



24-Hour Reportable Disease

The Disease and Its Epidemiology

A. Etiologic Agent

Pertussis is caused by the bacterium *Bordetella pertussis*. *B. pertussis* is an aerobic, gram-negative bacillus (short, thick rod), that is fastidious and requires special media for isolation.

B. Clinical Description

The duration of classic pertussis is 6 to 10 weeks; however, symptoms may last up to 3 months. The clinical course of illness is divided into three stages:

1. Catarrhal stage - characterized by the insidious onset of mild upper respiratory tract symptoms, such as nasal congestion, runny nose, mild sore throat, mild dry cough, and minimal or no fever. The cough gradually becomes more severe and after 1 to 2 weeks the next stage (paroxysmal stage) develops.
2. Paroxysmal stage - characterized by coughing fits (paroxysms), which may be followed by a crowing or high-pitched inspiratory whoop, vomiting, and/or apnea. This stage usually lasts 1 to 6 weeks, but may continue as long as 10 weeks.
 - ▶ Paroxysmal cough is sudden uncontrollable “spasms” or spells of coughing where one cough follows the next without a break for breathing. Paroxysmal episodes occur more frequently at night. The person usually appears relatively well between coughing fits.
 - ▶ Whoop is a high-pitched noise heard upon inhalation after a coughing spasm, due to a constricted airway.
 - ▶ Apnea is a period of not breathing, which may occur either after a coughing spasm or spontaneously, in an infant. Apnea may be the only symptom exhibited by young infants.
 - ▶ Post-tussive vomiting is vomiting that follows a paroxysm of coughing.
3. Convalescent stage - characterized by gradual recovery with fewer paroxysmal coughing episodes and cough usually disappears in 2 to 3 weeks, but may continue for months. During the recovery period, super imposed viral respiratory infections can trigger a reoccurrence of paroxysms. Paroxysms may recur with subsequent respiratory infections for many months after recovering from pertussis.

The clinical presentation of pertussis is variable and diagnosis challenging. Physicians should include pertussis in their differential diagnosis for patients in all age groups who present with a prolonged cough illness. Infants less than 6 months of age, vaccinated children, adolescents, and adults may *not* have the typical whoop or cough paroxysms. Apnea is a common manifestation in infants less than 6 months of age and may occur in the absence of a cough in this age group. Pertussis is most severe when it occurs during the first 6 months of life (particularly for preterm infants). Complications include pneumonia, seizures, encephalopathy, and death. Most deaths and severe disease occur in infants <6 months of age.

The differential diagnosis for pertussis includes infections due to parapertussis, mycoplasma, chlamydia, respiratory syncytial virus (RSV), and adenovirus.

C. Reservoirs

Humans are the only known host. Adolescents and adults are an important reservoir for *B. pertussis* and are often the source of infection for infants.

D. Modes of Transmission

Pertussis is transmitted person-to-person via the respiratory route. Transmission occurs through large aerosolized respiratory droplets or direct contact with secretions from the respiratory tract of infectious individuals. Indirect spread through contaminated fomites occurs rarely and is not considered a significant source of exposure for most pertussis cases.

A silent carrier state may exist but is not well documented and is probably of little importance in the transmission of pertussis since asymptomatic persons do not spread disease by coughing.

E. Incubation Period

The incubation period is usually 7 to 10 days (range of 4 to 21 days), and rarely may be as long as 42 days.

F. Period of Communicability or Infectious Period

Persons with pertussis are most infectious during the catarrhal (early) stage and continue being infectious during the first 21 days of cough if not treated with appropriate antibiotic. A pertussis case is no longer infectious after 5 days of treatment with an appropriate antibiotic.

See Disease Control Measures section above for appropriate antibiotics.

G. Epidemiology

Pertussis occurs worldwide. It remains endemic in the United States despite longstanding routine childhood pertussis vaccination. Pertussis is cyclical in nature with peaks occurring every 3 to 5 years. There is no distinct seasonality in the United States. It is highly infectious with secondary attack rates of 80% among susceptible household contacts.

