertussis. Alternatively, if not administered during pregnancy, Tdap should be administered immediately postpartum. Also, all adults should have documentation of one dose of Tdap. If adults have not received one dose of Tdap, they should receive it as soon as possible, particularly those who will have contact with infants.

4. Prevention

4.1. Immunization: There are currently two licensed pertussis vaccines in the U.S. They are acellular vaccines combined with diphtheria and tetanus toxoids. 1) DTaP for pediatric use (children under 7); 2) Tdap (adolescent & adult formulations).

4.2. DTaP is the recommended vaccine for use in infants and children up to 7 years of age. The vaccine efficacy for disease prevention is 70-90% after completion of a four dose series. For more information about vaccines, see the NMDOH Immunization Program website at: http://www.health.state.nm.us/immunize/.

Management of Pertussis in Child Care Centers

1. When a case of pertussis is reported in an attendee or staff member at a child care facility, the following recommendations apply:

1.1. Consult with the Epidemiology and Response Division or the Public Health Division Regional Health Officer regarding the case.

1.2. Notify the child care director that a case has occurred and provide education about disease transmission and prevention.

1.3. Conduct surveillance at the facility.

1.4. If symptomatic contacts are identified, refer them to a healthcare provider or, if they have no access to healthcare services, refer them to their local public health office for consultation and potential evaluation. If a symptomatic contact meets the clinical case definition, consider laboratory testing for pertussis, identify their high-risk contacts for prophylaxis, and isolate the case until 5 days of an appropriate antibiotic have been completed.

1.5. Any confirmed, probable or PCR positive suspect cases of pertussis and any symptomatic contacts should be excluded until completion of 5 days of appropriate antibiotics.

1.6. Consider excluding the following individuals for 21 days after their last exposure to a case: asymptomatic high-risk contacts who refuse antimicrobials; vaccine exemptors; contacts who are not up to date with pertussis vaccination. These situations will be considered on a case-by-case basis.

1.7. Monitor the day care center for additional cases for 21 days after the last contact with the known case(s).

2. Consult with the Regional Health Officer and Epidemiology and Response Division if the school requests assistance sending a letter of notification and educational fact sheet to attendees' families and/or school staffs.

3. Assess the vaccination status of all contacts and attendees in the same setting. Exposed children less than 7 years of age who have received their third dose of DTaP 6 months or more before exposure to pertussis should be given a 4th dose. Children less than 7 years of age who received all four primary doses before their fourth birthday should receive a fifth (booster) dose of DTaP before entering school. Persons 7-9 years of age who have not been fully vaccinated against pertussis should receive Tdap. Those 10 years of age or older who have not received Tdap should get it. There is no need to observe any minimum interval between doses of Td and Tdap. It is preferred that pregnant women who have not previously received Tdap be vaccinated with Tdap during the late 2nd or 3rd trimester ($\geq$ 20 weeks gestation) to prevent infant pertussis. Alternatively, if not administered during pregnancy, Tdap should be administered immediately postpartum. Also, all adults should have documentation of one dose of Tdap. If adults have not received one dose of Tdap, they should receive it as soon as possible, particularly those who will have contact with infants.

4. If an outbreak is identified or suspected, consult with Regional Health Officer, the Epidemiology and Response Division and the child care owner/operator.

5. Focus prophylaxis efforts on high-risk close contacts.

Management of Pertussis in a School

1. When a case of pertussis is reported in a school, regardless of whether the school is private or public, contact the school nurse and provide the following recommendations:

1.1. Consult with the Epidemiology and Response Division or the Regional Health Officer regarding the case.

1.2. Inform the principal, teacher(s), and appropriate staff.

1.3. Elicit the school nurses' assistance in identifying high-risk close contacts of the case, vaccine exemptors, and those not up to date with pertussis vaccination.

1.4. Conduct surveillance at the facility.

1.5. If symptomatic contacts are identified, refer them to a healthcare provider or, if they have no access to healthcare services, refer them to their local public health office for consultation and possible evaluation. If a symptomatic contact meets the clinical case definition, consider laboratory testing for pertussis, identify their high-risk contacts for prophylaxis, and isolate the case until 5 days of an appropriate antibiotic have been completed.

1.6. **Any confirmed, probable or PCR positive suspect cases of pertussis and any symptomatic contacts should be excluded until completion of 5 days of appropriate antibiotics.**

1.7. Consider excluding the following individuals for 21 days after their last exposure to a case: asymptomatic high-risk contacts who refuse antimicrobials; vaccine exemptors; or contacts who are not up to date with pertussis vaccination. These situations will be considered on a case-by-case basis.

