Pertussis

Summary

Pertussis, or whooping cough, is a communicable respiratory disease which can cause severe illness, complications, and even death, particularly in infants <6 months of age. Neither infection nor vaccination confer lifelong immunity. Adolescents and adults, even 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, including *B. parapertussis* (see **Appendix C** below for recommendations), *B. holmesii*, and *B. bronchiseptica,* are also occasionally associated with respiratory disease in humans.

Transmission

Reservoir**:**

Humans.

Mode of transmission:

- Pertussis is transmitted person to person by direct contact with respiratory secretions or via respiratory droplets produced from coughing, sneezing, or talking face-to-face with infectious individuals.

Period of communicability:

- Pertussis is highly contagious. Persons with pertussis are infectious from the beginning of the catarrhal stage (about 2 weeks before cough onset) through the third week (21 days) after cough onset, or until five days after the start 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 or fits of severe coughing (paroxysms) lasting 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. Paroxysmal (approximately 1-6 weeks which may extend to 10 weeks): Spasms of cough that may end with a gasp, inspiratory “whoop” sound, and/or vomiting (post-tussive emesis). Infants, however, may lack paroxysmal cough or whoop, and instead may present

with poor feeding, gasping or gagging, bradycardia, apnea, and/or cyanosis. Adolescents and adults may have prolonged cough with spasms, with or without whoop or post-tussive emesis.

3. Convalescent (approximately 2-3 or more weeks): Gradual resolution of paroxysmal coughing.

Infection from *B. parapertussis* resembles whooping cough, although the illness is usually milder and of shorter duration (thought to be due to the lack of pertussis toxin in the bacteria). Differentiation between pertussis and parapertussis is based on isolation of the bacteria in culture or through polymerase chain reaction (PCR) identification. Some types of respiratory panels may have limited or no ability to differentiate between *Bordetella* species, but these specimens are sometimes still able to be speciated at SLD. Co-infections of *B. pertussis* with *B. parapertussis, B. holmesii*, or *B. bronchiseptica* species have been reported. Neither previous infection with pertussis nor the pertussis vaccine (DTP, DTaP, or Tdap) provides cross-protection against these other *Bordetella* species.

Complications

Disease is most severe in infants younger than 6 months of life, particularly in preterm and unimmunized infants. Infants are also at the highest risk for complications, including pneumonia, seizures, encephalopathy, hypoxia, conjunctival bleeding, and death. From 2016-2020, an average of 42% of US pertussis cases younger than 6 months old were hospitalized (and an average of 12% of infants aged 6-11 months). Of the 37 pertussis deaths during that time period, 26 (70%) occurred in infants younger than 1 year.

Complications more commonly seen among adolescents and adults include syncope (fainting, which can result in injury), weight loss, sleep disturbance, incontinence, and rib fractures.

Laboratory Diagnosis

Laboratory methods may differ depending on individual laboratory capabilities. Pertussis testing at New Mexico State Laboratory Division (SLD) is not free. There is a charge for pertussis tests performed at SLD except in cases where the submitter is a NMDOH public health office or when prior arrangements through the Emergency Response Division (ERD) have been made.

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: https://nmhealth.org/about/sld/ 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 up to 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 (EPS). Culture specimen collection and submission to SLD should be coordinated with the ERD pertussis epidemiologist and the SLD General Microbiology Supervisor. Culture specimens require special collection kits, culture plates, and a monitored incubator; isolation is most successful on specimens collected within two weeks of onset. (Contact ERD 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**.)

Laboratory testing at Commercial or Reference Laboratories:

- PCR testing for pertussis is widely available; culture is also available but rarely ordered by providers due to the narrow window for collection and lengthy time to results.
- PCR tests for pertussis/parapertussis are increasingly included on commercially-available respiratory panels (such as BioFire). These assays are typically done on specimens in viral or universal transport media, may or may not be able to distinguish between *Bordetella* species, and the ordering provider may not have had any clinical suspicion for pertussis specifically.
- 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, hence it is no longer recommended. 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 widely available in commercial laboratories. However (with the exception of a test available only at CDC), these tests have not been validated or standardized, and are not currently recommended for diagnostic purposes. For updates on validation of commercial assays visit: https://www.cdc.gov/pertussis/clinical/diagnostic-testing/diagnosis-confirmation.html.

