Pertussis Quicksheet

February 2025

Pertussis Basics

Infectious agent

Pertussis, more commonly known as whooping cough, is a contagious, respiratory disease caused by the bacterium *Bordetella pertussis*. Illness is typically characterized by a prolonged paroxysmal cough often with an inspiratory whoop. Symptoms can vary with age and history of previous exposure or vaccination. Pertussis rarely causes severe complications among healthy, vaccinated persons. Infants are at greatest risk for pertussis-related complications and mortality.

Other *Bordetella* species can cause sporadic prolonged cough illness in people, including *B. parapertussis*, *B. bronchiseptica* and *B. holmesii*. Disease attributable to *Bordetella* species other than *B. pertussis* is not reportable in California.

Clinical symptoms

Catarrhal stage (Early symptoms)

Onset of cold-like symptoms (coryza, sneezing, occasional cough). Fever is absent or minimal. This stage lasts approximately 1-2 weeks with cough gradually becoming more severe.

Paroxysmal stage (Later symptoms)

Spasms of severe and rapid coughing are followed by a sudden deep inspiration, often resulting in a characteristic “whooping” sound. Post-tussive vomiting is common in all ages. Illness may be milder in previously vaccinated people. This stage usually lasts 1-6 weeks but may persist for up to 10 weeks.

Infants <1 year of age (particularly very young infants) may present differently:

- may have a shorter catarrhal stage
- may gag, gasp, or stop breathing (apnea)
- may have facial color changes (turn blue, purple, or red)
- may not have noticeable cough or “whoop”
- likely to have leukocytosis (high white blood cell count) with an increased absolute lymphocyte count

Convalescent stage (Recovery)

Decreasing frequency and severity of coughing, whooping, and vomiting. Coughing paroxysms may recur with subsequent respiratory infections. Classic pertussis is 6-10 weeks in duration, but cough may last longer in some people.

Modes of transmission

Pertussis is highly contagious. Transmission typically occurs when a susceptible person inhales aerosolized droplets from the respiratory tract of an infected person. Transmission via contact with fomites is thought to occur rarely, if ever.

Pertussis infectious period

Persons ≥1 year of age are considered infectious from the onset of cold-like symptoms until after 5 days of treatment or until 21 days after cough onset if no (or partial) treatment is given. Infants < 1 year are considered infectious for 6 weeks if no or partial treatment is given.

Pertussis incubation period
Typically, 7-10 days (range 4-21 days).

Pertussis case definition
Clinical case definition:
In the absence of a more likely diagnosis, a cough illness lasting ≥2 weeks with at least one of the following:
- Paroxysms of coughing*
- Inspiratory "whoop"
- Post-tussive vomiting
- Apnea (with or without cyanosis)

* Sudden uncontrollable "fits" or spells of coughing where one cough follows the next without a break for breath.
Transient cessation of respiration occurring spontaneously or after a coughing spasm. Apnea is generally associated with cyanosis or syncope and might be accompanied by bradycardia. Apnea is a common pertussis symptom in infants and might be the only presenting sign of pertussis in young infants with no cough but is rarely associated with pertussis in older children and adults.

Probable case:
- 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 following signs or symptoms:
    - Paroxysms of coughing
    - Inspiratory whoop
    - Post-tussive vomiting
    - Apnea (with or without cyanosis)

    AND
  - Contact with a laboratory confirmed case (epidemiologic linkage)

Confirmed case:
Acute cough illness of any duration with
- Isolation of *B. pertussis* from a clinical specimen (culture positive)

OR
- Polymerase chain reaction (PCR) positive for *B. pertussis*

Pertussis Outbreak Definition
Pertussis outbreaks are reportable to CDPH. CDC does not have a standardized pertussis outbreak definition. CDPH suggests LHDs can define a pertussis outbreak as three or more confirmed cases who do not reside in the same household, and who are epi-linked and/or from a common setting, and with symptom onset dates within 21 days of each other.

Implementation of this outbreak definition by LHDs is optional. Additional outbreak definition considerations include:
- In this definition "household" does not include congregate settings such as assisted livings, correctional facilities, and shelters.
- For school settings, consideration may be given to modifying the outbreak threshold depending on the size of the school population.

- In high-risk and/or congregate settings including but not limited to neonatal care units, daycare classrooms, and long-term care facilities, a threshold of two cases may be used.

Pertussis Laboratory Testing

The preferred methods for the laboratory diagnosis of pertussis are positive polymerase chain reaction (PCR) test for *B. pertussis* or isolation of *B. pertussis* from a clinical specimen, although the organism can be difficult to isolate and use of this method is rare. Serology testing *is not* recommended. Many commercially available serologic tests have unproven or unknown clinical accuracy, and their use is not recommended. LHD staff receiving serological test results for pertussis may consider informing the ordering provider that PCR testing is the preferred diagnostic method for pertussis.

Best practices for PCR testing

- Only test patients with signs and symptoms of pertussis. Testing asymptomatic persons increases the likelihood of obtaining falsely positive results.
- Only test patients during the first 3 weeks of cough when bacterial DNA is still present.
- Do not test patients who have had ≥5 days of antibiotics.