Since the 1980s, there has been an increase in the number of reported cases of pertussis and on average, 10 to 20 deaths from pertussis each year in the US. The majority of deaths are in infants less than 3 months of age. In 2012, an epidemic year, 48,277 cases of pertussis were reported in the U.S and 18 reported pertussis deaths occurred, with 1,432 cases reported in Colorado.

In 2012 in the US, the highest rate of pertussis was in those <6 months of age, followed by those 7 to 10 years of age. In Colorado, the highest rate of pertussis was in those <6 months of age, followed by those 11 to 14 years of age. In 2012, 24% of Colorado's pertussis cases were between the ages of 11 and 14, compared to an average of 9% of cases during baseline years (2007-2011). Increased pertussis rates in Colorado in the 11 to 14 year old age group coincide with the first cohort of children receiving DTaP exclusively without any DTP primer. This reinforces the need for a routinely recommended booster dose of Tdap at age 11 or 12 years and for older adolescents and adults who have not previously received a dose of Tdap.

Colorado pertussis statistics are available on the CDPHE pertussis website:

<https://www.colorado.gov/cdphe/pertussis-data-and-statistics>

Case Definition

Clinical Case Definition

In the absence of a more likely diagnosis, a cough illness lasting ≥ 2 weeks and with at least one of the following symptoms:

- Paroxysms of coughing
- Inspiratory whoop

- Posttussive vomiting
- Apnea, with or without cyanosis (for infants <1 year only)

Case Classification

Confirmed:	<ul style="list-style-type: none"> • An acute cough illness of any duration, with isolation of <i>B. pertussis</i> from a clinical specimen, or • A case that meets the clinical case definition and is confirmed by polymerase chain reaction (PCR), or • A case that meets the clinical definition and is epidemiologically linked directly to a laboratory-confirmed case (culture or PCR lab confirmed)
Probable:	<ul style="list-style-type: none"> • A case that meets the clinical case definition only. • An infant (less than 12 months of age) with an acute cough illness of any duration (<14 days) with at least one clinically-relevant pertussis symptom (paroxysms of cough, whoop, posttussive vomiting, or apnea with or without cyanosis) AND confirmation by polymerase chain reaction (PCR) or direct epidemiologic linkage to a laboratory-confirmed case. • A case that meets the clinical case definition and has direct epidemiologic linkage with an infant <12 months who is PCR positive for pertussis and has ≥ 1 sign or symptom and cough duration <14 days (classified as ‘probable’ case). <p>Note: Positive direct fluorescent antibody (DFA) tests and positive serology tests do not meet the criteria for pertussis laboratory confirmation so cases diagnosed by DFA or serology are classified as PROBABLE cases if they meet the clinical case definition.</p>
Suspect:	Council for State and Territorial Epidemiologists (CSTE) no longer recognizes a suspect case definition; however CEDRS still has ‘suspect’ as a dropdown box option under case status for those health departments that want to track these cases that do not meet a confirmed or probable case status.
Outbreak:	Two or more cases involving two or more households clustered in time (e.g., occurring within 42 days of each other) and either epidemiologically-linked or sharing common space (e.g., in one building) where transmission is suspected to have occurred (e.g., a school). One case in an outbreak must be lab confirmed (PCR positive and meet case definition, or culture positive).

Reporting Criteria

What to Report to the Colorado Department of Public Health and Environment (CDPHE) or local health agency

- Confirmed and probable pertussis cases.
- Pertussis cases should be reported within 24 hours of a positive laboratory test or diagnosis (if no test is being performed).
- Cases should be reported using telephone, fax, or the Colorado Electronic Disease Reporting System (CEDRS) to CDPHE or local health departments. See below for phone and fax numbers.

