Local Health Department Guidelines for the Epidemiological Investigation and Control of Pertussis

Maryland Department of Health (MDH)
Prevention and Health Promotion Administration (PHPA)
Infectious Disease Epidemiology and Outbreak Response Bureau (IDEORB)
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Introduction and Background

Pertussis, commonly known as whooping cough, is a contagious respiratory disease caused by the bacterium *Bordetella pertussis*. The illness is typically characterized by a prolonged paroxysmal cough that is often accompanied by an inspiratory "whoop." Disease presentation can vary with age and history of previous exposure or vaccination. Whooping cough can cause serious and sometimes deadly complications, particularly in babies and young children who haven't had all recommended pertussis vaccines.

This document was created to consolidate pertussis guidance found in different CDC resources for use by public health officials and partners involved in pertussis case investigations and outbreak response. The recommendations in this document are intended to provide general guidance. Pertussis cases and outbreaks should be evaluated on an individual basis, with the consultation of local and state health officials to determine the appropriate steps for pertussis prevention and control.

Questions regarding this document can be directed to:

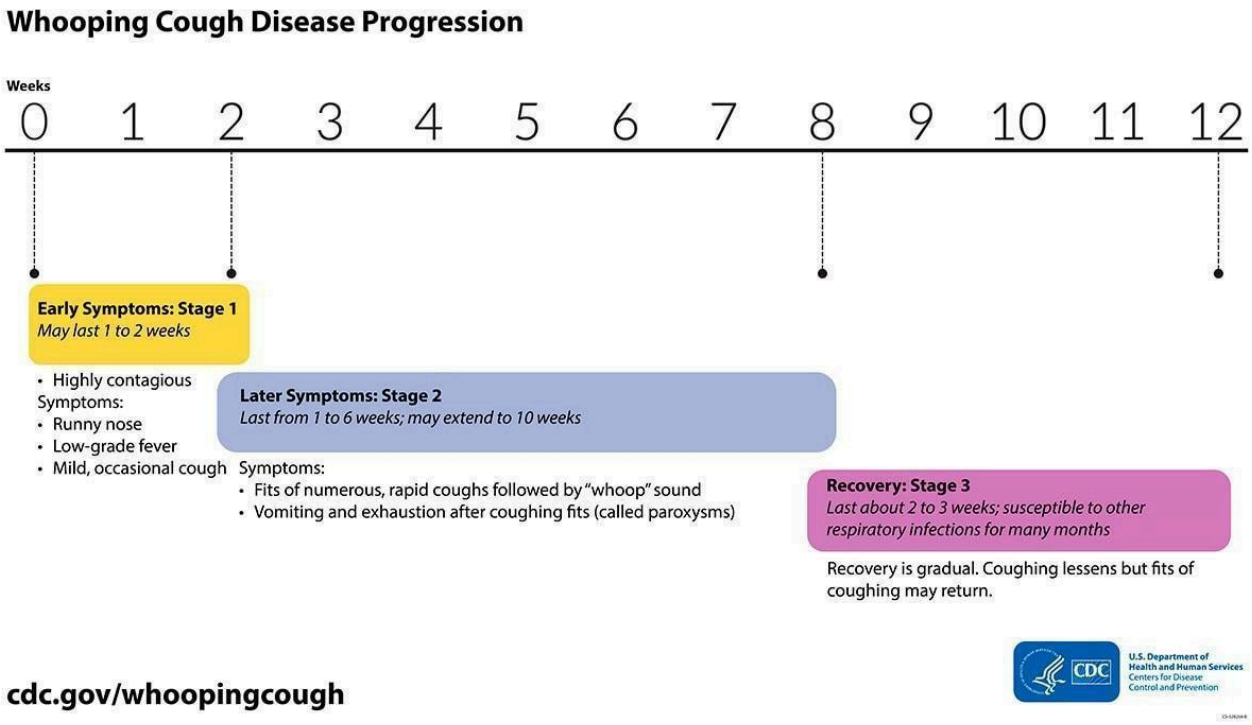
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Disease Description and Case Definition

Pertussis illness consists of 3 stages: catarrhal, paroxysmal, and convalescent. The entire course of illness is typically 6-10 weeks, although it may take young children and infants longer to fully recover.

The catarrhal stage (Stage I) begins with mild respiratory symptoms similar to the common cold, such as runny nose, sneezing, congestion, and/or mild coughing. Fever might also be present. Coughing gradually becomes more severe and frequent, and in the paroxysmal stage (Stage II), paroxysmal coughing (bursts of rapid coughing), often followed by an inspiratory "whoop" and/or post-tussive vomiting (vomiting after coughing), can last from 1 to 6 weeks. In the convalescent stage (Stage III), recovery is gradual. The cough becomes less frequent and usually disappears after an additional 2 to 3 weeks.

Pertussis may be difficult to diagnose in its early stages since symptoms resemble those of a common cold or other respiratory infection. Illness may also be difficult to recognize in infants younger than 6 months of age since they may have atypical symptoms such as apnea, gasping, and absence of whoop. Symptoms are often milder in adolescents, adults, and individuals who have received pertussis-containing vaccines.



