



# Pertussis: Public Health Investigation



## Clinical symptoms

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

**Paroxysmal stage:** Spasms of severe coughing are followed by a sudden deep inspiration, often resulting in a characteristic “whooping” noise. Post-tussive vomiting is common in all ages. Illness may be milder in previously vaccinated people.

Infants <6 months of age may present differently:

- may have a shorter catarrhal stage
- may gag, gasp or stop breathing (apnea)
- facial color changes (may 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:** 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.

**Incubation period** typically 7-10 days (range 5-21 days).

## Period of communicability

Persons  $\geq 1$  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 (6 weeks for infants <1 year of age).

## CDPH case definitions

### Confirmed case

- culture positive with an acute cough illness of any duration; **or**
- PCR positive and meets the clinical case definition; **or**
- meets the clinical case definition and is epidemiologically linked directly to a case confirmed by either culture or PCR.

### Probable case

- meets the clinical case definition; **and**
- is not laboratory confirmed; **and**
- is not epidemiologically linked to a laboratory-confirmed case.

### Suspect case

- PCR positive with an acute cough illness of any duration; **or**
- is epidemiologically linked to a laboratory-confirmed case with an acute cough illness of any duration and at least one: whoop, paroxysm or post-tussive vomiting.

## Clinical case definition

- A cough illness lasting at least 2 weeks with one or more of the following: paroxysms of coughing, inspiratory “whoop”, post-tussive vomiting, **AND** without other apparent cause.
- In outbreak settings, a case may be defined as a person with a cough illness lasting at least 2 weeks.

## CDC laboratory criteria for diagnosis

Isolation of *B. pertussis* from clinical specimen or positive polymerase chain reaction (PCR) test for *B. pertussis*.

## Case investigation and outbreak management

1. Confirm that the suspected case meets the case definition and/or is highly suspected.
2. Start antibiotic treatment of case and symptomatic contacts per recommendations on next page.
3. Identify close contacts. Emphasis should be given to identifying contacts who are at high risk for severe pertussis or who may transmit the disease to persons at high risk for severe pertussis (see next page).
4. Recommend prophylaxis for contacts as appropriate; prophylaxis may be limited to high risk contacts. When recommended, prophylaxis should be implemented as soon as possible and within 21 days of last exposure to the infectious case.
5. Exclude cases from child care, school and other group activities until 5 days of effective antibiotic treatment (or 21 days after cough onset if no treatment).
6. Recommend vaccination for all persons who are not up-to-date for pertussis vaccine, using Tdap for people  $\geq 7$  years of age who have not already received it.
7. Monitor contacts in childcare centers, schools, hospitals, and other high risk settings for acute illness for  $\geq 21$  days after last exposure to an infectious case.
8. An institutional outbreak is defined as  $\geq 2$  cases  $\leq 42$  days. Since PCRs can be falsely positive, outbreaks should be confirmed with  $\geq 1$  positive culture.
9. In school and childcare outbreaks, notify parents/guardians and staff about pertussis signs/symptoms, prevention and control measures. Consider active surveillance for cough illness.
10. During school outbreaks, school exclusion of unvaccinated students is generally not indicated.
11. Alert clinicians and educate the public as indicated.

### 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 is unclear. However, being a household member, attending or working in the same child care 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 contact definition** (contacts at highest risk of severe disease or transmitting disease to high risk people)

- infants <1 year of age;
- pregnant women in their third trimester;
- household contacts, particularly if there is an infant or third trimester pregnant woman in the household;
- 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) *if* there is an infant or a third trimester pregnant woman in the setting;
- healthcare workers who care for infants <1 year of age or pregnant/postpartum women; and
- other contacts at the discretion of the local health department, e.g., unimmunized children, persons with chronic respiratory conditions, neuromuscular disease, or immunodeficiency disorders.

### Post-exposure chemoprophylaxis (PEP)

Most pertussis in adults and adolescents is neither diagnosed nor reported and antibiotic prophylaxis does not control the transmission of pertussis when it is widespread in the community. Therefore, local health jurisdictions may consider focusing antibiotic prophylaxis efforts on infants <1 year of age and their contacts since serious complications and death are primarily limited to these infants.

- CDC and AAP currently recommend PEP for all close contacts, regardless of age or immunization status. However, CDPH considers it reasonable to prioritize PEP to high risk contacts, as noted above.
- Contacts who have not received PEP should be instructed to monitor themselves closely for cold-like symptoms for 21 days after last exposure and notify public health if symptoms occur so that antimicrobial treatment/exclusion can be implemented immediately.
- Starting PEP  $\geq 3$  weeks after the last exposure to an infectious case is probably of no benefit to the contact.
- Vaccine is not PEP, but during a community outbreak, DTaP can be given to infants at an accelerated schedule; the first dose can be given as early as 6 weeks of age, with at least 4 weeks between each of the first three doses. Even one dose of DTaP may offer some protection against fatal pertussis disease.
- All contacts of infants should be up-to-date for pertussis vaccine as part of a “cocooning” strategy.
- Tdap should be promoted to increase community immunity levels during a community outbreak.

## RECOMMENDED TREATMENT AND POSTEXPOSURE PROPHYLAXIS, BY AGE GROUP

Age group	Azithromycin	Erythromycin*	Clarithromycin	Alternate agent: TMP-SMX†
<1 month	Recommended agent for infants <1 month of age; 10 mg/kg per day in a single dose x 5 days.	Not preferred; associated with hypertrophic pyloric stenosis in infants <1 month of age. If azithromycin is unavailable use 40–50 mg/kg per day in 4 divided doses x 14 days.	Not recommended.	Contraindicated in infants <2 months of age (risk for kernicterus).
1–5 months	10 mg/kg per day in a single dose x 5 days.	40–50 mg/kg per day in 4 divided doses x 14 days.	15 mg/kg per day in 2 divided doses x 7 days.	Contraindicated in infants <2 months of age. For infants aged $\geq 2$ months of age, TMP 8 mg/kg per day; SMX 40 mg/kg per day in 2 divided doses x 14 days.
Infants aged $\geq 6$ months 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 2–5 (maximum 250 mg/day).	See above. (maximum 2g/day)	See above. (maximum 1g/day)	See above.
Adolescents and adults	500 mg as a single dose on day 1 then 250 mg as a single dose on days 2–5.	2g/day in 4 divided doses x 14 days.	1g/day in 2 divided doses x 7 days.	TMP 320 mg/day, SMX 1600mg/day in 2 divided doses x 14 days.

\*Some experts prefer erythromycin estolate over erythromycin stearate or ethylsuccinate because it achieves higher serum levels with equal doses.

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

More materials on pertussis are available at: <http://www.cdph.ca.gov/HealthInfo/discond/Pages/Pertussis.aspx>