Purpose of Surveillance and Reporting

- To identify cases for investigation.
- To identify sources and sites of transmission, and any additional cases.
- To identify exposed persons, assure timely administration of antimicrobial prophylaxis/treatment, and prevent further spread of the disease.
- To promptly identify clusters and potential outbreaks of disease.
- To monitor trends in disease incidence.
- To monitor vaccine coverage of at risk populations.

Important Telephone and Fax Numbers

CDPHE Communicable Disease Epidemiology Branch

- Phone: 303-692-2700 or 800-866-2759
- Fax: 303-782-0338
- After hours: 303-370-9395

CDPHE Microbiology laboratory: 303-692-3480

Communicable Disease (CD) Manual website: <https://www.colorado.gov/pacific/cdphe/communicable-disease-manual>

Pertussis webpage: <https://www.colorado.gov/cdphe/pertussis-whooping-cough>

State Laboratory Services

Laboratory Testing Recommendations

Culture

Pertussis culture has long been considered the “gold standard” for pertussis testing but since the organism can be difficult to isolate and results may take up to 10 days it has largely been replaced by rapid PCR testing.

PCR Testing

- PCR is the preferred test for diagnosing pertussis and is available through most commercial laboratories. PCR testing methodologies vary among laboratories and false positive results are not uncommon.
- A nasopharyngeal (NP) swab or aspirate should be obtained from all persons with suspected pertussis. See here for specimen collection instructions: <http://www.cdc.gov/pertussis/clinical/diagnostic-testing/specimen-collection.html>
- PCR has optimal sensitivity during the first 3 weeks of cough when bacterial DNA is still present in the nasopharynx. After the fourth week of cough, the amount of bacterial DNA rapidly diminishes which increases the risk of obtaining falsely-negative results.
- PCR testing following antibiotic therapy can result in falsely-negative findings. The exact duration of positivity following antibiotic use is not well understood, but PCR testing after 5 days of antibiotic use is unlikely to be of benefit and is generally not recommended.

For more information see the CDC Best Practices for Healthcare Providers on the Use of PCR for Diagnosing Pertussis at: <http://www.cdc.gov/pertussis/clinical/diagnostic-testing/specimen-collection.html>

Serology

- Serological testing for pertussis is not standardized; however, the Council for State and Territorial Epidemiologists (CSTE) is continuing to assess pertussis laboratory diagnostics to potentially include serology as a confirmatory test among all age groups. Presently it is not confirmatory.
- Commercially, there are several different serologic tests used in United States with unproven or unknown clinical accuracy. CDC is actively engaged in better understanding the usefulness of these commercially available assays. For more information about these commercial assays, please go to: <http://www.cdc.gov/pertussis/clinical/diagnostic-testing/diagnosis-confirmation.html#serology>.
- Serologic tests can be useful for diagnosis in later phases of the disease with optimal timing for specimen collection at 2 to 8 weeks following cough onset, when the antibody titers are at their highest. Serology may be performed on specimens collected up to 12 weeks following cough onset.

Direct Fluorescent Antibody (DFA)

DFA testing for pertussis has low sensitivity (false negative results) and variable specificity (false positive results). DFA is not recommended to test for pertussis.

Laboratory Testing Services Available

Pertussis testing is available at the CDPHE laboratory on a fee for service basis. Testing formats include real-time PCR and culture isolation. Consult with a CDPHE vaccine preventable disease epidemiologist regarding pertussis testing as fees may be waived in support of an outbreak investigation.

Case Investigation

Investigate all pertussis reports including all suspected cases.

Cases should be investigated to:

- Identify household members and contacts who are high-risk and recommend antibiotic prophylaxis (or treatment if already symptomatic) to prevent secondary cases.
- Provide information about the disease, its transmission, and methods of prevention.
- Promptly identify clusters or outbreaks of disease and initiate appropriate prevention and control measures.

A. Case Investigation / Forms

Local health departments have primary responsibility for investigating cases in their jurisdiction. Counties needing assistance should consult their CDPHE Regional Epidemiologist to establish primary responsibility for investigating cases in their jurisdiction.

