



# 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.

Infants <6 months of age:

- may have a shorter catarrhal stage
- may gag, gasp or stop breathing (apnea)
- may not “whoop”

Adolescents and adults are likely to have milder illness. Post-tussive vomiting is common in all ages.

**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.

## Modes of transmission

Transmission occurs by close contact via aerosolized droplets from the respiratory tracts of infected persons.

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

## 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 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*.

## Period of communicability

Persons with pertussis are most infectious during the catarrhal stage and up to 2-3 weeks after onset of paroxysmal cough if untreated. Untreated and unvaccinated infants can remain culture positive for >6 weeks. Communicability ends after 5 days of treatment.

## CDC case definitions

### Probable case

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

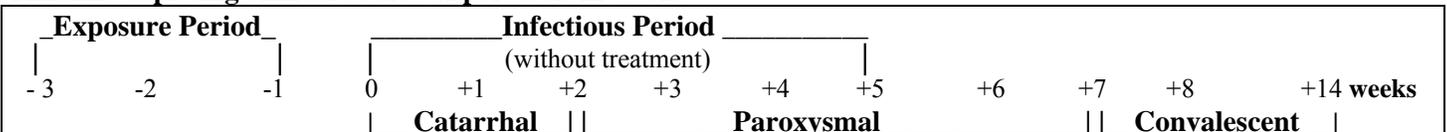
### Confirmed case

- 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.

## Case investigation and outbreak management

1. Confirm that the suspected case meets the case definition and/or is highly suspected.
2. Collect nasopharyngeal specimens for laboratory diagnosis (see laboratory testing information sheet).
3. Start antibiotic treatment of case and symptomatic contacts per recommendations on next page.
4. Identify and notify contacts. Emphasis should be given to identifying those at high risk for severe pertussis or those who may transmit the disease to persons at high risk for severe disease.
5. Recommend prophylaxis for contacts as appropriate. When recommended, prophylaxis should be implemented as soon as possible and within 21 days of exposure to infectious case.
6. Exclude cases from child care, school and extra-curricular group activities until 5 days of appropriate antibiotic therapy (or 21 days if no therapy).
7. Vaccinate all persons who are not up-to-date for pertussis vaccine, using Tdap for people  $\geq 10$  years of age who have not previously received it.
8. 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.
9. An outbreak is defined as  $\geq 2$  cases, with  $\geq 1$  culture-confirmed case. If outbreak confirmed, it is not critical to perform testing on persons meeting the clinical case definition who have an epi-link to a confirmed case.
10. Alert clinicians and educate the public as indicated.

## Timeline depicting clinical course of pertussis in weeks



## Control measures

- Vaccination of persons who are not up-to-date for pertussis provides long term protection but may not protect close contacts against the current exposure.
- Chemoprophylaxis of contacts within 2-3 weeks of cough onset of index case may limit transmission of pertussis in households and high risk settings (e.g., residential institutions, hospitals).

## Close contact definition

Those who have had direct contact with respiratory, oral or nasal secretions from a symptomatic case (catarrhal or paroxysmal stages), e.g., a cough or sneeze in the face, sharing food/eating utensils, kissing, or sharing a confined space in close proximity for a prolonged period of time ( $\geq 1$  hour) with a symptomatic case.

## High risk contact definition

Contacts at high risk for severe pertussis disease and adverse outcomes include: infants <6 months of age, particularly premature infants, pregnant or recently post-partum women, unimmunized infants and children, immunocompromised persons, persons with neuromuscular disease, persons who have severe underlying disease such as chronic lung disease or cystic fibrosis, or contacts who may transmit pertussis to a high risk person, such as healthcare workers.

## Post-exposure prophylaxis (PEP)

- People with the highest priority for chemoprophylaxis include: close contacts in household and child care settings; close contacts in a hospital setting; close contacts at high risk for severe disease and adverse outcomes; close contacts who may transmit disease to persons at high risk for severe disease; and close contacts in group settings where close interactions occur (e.g., after-school care groups, playgroups, groups of close friends, teammates, etc.).
- The AAP recommends chemoprophylaxis for all close contacts, regardless of age or immunization status. However, CDPH considers it reasonable to recommend PEP for contacts other than those listed above on a case-by-case basis based on length of time from the onset of illness in the case, cough frequency and severity in the case, type of exposure to the contact, risk status of the contact, and the setting.
- Non-household, non-high risk contacts who have not received chemoprophylaxis during a school or community outbreak should be monitored closely for symptoms for 21 days after the last exposure so that antimicrobial treatment/exclusion can be implemented immediately if catarrhal symptoms occur.
- Starting PEP  $\geq 3$  weeks after exposure to an infectious case is probably of no benefit to the contact.

## 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; 10 mg/kg per day in a single dose x 5 days	Not preferred; associated with hypertrophic pyloric stenosis in infants <1 month. 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 (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 For infants aged $\geq 2$ months, 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 2 g/day)	See above (maximum 1 g/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	2 g/day in 4 divided doses x 14 days	1 g/day in 2 divided doses x 7 days	TMP 300 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.

†TMX (trimethoprim) - SMX (sulfamethoxazole) can be used as an alternative agent to macrolides in patients aged  $\geq 2$  months who are allergic to, cannot tolerate, or are infected with a rare macrolide-resistant strain of *B. pertussis*.

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