Optimal specimen collection for PCR testing

- Specimens for PCR testing should be obtained by aspiration or swabbing of the posterior nasopharynx.
- Specimens collected by nasopharyngeal (NP) aspiration, a saline flush of the posterior nasopharynx, are preferred over specimens collected by NP swab. A specimen collected by NP aspiration will contain a larger quantity of bacteria.
- Specimens collected by NP swab should be obtained using polyester (such as Dacron®), rayon, or nylon-flocked swabs. Cotton-tipped or calcium alginate swabs are not acceptable as residues present in these materials inhibit PCR assays
- Throat swabs and anterior nasal swabs have unacceptably low rates of DNA recovery and should not be used for pertussis diagnosis.

For more information on pertussis laboratory testing, see CDPH Microbial Diseases Laboratory's Services and Test Catalog section for pertussis.

Contacts

Close Contact Definition

Close contacts are defined as persons with exposure to a pertussis case where contact with respiratory aerosols is likely. The duration and intensity of exposure needed to cause infection are unclear. Being a household member, attending or working in the same childcare setting, receiving a cough or sneeze in the face, performing a medical examination of the mouth, nose or throat, sitting at adjacent desks or the same table at school, or sharing a confined space with an infectious person for >1 hour are generally considered significant exposures.

High-Risk Close Contact Definition

Contacts at the highest risk of severe disease or of transmitting disease to high-risk people should be prioritized for postexposure prophylaxis (PEP). High-risk contacts include:

- Infants <1 year of age, particularly infants <4 months of age who have not yet received any doses of DTaP
- Pregnant persons in their third trimester

- Caregivers and household contacts of infants (e.g., family members, friends, or babysitters who spend time caring for an infant)
- All those attending or working in a childcare setting (i.e., same room)

Case and Contact Investigation

1) Confirm that the known or suspected case meets the confirmed or probable pertussis case definition.
   a) Obtain basic clinical information available at the time of the interview. Follow-up to assess cough duration for case classification is not needed.
   b) For infant cases <4 months of age or cases requiring hospitalization, more detailed information on the clinical course, hospitalization, and mother's Tdap vaccination history and case's DTaP vaccination history should be obtained.
2) Ensure that the case has been recommended to receive antibiotic treatment if it is <21 days since cough onset.
3) Determine if the case has any high-risk contacts.
   a) In general, only high-risk contacts should be recommended to receive antibiotic PEP.
   b) Identifiable high-risk close contacts are typically those in the case's household or childcare setting; if the case is a healthcare worker, there could also be high-risk contacts in a healthcare setting.
   c) Obtain contact information for identifiable high-risk contacts who are not in the case's household.
   d) Follow-up on identifiable high-risk contacts outside of the case household and recommend PEP.
   e) High-risk contacts should receive PEP as soon as possible and within 21 days of last exposure to the infectious case.
   f) Instruct high-risk contacts to seek medical attention if early symptoms of pertussis develop.
4) Advise lower-risk household and childcare contacts to monitor for symptoms and seek treatment if symptoms develop; follow-up of such contacts is not necessary.
5) For cases who are K-12 students, please record name of school case attends.
   a) Other than pregnant staff or students, contacts in a K-12 school setting are typically lower-risk and do not require PEP.
   b) LHJs may choose not to do notification of individual contacts in the K-12 school setting unless there is a known high-risk contact.
   c) LHJs may consider notification of the case's school.
6) Recommend vaccination for all persons who are not up to date for pertussis vaccine. When pertussis incidence is high in the community and it is difficult to follow-up on all cases, LHJs may choose to prioritize investigation of cases in infants <1 year, children aged 1-12, and persons of childbearing age.
   a) Infants are at highest risk of severe pertussis and may have other infant contacts.
   b) Younger children may be more likely to have contacts who are pregnant, infant siblings, or other infant contacts.
   c) Persons of childbearing age may have an infant or be pregnant in their third trimester.

Case Management

Management of Cases in Childcare Settings

- Exclude case from the setting until 5 days of appropriate antibiotic treatment (or 21 days after cough onset if no treatment).

- Notify parents/guardians and staff about pertussis signs and symptoms, prevention and control measures, and who is considered a high-risk contact. Consider active surveillance for cough illness and exclusion of those with cough until evaluation by healthcare provider.

Management of Cases in K-12 School Settings when Pertussis is Known to be Widespread in the Community

- LHJs should instruct schools about management of pertussis cases so that cases are handled uniformly in schools across the jurisdiction.
- The CDC and the American Academy of Pediatrics recommend school exclusion for children with pertussis until they have completed 5 days of antibiotic treatment. However, many cases will be undiagnosed and untreated, and the benefit of school exclusion of known cases is unclear. In these situations, LHJs may consider permitting cases who have started but not completed 5 days of antibiotic treatment to attend school if they are well enough to participate in school activities.
- School exclusion of unvaccinated students is generally not indicated.
- LHJs should assist with pertussis communications to the school community. Communications should include:
  - The signs and symptoms of pertussis
  - Information about acellular pertussis vaccines and waning immunity
  - The recommendation that pregnant staff and students should receive Tdap vaccine at the earliest opportunity between 27-36 weeks gestation; and
  - Information that infants <1 year of age are at the highest risk of severe pertussis and that the healthcare providers of high-risk household members, including infants <1 year and pregnant persons in their third trimester, should be contacted to discuss PEP.