- Contact case's medical provider to notify them of public health follow-up. Also verify symptoms, onset date, vaccination history, and treatment given.
- Interview case or case's guardian to determine the cough onset date and whether the case's symptoms are compatible with pertussis.
- Pertussis Surveillance Worksheet (<http://www.cdc.gov/vaccines/pubs/surv-manual/appx/appendix11-2-pertussis-wrsht.pdf>) may be helpful during the interview to ensure collection of all pertinent information. The worksheet and instructions for completing the worksheet are available on the CD Manual website. All relevant information on the worksheet should be entered into CEDRS.
- Recommend appropriate antibiotic treatment for the case if the case has not been treated. See Disease Control Measures, Section A (Treatment), for appropriate antibiotics. Treatment is not necessary if the case has coughed more than 21 days, however, treatment may still be considered for some high-risk pertussis cases.
- Recommend exclusion from school, childcare, work, and all public settings until the case has completed 5 days of an appropriate antibiotic or until 21 days after cough onset, or until coughing stops (whichever comes first).
- Provide education about infectious period, method of transmission, and disease severity in high-risk groups.
- Recommend vaccination as appropriate for case and case's contacts.
- Individuals who do not work in high-risk settings (e.g., health care facilities or childcare centers) may be able to return to work provided they can do their job without exposing other individuals.
- Individuals who do work in high-risk settings (e.g., health care facilities or childcare centers) must be excluded from work. This may include but is not limited to nurses, physicians, administrators, janitorial staff, security workers, kitchen staff, and/or laundry services.
- Obtain information (names, ages, county, and phone numbers) for the case's household and high-risk close contacts.
- Ask case to notify their close contacts of potential exposure to pertussis and what symptoms to watch for regardless of vaccination status. Close contacts should be advised to seek guidance from their healthcare provider regarding testing and treatment.
- Identify the case's activities (e.g., school, work, childcare, church, social gatherings, travel, etc.) during the case's infectious period to determine if these activities would potentially expose high-risk individuals. For each activity that is assessed to potentially expose high-risk individuals, record the facility's name, phone number, and a contact person.
- Information about contacts and activities occurring outside the investigator's county/area should be given to the appropriate county health department or nursing service or CDPHE.

- CDPHE should be notified of all out-of-state close contacts.
- If multiple attempts to obtain information on the contact(s) are unsuccessful (e.g., the contact, contact's guardian or healthcare provider does not return your calls, or the person refuses to divulge information), contact your CDPHE Regional Epidemiologist to discuss the situation.
- If at the time of the initial interview the case is currently coughing but has not coughed for at least 14 days, they should be interviewed again 14 days after cough onset to verify they met the clinical case definition.
- When resources are limited, if a case or contact meets the clinical case definition on initial interview, a follow-up interview to determine entire cough duration can be suspended.

When resources are limited, investigations can be prioritized. In general, an indication of a high-risk case or contact will increase the priority of a report.

Investigations that are highest priority:

A confirmed, probable, or suspected case that is high risk or who may expose persons at high risk.

Investigations that are intermediate priority:

- Culture or PCR-positive cases (including those whose illness does not yet meet the clinical case definition).
- Cases that are epidemiologically-linked to confirmed cases and meet the clinical case definition.

Investigations that are lowest priority:

- Cases that meet the clinical case definition but have no epi-link or lab confirmation.
- Cases with classic symptoms (paroxysmal cough, post-tussive emesis, or whooping) and <2 weeks cough duration with a physician diagnosis, positive serology and/or positive DFA.
- Cases with classic symptoms (paroxysmal cough, post-tussive emesis, or whooping) and <2 weeks cough duration with no testing or a negative test, suspect cases.
- Cases with an epidemiologic-link to a confirmed case who themselves do not meet the clinical case definition at the time of initial interview.

B. Identify and Evaluate Contacts

The primary objective of pertussis investigations and postexposure antimicrobial prophylaxis (PEP) should be to prevent death and serious complications from pertussis in individuals at increased risk of severe disease (i.e., infants).