1.8. Monitor the school for additional cases for 21 days after the last contact with the known case(s).

1.9. Provide education to staff, students and parents about the clinical presentation, disease transmission, incubation period, prophylaxis and/or treatment.

2. Consult with the Regional Health Officer and Epidemiology and Response Division if the school requests assistance sending a letter of notification and educational fact sheet to attendees' families and/or school staffs.
3. If a case attends several classes or group activities at the school, then the school nurse should identify high-risk contacts for prophylaxis in every setting where contact occurred with the case and should report any student with paroxysmal cough of any duration or any student with non-paroxysmal cough illness of $\geq$ 7 days duration.
4. Assess the vaccination status of all contacts and students in the same setting. Exposed children less than 7 years of age who have received their third dose of DTaP 6 months or more before exposure to pertussis should be given a 4th dose. Children less than 7 years of age who received all four primary doses before their fourth birthday should receive a fifth (booster) dose of DTaP before entering school. Persons 7-9 years of age who have not been fully vaccinated against pertussis should receive Tdap. Those 10 years of age or older who have not received Tdap should get it. There is no need to observe any minimum interval between doses of Td and Tdap. It is preferred that pregnant women who have not previously received Tdap be vaccinated with Tdap during the late 2nd or 3rd trimester ($\geq$ 20 weeks gestation) to prevent infant pertussis. Alternatively, if not administered during pregnancy, Tdap should be administered immediately postpartum. Also, all adults should have documentation of one dose of Tdap. If adults have not received one dose of Tdap, they should receive it as soon as possible, particularly those who will have contact with infants.
5. If an outbreak is identified or suspected, consult with Regional Health Officer, the Epidemiology and Response Division and School Officials.
6. Focus prophylaxis efforts on high-risk close contacts.

Appendices

- Appendix A. – New Mexico Department of Health - Scientific Laboratory Division (SLD), *Bordetella pertussis* (Whooping cough) Specimen Collection Procedure for PCR Testing
- Appendix B – Pertussis Treatment Recommendations

References

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Appendix A

New Mexico Department of Health - Scientific Laboratory Division (SLD)

Bordetella pertussis (Whooping cough) Specimen Collection Procedure for PCR Testing

Healthcare providers considering pertussis testing through SLD directly should call the infectious disease epidemiology on-call service (available 24/7/365 at [505] 827-0006) to expedite testing. Tests approved by an on-call epidemiologist will be processed by SLD at no cost.

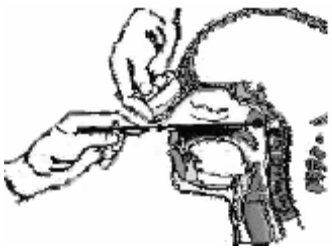
If the test ordered has been pre-approved by the infectious disease epidemiology on-call service, the submitter must write "pre-approved" in the upper right hand corner of the SLD General Clinical Request Form.

Kit includes: This instruction sheet, SLD's General Clinical Request Form, nasopharyngeal (NP) swab in plastic tube for real-time PCR, plastic bag. This kit may be kept at room temperature as there are no temperature requirements for the uninoculated swab.

Wear gloves and a mask while collecting specimens to minimize risk of exposure to respiratory secretions.

A. **Obtain a nasopharyngeal specimen as follows**:
   - Immobilize the patient's head.
   - Gently insert a thin Rayon/Nylon NP swab into a nostril until the **posterior nasopharynx** is reached.
   - Leave the swab in place for up to 10 seconds. This procedure may induce coughing and tearing.
   - Remove and repeat procedure on the opposite nostril. It is important to obtain sample from **both** nostrils, as in some instances one nostril may be negative whereas the other is positive for pertussis.
   - If resistance is encountered during insertion of the swab, remove it and attempt insertion on the opposite nostril.
   - Remove the swab slowly.

OR



   - **Immediately** replace the swab back into the plastic tube.
   - Label the swab's plastic tube with the patient's name and DOB. A preprinted label would be preferable.

B. Completely fill out SLD's General Clinical Request Form with:
   - Submitter name and address
   - Patient name
   - Sex
   - DOB

- Clinician name and phone number
- Date/time collected
- Indicate specimen source (Nasopharyngeal swab)
- Indicate test request (Pertussis, (*Bordetella* spp.)).

C. Place the properly labeled 1) plastic tube with inoculated swab and 2) completed General Clinical Request Form into the plastic bag provided. Send immediately to SLD.