Management of Exposed Healthcare Workers

Healthcare workers with unprotected (i.e., unmasked) exposure to pertussis cases may be managed in two ways:

- They may receive PEP, or
- They may self-monitor for symptoms for 21 days from the time of exposure.

Decisions on whether to PEP or initiate symptom monitoring should take into consideration the patient population served by the HCW and the likely frequency of exposures, (e.g., PEP would likely be preferred over symptom watch for HCWs in a neonatal intensive care unit), but symptom watch may be preferred for HCWs in a pediatric clinic where repeated exposures are likely.

Postexposure Chemoprophylaxis (PEP)

With increasing incidence and widespread community transmission of pertussis, extensive contact tracing and broad use of PEP among contacts is not an effective use of limited public health resources or appropriate antibiotic stewardship. While antibiotics may prevent pertussis if given prior to symptom onset, there are no data to indicate that widespread use of PEP among contacts effectively controls or limits the scope of pertussis outbreaks. Therefore, LHJs should focus PEP efforts on infants <1 year of age and their contacts since serious complications and death are primarily limited to young infants.

- CDC and AAP currently recommend PEP for all household contacts, regardless of age or immunization status, because secondary attack rates in households are high even among vaccinated persons. However, CDPH considers it reasonable to prioritize PEP only to high-risk contacts or households, as noted above.

- Lower-risk contacts who have not received PEP should be instructed to monitor themselves closely for cold-like symptoms for 21 days after last exposure and contact their healthcare provider if symptoms occur so that antibiotic treatment can be implemented immediately.
- If pertussis is not widespread in the community, broader use of PEP may be considered in limited closed settings; however, if exposure is ongoing, multiple courses of PEP are not recommended.
- If 21 days have elapsed since last exposure to an infectious case, PEP has limited value but should be considered for households with high-risk contacts.
- See table below for recommended agents and dosing by age of patient for both PEP and treatment.

Pertussis Vaccines

- The primary DTaP series is essential for reducing severe disease in young infants. During a community outbreak, infants can receive DTaP on an accelerated schedule with the first dose given at 6 weeks of age, and at least 4 weeks between each of the first 3 doses. Even one dose of DTaP may offer some protection against fatal pertussis in young infants, so accelerating even the first dose may be beneficial.
- All pregnant persons should receive Tdap vaccine during every pregnancy regardless of pertussis vaccination history, preferably at the first opportunity between 27-36 weeks gestation to maximize the maternal antibody response and passive antibody transfer to the infant.
- All persons in contact with infants should be up to date for pertussis vaccine. Although only one dose of Tdap is recommended by ACIP for nonpregnant adolescents and adults, persons may choose to be revaccinated if it has been several years since receipt of Tdap.
- Immunity to pertussis from vaccine or disease wanes over time and persons who have been vaccinated or had disease can become infected. Data on duration of protection from acellular vaccines suggest that waning occurs within several years of vaccination, particularly in persons who have never received whole-cell vaccine.
- CDC Pertussis Vaccination Recommendations

Recommended Treatment and Postexposure Prophylaxis, by Age Group‡

Age group	Azithromycin	Erythromycin	Clarithromycin	Alternate agent: TMP-SMX
Younger than 1 month	10 mg/kg/day as a single dose daily for 5 days§,**	40 mg/kg/day in 4 divided doses for 14 days	Not recommended	Contraindicated at younger than 2 months
1 through 5 months	10 mg/kg/day as a single dose daily for 5 days§	40 mg/kg/day in 4 divided doses for 14 days	15 mg/kg/day in 2 divided doses for 7 days	2 months or older: TMP, 8 mg/kg/day; SMX, 40 mg/kg/day in 2 doses for 14 days
6 months or older and children	10 mg/kg as a single dose on day 1 (maximum 500 mg), then 5 mg/kg per day as a single dose on days 2 through 5 (maximum 250 mg/day)§,††	40 mg/kg/day in 4 divided doses for 7-14 days (maximum 1-2 g per day)	15 mg/kg/day in 2 divided doses for 7 days (maximum 1 g/day)	2 months 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§,††	2g/day in 4 divided for 7-14 days	1g/day in 2 divided doses for 7 days	TMP 320 mg/day; SMX, 1600 mg/day in 2 divided doses for 14 days.

From: Red Book 2021-2024

‡ 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

§ Azithromycin should be used with caution in people with prolonged QT interval and certain proarrhythmic conditions.

** Preferred macrolide for this age because of risk of idiopathic hypertrophic pyloric stenosis associated with erythromycin.

†† A 3-day course of azithromycin for PEP or treatment has not been validated and is not recommended.