The following are examples of exposures for which contacts may need to be notified and/or receive PEP:

- Sharing a household
- Direct face-to-face contact for an undefined time period with an infectious pertussis case (case coughing <21 days and has not completed 5 days of appropriate antibiotic treatment).
- Shared confined space in close proximity for a prolonged period of time, such as ≥ 1 hour, with an infectious pertussis case. For example, riding in a car with a pertussis case.
- Direct contact with respiratory, oral, or nasal secretions from an infectious pertussis case (e.g., an explosive cough or sneeze in the face, sharing food, sharing eating utensils, kissing, mouth-to-mouth resuscitation, or performing a full medical exam including examination of the nose and throat without wearing a mask).
- Recommend PEP to all household contacts of a pertussis case, regardless of vaccination status. Administration of antimicrobial prophylaxis to asymptomatic household contacts within 21 days of onset of cough in the index patient can prevent symptomatic infection.
- Household contacts should be interviewed to determine if the contact has symptoms of pertussis (including mild or slight cough). All symptomatic contacts will need to be investigated as potential pertussis cases and reported to CDPHE as required.
- Recommend PEP to high risk contacts. Examples of high risk contacts include:
 - ▶ Infants less than 12 months of age
 - ▶ Women in their third trimester of pregnancy
 - ▶ Persons with pre-existing health conditions that may be exacerbated by a pertussis infection

(For example, but not limited to immunocompromised persons, patients with neuromuscular disease and moderate to severe lung disease including those with moderate to severe medically treated asthma.)

- Recommend PEP to contacts who may expose high risk persons to pertussis should they become sick with pertussis
 - Individuals who work in high-risk settings (e.g., health care facilities or childcare centers)

This may include but is not limited to nurses, physicians, administrators, janitorial staff, security workers, kitchen staff, and/or laundry services. In summary, antibiotic prophylaxis/treatment is recommended for all household contacts and high-risk contacts, of a pertussis case, regardless of age, vaccination status, or disease history.

Disease Control Measures

A. Treatment

Antibiotic treatment (see table below) is recommended for all pertussis cases and their symptomatic close contacts (if they have been coughing <21 days) to render them non-infectious. Appropriate antibiotics will not reduce cough symptoms unless taken in the catarrhal (early) stage of pertussis. Infected persons may still be contagious during the first 5 days of antibiotic treatment. In some situations, antibiotic treatment may be considered for cases having coughed up to 42 days.

Recommended Regimens for Treatment *or* Prophylaxis of Pertussis

Preference	Drug	Age Group	Dosage	Duration
1 st choice(s):	Azithromycin (Zithromax)	< 1 month ⁺	10 mg/kg in single dose (Preferred drug; limited safety data available)	5 days
		1 - 5 months	10 mg/kg in single dose	5 days
		≥ 6 months	10 mg/kg in single dose on day 1 (maximum =500mg) <i>and</i> then 5 mg/kg in single dose (maximum=250mg) on days 2-5	5 days
	Clarithromycin (Biaxin)	< 1 month ⁺	Not recommended (Safety data unavailable)	NA
		≥ 1 month	15 mg/kg/day in two divided doses (maximum 500mg/dose)	7 days
2 nd choice:	Erythromycin	< 1 month ⁺	Not usually recommended, use associated with increased risk of IHPS*. Only use as alternate drug for infants <1 month using same dosage and duration listed for ≥ 1 month of age.	NA
		≥ 1 month	40-50 mg/kg/ day in four divided doses (maximum 2 gm/day)	14 days
3 rd choice:	Trimethoprim- sulfamethoxazole (Bactrim or Septra)	< 2 months	Should not be used due to risk of kernicterus.	NA
		≥ 2 months [¶]	8 mg/kg/day of trimethoprim (maximum =320mg), sulfamethoxazole 40mg/kg/day (maximum =1600) in two divided doses.	14 days

⁺ All infants <1 month of age who receive any macrolide should be monitored for development of IHPS.