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 person). Those decisions will be made on a case-by-case basis.
- Confirmed or probable cases (refer to case definitions below) of pertussis should be treated with an appropriate antimicrobial agent if it has been ≤21 days since cough onset. The treatment and chemoprophylaxis regimens for pertussis are the same (see **Appendix B**).
- Antimicrobials given during the catarrhal stage may reduce duration and severity of signs and symptoms. Antimicrobials given during the paroxysmal stage will likely have no effect on the course of illness, but are still recommended to kill the remaining bacteria and reduce the infectious period.

Surveillance

Case Definition (2020):

Clinical Case Definition **-** In the absence of a more likely diagnosis, a cough illness lasting ≥2 weeks with at least one of the following signs or symptoms:

- Paroxysms of coughing
- Inspiratory "whoop"
- Post-tussive vomiting
- Apnea (with or without cyanosis)

Confirmed

An acute cough illness of any duration, with

- Isolation of *B. pertussis* from a clinical specimen; or
- PCR positive for *B. pertussis*

Probable

In the absence of a more likely diagnosis,

- Illness meeting the clinical criteria **or**
- Illness with cough of any duration, with at least one of the signs listed in the clinical criteria above **and** contact with a laboratory-confirmed case (i.e., epidemiologic linkage)

Note: There is no national surveillance case definition for parapertussis or other non-pertussis *Bordetella* species. In New Mexico, cases that are confirmed by culture or PCR to be one of these other species, regardless of symptoms, are classified as Not a Case in NMEDSS. Cases that are not laboratory-confirmed to be any *Bordetella* species, and do not meet the clinical criteria for a Probable pertussis case (i.e., are not a case of pertussis or *Bordetella* at all), are classified as Suspect in NMEDSS. This protocol is specific to New Mexico and how NMDOH currently counts non-pertussis *Bordetella* cases. CDC is aware of this protocol as an aspect of New Mexico's participation in the Enhanced Pertussis Surveillance network.

Reporting:

Report all confirmed, probable and suspected 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 (NMEDSS) or Fax (505-827-0013) information as soon as it is available.

Case Investigation:

Regional public health nurses are typically assigned pertussis (and non-pertussis *Bordetella*) cases for investigation. If an infant case is identified or reported outside of business hours, the medical epidemiologist on call will typically begin the investigation and ensure the infant is under clinical care. Use the Pertussis Investigation Form to complete the investigation; all fields within this form are considered to be required fields. Enter information collected during investigation into NMEDSS per established procedures.

Control Measures

1. Case management:

1.1. Isolation: Confirmed and probable cases of pertussis should remain in isolation at home until five days of appropriate antimicrobial therapy have been completed, or until 21 days have elapsed since cough onset, whichever is first.

1.1.a Hospitalized patients should be on droplet precautions during this time.

1.2. Surveillance activities for pertussis evaluation:

1.2.a Interview case using pertussis case report form and enter information into NMEDSS.

1.2.b Identify high-risk close contacts and, if asymptomatic, assure prophylaxis as indicated, or if symptomatic, refer to healthcare provider (see below).

1.2.c Test, isolate, and treat symptomatic contacts presumptively if pertussis is a likely diagnosis and determine if those contacts meet pertussis clinical case definition.

1.2.d Contact the institution (e.g., childcare facility, school, or workplace) where case and symptomatic contacts are located.

2. Contact management

2.1. Close contact is defined as follows:

2.1.a Direct contact with the respiratory, oral, or nasal secretions of an infectious case (e.g., cough or sneeze in the face, kissing, mouth-to-mouth resuscitation, performing a full examination of the nose and throat)

2.1.b Shared confined space in close proximity (3-6 feet) for at least one hour with a symptomatic case

2.2. Close contacts at high risk for severe disease include:

2.2.a Infants (<1 year old)

2.2.b Pregnant women in the third trimester of pregnancy

2.2.c Individuals with pre-existing health conditions that may be exacerbated by pertussis, such as immunocompromising/immunosuppressing conditions or chronic lung conditions (including, but not limited to, moderate to severe medically-treated asthma and COPD)

2.3. Isolation/Quarantine of Contacts:

2.3.a Symptomatic (i.e., those with cough illness) close contacts of confirmed or probable cases of pertussis should remain in isolation until five days of appropriate antibiotic therapy have been completed, or negative PCR results and clinical findings suggest an alternative diagnosis.