- The inoculated swab can be refrigerated, but if there will be a delay in transport of more than two hours, please place the bag in the **freezer**
- When ready to transport, please send to SLD **on an ice pack.**

D. Rejections

- Samples not received on an ice pack will be rejected.
- Please note that the PCR is able to detect and evaluate specimen quality. SLD will reject specimens where the swab is insufficiently inoculated. Please ensure that your staff follows the instructions described above.
- SLD will only accept swabs that are nasopharyngeal (NP) swabs made of synthetic materials and in dry plastic containers. Swabs made of calcium alginate or cotton are not acceptable. Swabs in paper sleeves will also be rejected. See pictures above for two appropriate types of NP swabs.
- SLD will reject swabs collected as Nasal swabs as opposed to Nasopharyngeal swabs due to the increased chance of obtaining a false negative from a nasal swab.

E. Kits

- The kit can be ordered as usual through SLD's Specimen Receiving section by faxing Specimen Receiving at 505-383-9062 (ATTN: Kit Prep on the fax sheet).
- Questions on *Bordetella* testing can be directed to the Molecular Biology Section – 505-383-9130 or 383-9132.

Appendix B

Dosing Guidelines for Treatment and Chemoprophylaxis of Pertussis*

TABLE 4. Recommended antimicrobial treatment and postexposure prophylaxis for pertussis, by age group

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

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

* Taken from Recommended Antimicrobial Agents for Treatment and Postexposure Prophylaxis of Pertussis 2005 CDC Guidelines. MMWR Dec. 9, 2005/Vol. 54/No. RR-14

- Note that the duration of therapy varies by agent.
- Azithromycin and clarithromycin are better tolerated than erythromycin. Erythromycin frequently causes gastrointestinal disturbances (anorexia, nausea, vomiting, diarrhea).
- Assess patient medication allergies and potential for drug interactions before selecting agent. Any questions should be discussed with the Regional Health Officer, and/or the patient's health care provider, or Epidemiology and Response Division staff.
- For pregnant woman, the antimicrobial of choice is erythromycin or azithromycin. Both erythromycin and azithromycin are categorized as pregnancy Class B. There is limited evidence regarding macrolide safety during pregnancy. However, erythromycin and azithromycin have been widely used during pregnancy without evidence of adverse birth outcomes. Clarithromycin should not be used in pregnant women except in clinical circumstances where no alternative therapy is appropriate and the potential benefit justifies the potential risk to the fetus.
- TMP-SMZ should not be administered to pregnant women or nursing mothers.
- Ampicillin, amoxicillin, and cephalosporins are not suitable for the treatment or chemoprophylaxis of pertussis. In addition, due to their potential harmful side effects in children, tetracyclines and flouroquinolones are also not recommended.
- To convert from pounds (lbs) to kilograms (kg) – Divide weight in lbs by 2.2 (e.g. 25 lbs = 25/2.2= 11.4 kg)

What is pertussis?

Pertussis or whooping cough is a disease of the nose and throat caused by the bacterium *Bordetella pertussis*.

What are the symptoms of pertussis infection?

Symptoms usually appear 4 to 21 days after exposure to someone with the illness. The symptoms of pertussis occur in 3 stages.

- The **first stage** begins like a cold, with a runny nose, sneezing, mild fever and cough. The cough may be mild at first but soon gets worse.
- The **second stage** includes uncontrolled coughing or coughing spasms followed by a whooping noise when the person breathes in air. During these severe coughing spells, a person may vomit, or their lips or face may look blue from a lack of oxygen. The infected person may appear well between coughing spells. This stage may last several weeks.
- The **third stage** is the last stage where the cough slowly begins to disappear. This stage may also last for several weeks.

How is pertussis spread?

The bacterium that causes pertussis is found in the nose and throat of infected people. These bacteria spread through the air in droplets produced when an infected person sneezes and/or coughs. Persons in the early stage of illness are the most contagious.

How long are people contagious?

After 5 days of the proper antibiotics, people are no longer contagious. If a person does not take antibiotics, s/he is contagious for 21 days after the onset of the coughing spasms.

Who gets pertussis?

Pertussis can occur at any age, but vaccination lowers the risk. It most commonly occurs in very young children who have not been vaccinated. Older children and adults may also get pertussis, but usually a milder form of the illness.

What treatment is available for people with pertussis?