^{*} Infantile hypertrophic pyloric stenosis.

[¶] Trimethoprim-sulfamethoxazole should not be given to pregnant women, nursing mothers or infants < 2 months of age due to the risk of kernicterus.

For purposes of release from isolation, 5 days of treatment is required (regardless of which antibiotic is prescribed). The release from isolation assumes 100% compliance. The dosages as provided above should be used.

Note: Please refer to the Physicians' Desk Reference (PDR) or a pharmacist for information regarding contraindications to these antibiotics.

Reference

Centers for Disease Control and Prevention. Recommended Antimicrobial Agents for the Treatment and Prophylaxis of Pertussis, 2005 CDC Guidelines. MMWR 2005; 54 (No. RR-14): 1-16.

The above table is included in the one-page CDPHE Guidance on the Treatment and Prophylaxis of Pertussis Cases and Contacts document, which is available on the Pertussis Information for Schools and Health Care Professionals webpage (<https://www.colorado.gov/pacific/cdphe/pertussis-information-schools-and-health-care-professionals>).

Please refer to the Physicians' Desk Reference (PDR) or a pharmacist for information regarding contraindications to the antibiotics for pertussis treatment and prophylaxis. Infantile hypertrophic pyloric stenosis (IHPS) in infants <1 month of age has been reported following the use of oral erythromycin.

B. Vaccination

Vaccines are the safest and most effective tool to prevent pertussis but a fully vaccinated person (of any age) can become infected and transmit illness to others. Vaccinated persons with pertussis usually experience less severe disease and may present atypically without the classic "whoop". Neither vaccination nor natural disease confers complete or lifelong protective immunity against pertussis or reinfection.

The duration of protection of Tdap is still unknown. Waning immunity and known limitations in effectiveness of DTaP and Tdap vaccines are likely contributing to the observed increased disease rates among older children and adolescents.

Pertussis Vaccination Recommendations:

- Children should receive five doses of DTaP at 2, 4, 6, and 15-18 months of age with a fifth dose at 4 to 6 years of age.
- Tdap is recommended between 11 to 12 years of age and for all adults aged 19 years and older who have not yet received a dose of Tdap.
- Pregnant women should get one dose of Tdap during the late second or early third trimester during every pregnancy. Tdap is recommended in the immediate postpartum period for new mothers who were not previously vaccinated or whose vaccination status is unknown.
- Parents, siblings, caregivers, and other potential visitors of infants should be up to date on pertussis vaccinations before having contact with an infant.
- When a tetanus booster is indicated, Tdap should be used in place of Td for wound management in adults aged 19 years and older who have not received Tdap previously.
- Tdap is recommended for health care personnel who have not previously received it.
- An accelerated schedule of pertussis vaccination for infants (aged <2 months at initial vaccination) can be considered during community-wide pertussis outbreaks. The minimum acceptable age for initial vaccination is 6 weeks of age with a minimum interval of 4 weeks for subsequent doses. On this schedule, infants could complete their three-dose primary series by 14 weeks of age.

For more information on CDC Tdap Recommendations: <http://www.cdc.gov/vaccines/vpd-vac/combo-vaccines/DTaP-Td-DT/tdap.htm>

C. Prophylaxis

Antimicrobial prophylaxis

- Antibiotic prophylaxis is recommended to abort possibly incubating infection for all asymptomatic household and high-risk contacts (see Case Investigation, section B - Identify and Evaluate Contacts) of pertussis cases if the exposure occurred within the last 21 days.
- The same antibiotics and dosages used for pertussis treatment are recommended for pertussis prophylaxis. See Disease Control Measures, Section A (Treatment).
- Asymptomatic close contacts of pertussis cases that develop a cough during the first five days of taking antibiotic prophylaxis should be considered infectious until they have completed 5 days of antibiotics or stopped coughing (whichever occurs first).
- Asymptomatic close contacts that become symptomatic should be treated as suspected pertussis cases and excluded from childcare, school, and/or possibly work.