2.3.a.1 If pertussis is the confirmed or probable diagnosis for a symptomatic contact, the contact should be investigated as a case and entered into NMEDSS as such.

2.3.b Asymptomatic close contacts may continue working/attending school while completing PEP, as long as they remain asymptomatic.

2.3.c Asymptomatic close contacts who refuse PEP should avoid contact with people at high risk for severe pertussis for 21 days from exposure, and monitor for signs and symptoms during that time.

2.4. Prophylaxis:

2.4.a. The following close contacts of confirmed or probable cases of pertussis should receive chemoprophylaxis within 21 days of exposure to an infectious case, regardless of their own vaccination status:

- All household members
- Infants (<1 year old)
- Pregnant women in the third trimester of pregnancy
- Individuals with pre-existing health conditions that may be exacerbated by pertussis, such as immunocompromising/immunosuppressing conditions or chronic lung conditions (including, but not limited to, moderate to severe medically-treated asthma and COPD)
- People who have close contact with people at high risk, or who live/work in settings that include people at high risk (e.g., neonatal intensive care unit (NICU), childcare settings, maternity wards, etc.)
- Health care providers who provide direct care for infants or pregnant women (e.g., NICU workers, OB/GYNs, pediatricians, family practice physicians, nurse practitioners and physician assistants, nurses, medical assistants, emergency room, EMS personnel)

2.4.b. Chemoprophylaxis is not recommended for other close contacts who do not meet any of the criteria above unless special circumstances are identified. Mass prophylaxis (e.g., an entire classroom or bus) is usually not warranted except in special situations (e.g., small closed classroom with few students, or all contacts being in a high-risk category).

Multiple or extended rounds of antibiotics (e.g., from repeated exposures) are not recommended; if transmission continues and a person is exposed again after already completing PEP from an earlier exposure, the contact should instead be monitored for signs and symptoms for 21 days.

While PEP is beneficial in certain circumstances, it is not risk-free, and there are no data to indicate that widespread use of PEP effectively controls or limits the scope of pertussis outbreaks. Over-reliance on antimicrobials for pertussis post-exposure prophylaxis may provide a false sense of security, expose some people to side effects unnecessarily, and contribute to antibiotic resistance.

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.

2.4.c. Surveillance and Monitoring:

If a symptomatic contact is identified, that 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 NMEDSS, and high-risk and household contacts need to be identified, evaluated, and receive prophylaxis as indicated. Exposed households, schools, workplaces, etc. should be monitored for secondary cases for 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. Prevention

3.1. Immunization: There are currently two licensed pertussis vaccines in the US. They are acellular pertussis vaccines combined with diphtheria and tetanus toxoids. DTaP is recommended for pediatric use (children under seven years old), and is available alone or in combination with other pediatric vaccines (such as polio, Hib, and/or hepatitis B). Tdap is the adolescent & adult formulation.

3.1.a DTP (whole-cell pertussis vaccine with diphtheria and tetanus toxoids) was replaced by DTaP in the United States in 1997.

3.2. DTaP should be received as a 3-dose primary series at ages 2, 4, and 6 months, with booster doses at age 15-18 months and 4-6 years. If the 4th dose is given on or after the 4th birthday, the 5th dose is optional.

3.3. DTaP is the recommended vaccine for use in infants and children up to 7 years of age. The vaccine efficacy for disease prevention is 80-85% after completion of a 5-dose DTaP series, but wanes over time. (Efficacy estimates range from 98% within the year following the last dose, to about 71% five years after getting the last dose of DTaP.) For more information about vaccines, refer to the NMDOH Immunization Program website at: http://immunizenm.org.