Antibiotics will shorten the length of time the person is contagious or the length of time the illness can be spread. If started in the early stage of the disease, antibiotics may make the illness less severe. However, even with the antibiotics, people may cough for many weeks.

Do infected people need to be kept home from school, work or daycare?

Persons sick with a cough should be kept home until they have been treated with antibiotics for at least five days and are well enough to return to school, work or daycare.

How can I protect myself and my family from getting pertussis?

- If you are a household member or high-risk close contact of a person with pertussis, take the proper preventive antibiotics.
- Keep your children up to date on their vaccinations; pertussis vaccine is given at 2, 4, 6, and 15 months of age and when a child enters school. Persons 11-18 years of age should receive a single booster dose of pertussis vaccine, preferably at 11-12 years of age.
- Adults may also receive a single booster dose of pertussis vaccine if they have not previously had a booster.
- Keep infants away from people who are sick. Cover your cough and wash your hands frequently if you are coughing or sneezing. See your healthcare provider right away if you develop symptoms.

¿Qué es la tos ferina?
La tos ferina es una enfermedad de la nariz y la garganta causada por el bacteria *Bordetella pertussis*.

¿Cuáles son los síntomas de la tos ferina?
Los síntomas normalmente aparecen de 4 a 21 días después de haber estado expuesto a alguien con la enfermedad. Los síntomas ocurren en tres fases.

- La **primera fase** empieza como un resfriado, con nariz mocosa, estornudos, fiebre moderada y tos. La tos dura de una a dos semanas y después empeora.
- La **segunda fase** incluye ataques de tos sin control seguidos de un ruido parecido al de un silbido cuando la persona toma aire. Durante estos episodios graves de tos, la persona puede vomitar o puede que su cara o labios se vuelvan azules por falta oxígeno. Es posible que la persona infectada parezca estar bien entre estos episodios de tos. Esta fase dura para muchas semanas.
- La **tercera fase** es la última fase en la que los síntomas empiezan a desaparecer. Esta fase puede durar para muchas semanas también.

¿Cómo se transmite la tos ferina?
La bacteria que causa la tos ferina se encuentra en la nariz y la garganta de las personas infectadas. Estos gérmenes se transmiten a través de las gotitas que expulsa al aire la persona infectada al toser o estornudar. Las personas que están en el inicio de la enfermedad son las más contagiosas.

¿Por cuánto tiempo puede una persona con tos ferina contagiar a otros?
Después de 5 días tomando los antibióticos necesarios, la persona deja de ser contagiosa. Si una persona no toma antibióticos, puede contagiar a otros por 21 días después de que hayan aparecido los ataques de tos.

¿Quién puede contraer tos ferina?
La tos ferina puede ocurrir a cualquier edad, pero la vacunación disminuye el riesgo. Ocurre con más frecuencia en niños muy pequeños que no están vacunados. Los niños mayores y adultos también pueden contraer la tos ferina, pero la enfermedad se da de forma más leve.

¿Cómo se trata la tos ferina?
Los antibióticos pueden reducir el tiempo en que una persona es contagiosa, es decir, en que la enfermedad se puede transmitir a otros. Si se empieza el tratamiento al inicio de la enfermedad, los antibióticos *pueden* ayudar a que la enfermedad sea menos grave. Sin embargo, incluso con antibióticos, las personas pueden tener tos por muchas semanas.

¿Es necesario quedarse en casa y no ir a la escuela, a la guardería o al trabajo?
Los antibióticos pueden reducir el tiempo en que la enfermedad es contagiosa. Las personas enfermas deben quedarse en casa hasta que hayan recibido tratamiento con antibióticos por al menos cinco días y se encuentren bien para regresar a la escuela, a la guardería o al trabajo.

¿Cómo puedo protegerme yo y proteger a mi familia contra la tos ferina?

- Reciba el tratamiento preventivo con antibióticos si usted vive en la misma casa o es una persona que tiene contacto cercano con la persona enferma, incluso si está vacunado.
- Tenga al corriente las vacunas de sus niños. La vacuna de la tos ferina se recibe a los 2, 4, 6 y 15 meses de edad, también se recibe al empezar a la escuela por primera vez. Las personas de 11 a 18 años deben recibir una dosis de refuerzo, lo mejor sería a los 11-12 años de edad.
- Los adultos también pueden recibir una dosis de refuerzo de la vacuna contra la tos ferina, si no han recibido este refuerzo antes.
- Los niños no deben acercarse a los enfermos. Tape la boca antes de toser. Lave las manos después de toser o estornudar. Busca al médico si tiene síntomas de tos ferina.