D. Education

- Contacts should be advised of signs and symptoms of pertussis, the possible need for antibiotic prophylaxis or treatment, and vaccination.
- A pertussis frequently asked questions document is located on the Pertussis Information for Schools and Health Care Professionals webpage <https://www.colorado.gov/pacific/cdphe/pertussis-information-schools-and-health-care-professionals>. A Health Alert Network (HAN) Advisory about pertussis may be sent to physicians during a large or unusual pertussis outbreak. Sending a pertussis HAN should be discussed with your CDPHE Regional Epidemiologist, who may assist you in developing the alert.

E. Managing Special Situations

Childcare / Preschool

- Refer childcare providers to the Colorado Department of Public Health and Environment guidelines for child care providers Infectious Disease in Child Care and School Settings: (<https://www.colorado.gov/pacific/cdphe/infectious-disease-guidelines-schools-and-childcare-settings>)
- Determine the dates the pertussis case attended childcare and when the case was infectious. If the case attended childcare while infectious, determine if any high-risk infants, children, or staff were exposed (See Case Investigation, section B - Identify and Evaluate Contacts) to the case and therefore need antibiotic prophylaxis.
 - Childcare facilities may consider sending parents letters to notify them of exposure, pertussis symptoms, and vaccine recommendations. Sample letters are available on the Pertussis Information for Schools and Health Care Professionals webpage <https://www.colorado.gov/pacific/cdphe/pertussis-information-schools-and-health-care-professionals>. “Pertussis Disease Alert, Important Notice to Parents Children Needing Preventive Antibiotics” may be used to notify parents if their child needs antibiotic prophylaxis
 - When antibiotics are not recommended, “Pertussis Alert to Parents” may be sent to parents to inform them of their child’s possible exposure to pertussis and educate about pertussis symptoms.
- Children with pertussis should be excluded from childcare/preschool until they are noninfectious (after 5 days of appropriate antibiotic treatment, or 21 days after cough onset, or until cough stops [whichever comes first]).
- Parents should contact their health care provider for evaluation, testing, and treatment if their child develops symptoms of pertussis.
- Staff should be informed of their possible exposure to pertussis and educated about the signs and symptoms. Public Health may recommend PEP for childcare staff exposed to pertussis.
- Staff with symptoms of pertussis should be excluded from work until they are evaluated by their healthcare provider and antibiotic treatment is completed, if appropriate.
- Childcare or health department staff may consider contacting the parents’ of children not up to date on their pertussis vaccinations and refer them to their health care provider or the local public health agency for vaccination.

- There may be unusual circumstances in home childcare settings where all the contacts are coughing and exclusion of symptomatic contacts may not be required.
- Childcare personnel should increase monitoring for cough illness at the facility.
- Before and after school childcare facilities and classrooms should follow the guidelines for school situations in Disease Control Measures, section E (School), below).