3.4. Tdap should be used as a booster in adolescents and adults, and may also be used as a catch-up vaccine in individuals aged 8 years or older who did not complete their DTaP series.

3.4.a Adolescents aged 11-18 years who have completed their recommended childhood DTaP series should receive a booster of Tdap, preferably at age 11 or 12 years.

3.4.b Adults aged 19 years or older who have not previously received Tdap should receive a single dose of Tdap.

3.4.b.1 Tetanus/diphtheria toxoid boosters are recommended every 10 years; Tdap may optionally be used for these boosters.

3.4.c Pregnant women should receive one dose of Tdap during each pregnancy, ideally early in the 3rd trimester (27-36 weeks) to provide optimal protection to the newborn.

Management of *Pertussis* in Child Care Centers or Schools

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

1.1. Consult with the ERD at (505) 827-0006 (24/7/365) regarding the case.

1.2. Notify the childcare director (childcare center) or school nurse or principal (school) that a case has occurred and provide education about disease transmission and prevention.

1.3. Have the facility point-of-contact assist in identifying high-risk close contacts of the case. Remember that high-risk close contacts are recommended antimicrobial PEP regardless of vaccination status.

1.3.a If a case attends several classes or group activities at the school, then the school nurse (or other point of contact) should identify high-risk contacts for prophylaxis in every setting where contact occurred with the case, including extracurricular activities or the bus.

1.4. If symptomatic contacts are identified, refer them to a health care provider or, if they have no access to health care services, refer them to their local public health office for evaluation and testing if symptoms are consistent with pertussis. After a specimen has been collected for testing, the contact should isolate until five days of an appropriate antibiotic have been completed.

1.5. Any confirmed or probable cases of pertussis and any symptomatic contacts should be excluded until completion of five days of appropriate antibiotics.

1.6. Consider excluding asymptomatic high-risk contacts who refuse antimicrobials for 21 days after their last exposure to a case if they are in a high-risk setting (such as a worker interacting with infants). These situations will be considered on a case-by-case basis.

2. Consult with ERD if the school/facility requests assistance sending a letter of notification and educational fact sheet to students' families and/or staff.
3. Conduct active surveillance at the facility for one incubation period (21 days).
4. If an outbreak is identified or suspected, consult with ERD and the childcare director or school nurse/principal.
5. Focus prophylaxis efforts on high-risk and 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
- Appendix C. Parapertussis Case Management

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FDA Drug Safety Communication: Azithromycin (Zithromax or Zmax) and the risk of potentially fatal heart rhythms, March 12, 2013. Available at: https://www.fda.gov/drugs/drug-safety-and-availability/fda-drug-safety-communication-azithromycin-zithromax-or-zmax-and-risk-potentially-fatal-heart

See Whooping Cough (Pertussis) Fact Sheets (English) (Spanish).

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 ERD on-call service, the submitter must write "pre-approved" in the upper right-hand corner of the SLD General Clinical Request Form.

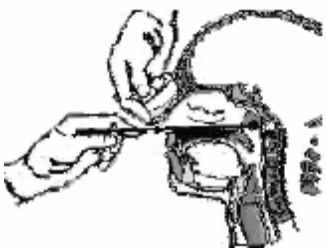
Kit includes: This instruction sheet, SLD's General Clinical Request Form, nasopharyngeal (NP) swab in plastic tube for real-time PCR, plastic bag. This kit may be kept at room temperature as there are no temperature requirements for the uninoculated swab.

Wear gloves, a mask and eye protection 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 3.44. Recommended Antimicrobial Therapy and Postexposure Prophylaxis for Pertussis in Infants, Children, Adolescents, and Adults[a]