School

- Refer school personnel to the CDPHE Infectious Disease in Childcare and School Settings (<https://www.colorado.gov/pacific/cdphe/infectious-disease-guidelines-schools-and-childcare-settings>).
- Determine the dates the pertussis case was infectious and if the case attended school during their infectious period.
- Cases should be excluded from school until they are noninfectious (after 5 days of appropriate antibiotic treatment, or 21 days after cough onset, or until cough stops [whichever comes first]).
- Notify the school nurse or health aide or person responsible for health issues at the school (secretary, principal, etc.) about the case and discuss possible school exposures and disease control strategies.
- Discuss with school personnel whether notification letters should be sent to school contacts.
- If letters are being sent, discuss whether the letters should be sent to the entire school or only the case's classroom(s). Some school administrators prefer to notify the entire school about pertussis cases, especially if liability may be an issue.
- In large middle and high schools, it may be easier to notify the entire school than to determine which individuals may have been exposed, since students attend multiple classes.
- Determine whether the case is involved in extra-curricular school activities, such as sports teams, clubs, etc.
- Antibiotic prophylaxis is not routinely recommended for school classroom contacts, unless certain individuals meet the criteria of high-risk, however, each situation needs to be evaluated individually. In some situations, antibiotic prophylaxis has been recommended for classrooms, sports teams or clubs; for example, multiple cases in a class/group, special education classrooms, school choir, cheerleaders, and football teams.
- The school nurse or health aide should assist in identifying any high-risk students or school staff with possible exposure to the case and the CDPHE sample letter Pertussis Disease Alert, Important Notice to Parents of Children Needing Preventive Antibiotics may be used to notify parents of high-risk school contacts needing antibiotic prophylaxis and educate them about pertussis. This sample letter is located on the Communicable Disease Manual website. The school should work with the local health department if there are high-risk contacts in order to facilitate obtaining antibiotic prophylaxis for the contact.
- The CDPHE sample letter, Pertussis Disease Alert, Important Notice to Parents, may be used to notify and educate school staff and parents of children that are not high-risk about pertussis exposure. This letter is located on the Communicable Disease Manual website.
- School health personnel should increase surveillance for cough illnesses by asking staff members to report students with prolonged or unusual coughs.
- Refer exposed symptomatic classmates and staff to their health care provider for evaluation of possible pertussis.
- Persons determined to have pertussis should be treated as pertussis cases.
- School staff and/or health department personnel may want to review the pertussis vaccination records of exposed classmates. In some situations vaccination records of all students may be reviewed.
- School staff and/or health department personnel may want to contact the parents' of students who are not up to date on their pertussis vaccinations and refer them to their health care provider or the local health department for vaccination.

Patients and Staff in Health Care Facilities (Hospitals and Long Term Care Facilities)

Hospitals and long term care facilities generally have written infection control policies and procedures for handling cases of communicable disease among patients and staff members. If a facility does not have such policies in place, provide the following recommendations:

- Standard and droplet precautions (respiratory isolation) are recommended for 5 days after the initiation of appropriate antibiotic treatment for hospitalized cases and cases in residential facilities.

- Standard and droplet precautions may not be necessary if a case in a residential facility has already coughed 21 days.
- Identify health care workers and staff having close contact with the case while the person was infectious and not in respiratory isolation (or staff not following respiratory precautions).
- Close contact includes activities such as performing a physical examination, suctioning, intubation, bronchoscopy, feeding, bathing, and other procedures requiring prolonged or close interaction.
- Infection Control and/or Employee Health staff typically assess the need for and administration of antibiotic prophylaxis of exposed staff.
- Exposed health care workers and staff who develop a cough should be tested for pertussis and excluded from work (or excluded from contact with other individuals) until completing five days of appropriate antibiotic treatment. Employees may return to work earlier if determined not to have pertussis.
- Exposed symptomatic staff unable to take appropriate antibiotic treatment should be excluded from work (or excluded from contact with other individuals) until they have coughed 21 days or stopped coughing (whichever comes first).
- Identify patients or residents who had close contact with the pertussis case and recommend antibiotic prophylaxis if they are identified as being a high-risk contact.
- Exposed hospital patients who have been discharged may be notified through the patients' primary care physicians.
- Exposed symptomatic contacts (patients or residents) should be treated as pertussis cases. They should be isolated and evaluated (including testing) for pertussis.
- Exposed patients or residents developing a cough during the first five days of antibiotic prophylaxis should be evaluated for pertussis and isolated until completing five days of antibiotics.
- Asymptomatic exposed patients or residents unable to take antibiotic treatment or prophylaxis should be under cough surveillance for 21 days, or possibly 42 days if they are a high-risk contact.
- Symptomatic exposed patients or residents unable to take antibiotics treatment should be isolated until they have coughed 21 days or stopped coughing (whichever comes first).

F. Environmental Measures

No specific environmental measures are recommended. Indirect spread through contaminated fomites occurs rarely, if at all.

References

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