	Recommended Drugs			Alternative
Age	Azithromycin	Erythromycin	Clarithromycin	TMP-SMX
Younger than 1 mo	10 mg/kg/day as a single dose daily for 5 days[b,c]	40 mg/kg/day in 4 divided doses for 14 days	Not recommended	Contraindicated at younger than 2 mo
1 through 5 mo	10 mg/kg/day as a single dose daily for 5 days[b]	40 mg/kg/day in 4 divided doses for 14 days	15 mg/kg/day in 2 divided doses for 7 days	2 mo or older: TMP, 8 mg/kg/day; SMX, 40 mg/kg/day in 2 doses for 14 days
6 mo or older and children	10 mg/kg as a single dose on day 1 (maximum 500 mg), then 5 mg/kg/day as a single dose on days 2 through 5 (maximum 250 mg/day)[b,d]	40 mg/kg/day in 4 divided doses for 7–14 days (maximum 2 g/day)	15 mg/kg/day in 2 divided doses for 7 days (maximum 1 g/day)	2 mo or older: TMP, 8 mg/kg/day; SMX, 40 mg/kg/day in 2 doses for 14 days
Adolescents and adults	500 mg as a single dose on day 1, then 250 mg as a single dose on days 2 through 5[b,d]	2 g/day in 4 divided doses for 7–14 days	1 g/day in 2 divided doses for 7 days	TMP, 320 mg/day; SMX, 1600 mg/day in 2 divided doses for 14 days

SMX indicates sulfamethoxazole; TMP, trimethoprim.
[a]Centers for Disease Control and Prevention. Recommended antimicrobial agents for the treatment and postexposure prophylaxis of pertussis: 2005 CDC guidelines. *MMWR Recomm Rep.* 2005;54(RR-14):1–16
[b]Azithromycin should be used with caution in people with prolonged QT interval and certain proarrhythmic conditions.
[c]Preferred macrolide for this age because of risk of idiopathic hypertrophic pyloric stenosis associated with erythromycin.
[d]A 3-day course of azithromycin for PEP or treatment has not been validated and is not recommended.

* Taken from Table 3.44, Recommended Antimicrobial Therapy and Postexposure Prophylaxis for Pertussis in Infants, Children, Adolescents, and Adults. American Academy of Pediatrics. In: Kimberlin DW, Barnett ED, Lynfield R, Sawyer MH, eds. *Red Book: 2021 Report of the Committee on Infectious Diseases*. 32nd ed. Itasca, IL: American Academy of Pediatrics; 2021:581.

Duration of therapy varies by agent.

- Azithromycin and clarithromycin are better tolerated than erythromycin. Erythromycin frequently causes gastrointestinal disturbances (anorexia, nausea, vomiting, and diarrhea).
- FDA issued a warning in 2013 that azithromycin can cause abnormal changes in the electrical activity of the heart that may lead to a potentially fatal irregular heart rhythm. For more information, visit https://www.fda.gov/drugs/drug-safety-and-availability/fda-drug-safety-communication-azithromycin-zithromax-or-zmax-and-risk-potentially-fatal-heart.
- Assess patient medication allergies and potential for drug interactions before selecting agent. Any questions should be discussed with the patient's health care provider or ERD.
- For pregnant women, 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 fluoroquinolones 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).

Appendix C

B. parapertussis and *B. holmesii* Case Management

Taken from Minnesota Department of Health's website:
(https://www.health.state.mn.us/diseases/pertussis/parapertussis.html)

Parapertussis and holmesii are diseases that affect the lungs. They are similar to pertussis (whooping cough) but less severe. Anyone of any age can get parapertussis or holmesii, and there is no vaccine for these diseases.

The symptoms of parapertussis and holmesii can be similar to a cold: sneezing, a runny nose, possibly low-grade fever, and a cough. After a week or two, the cough may become more severe and include:

- A cough that occurs in sudden, uncontrollable bursts.
- High-pitched whooping sounds when breathing in after a coughing episode.
- Vomiting after a coughing spell.

Persons with parapertussis or holmesii do not need to stay home from school, work, or other activities because the illness is relatively mild. However, it is important to still cover your cough and wash your hands to prevent the spread of germs to others.

These diseases can be treated with the same antibiotics as pertussis, but treatment may not cure the symptoms.

Preventive treatment is not generally recommended for contacts of people with parapertussis or holmesii. Preventive treatment may be considered for close contacts who are at a higher risk for more severe disease, including infants less than 6 months of age and immunocompromised people.

- Avoid close contact with others who are coughing or otherwise ill.
- Wash your hands often.
- Cover your coughs and sneezes with a tissue, or cough and sneeze into your sleeve.