Source: CDC.

The most common complication of pertussis is secondary bacterial pneumonia. Other potential complications include seizures and encephalopathy. Infants are at the highest risk for pertussis-associated complications, hospitalizations, and deaths.

CLINICAL CRITERIA

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; OR
- Inspiratory whoop; OR
- Post-tussive vomiting; OR
- Apnea (with or without cyanosis)

LABORATORY CRITERIA FOR DIAGNOSIS

Confirmatory laboratory evidence:

- Isolation of *B. pertussis* from a clinical specimen
- Positive Polymerase Chain Reaction (PCR) for *B. pertussis*

EPIDEMIOLOGIC LINKAGE

Contact with a laboratory-confirmed case of pertussis.

CASE CLASSIFICATION

- **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 following signs and symptoms:
      - Paroxysms of coughing, OR
      - Inspiratory "whoop," OR
      - Post-tussive vomiting, OR
      - Apnea (with or without cyanosis)

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

  Acute cough illness of any duration, with:
  - Isolation of *B. pertussis* from a clinical specimen, OR
  - PCR positive for *B. pertussis*

INCUBATION PERIOD

- 7 to 10 days with a range of 4 to 21 day

MODE OF TRANSMISSION

- Person-to-person via the respiratory route, when infectious respiratory droplets that have been expelled into the air through coughing/sneezing are breathed in by close contacts.

INFECTIOUS PERIOD

- Individuals are considered infectious from the onset of the catarrhal stage (Stage I) until 3 weeks after the onset of paroxysmal cough.
- Most infectious during the catarrhal stage (Stage 1)
- No longer considered infectious after 3 weeks of paroxysmal coughing or upon completion of 5 days of prescribed treatment with an antibiotic effective against pertussis

NOTE: Even though adolescents and adults may have milder symptoms, they can still transmit the disease to others. An infectious adult is often the source of infection for under-immunized or unimmunized infants and children.

Prevention

Vaccination is the most effective way to prevent pertussis infection.

- Children should get 5 doses of DTaP, one dose at each of the following ages: 2, 4, 6, and 15-18 months and 4-6 years.
- Adolescents 11-18 years of age (preferably at age 11-12 years) and adults 19 years of age and older who have never received a dose of Tdap should get one as soon as possible.
  - Tdap should be administered for this age group regardless of when the last time there was a tetanus or diphtheria toxoid-containing vaccine. This should be followed by either a Td or Tdap vaccine every 10 years.

- Pregnant women should receive a Tdap vaccination during each pregnancy, ideally during the early part of gestational weeks 27 through 36.
- For healthcare personnel who have direct patient contact, CDC recommends a single dose of Tdap for those who have never received it before and have direct patient contact.
- Any clinically significant events, unexpected events following vaccination, and/or events listed on the vaccine manufacturer's package insert, should be reported to Vaccine Adverse Event Reporting System (VAERS).
- For more information on pertussis vaccination, go to CDC Pertussis Vaccination Recommendations

Laboratory Tests and Specimen Collection

- Patients with signs and symptoms consistent with pertussis should be tested to confirm the diagnosis.
    - Culture and PCR are the preferred testing methods for pertussis diagnosis.
    - Blood tests (serology) are not the preferred method for diagnosing pertussis.
- Nasopharyngeal (NP) secretions are the best specimens for isolating the pertussis bacterium and diagnosing pertussis. Specimens should be collected as soon as possible after symptoms begin and, ideally, before antibiotic treatment.
    - A CDC training video for the collection of nasopharyngeal aspirate and swab specimens for pertussis testing is available at: https://www.youtube.com/watch?reload=9&v=zqX56LGItgQ.
- If pertussis testing has been performed at a hospital or commercial laboratory, specimens with positive results must routinely be sent to the MDH Laboratory for confirmation. These specimens do not require prior approval before sending.
- If testing has not been performed at a hospital or commercial laboratory, and initial testing is instead requested at MDH Laboratory, **MDH epidemiologists must approve pertussis testing before specimens are submitted to MDH Laboratory.** Such situations include if an LHD staff collects the specimen, or certain outbreak situations. Call 410-767-6700 during business hours to obtain approval. For urgent matters after-hours, call 410-795-7365.
- See Table 1 below, or the MDH Guide to Public Health Laboratory Services for more information on specimen collection and submission to the MDH Lab.
- Testing asymptomatic persons, including those identified as close contacts, should be avoided as it increases the likelihood of obtaining falsely positive results.

Table 1: MDH Laboratory Testing for Pertussis - Culture and PCR

*MDH Guide to Public Health Laboratory Services , starting on page 37.

	Culture	PCR
Time of specimen collection	Within 2 weeks of cough onset	Within 3 weeks of cough onset
Site of specimen collection	Posterior nasopharynx (NP swab)	
Method of collection	Nasopharyngeal specimen on Dacron™ swab in Regan-Lowe transport media.	
Specimen Identification	Specimens should be labeled with the patient's last and first name, patient's address, DOB, specimen type/source, and the date and time of collection. The specimen/sample must be properly labeled and match the test requisition or electronic test order.	
Turnaround time	7-10 business days	2-3 business days
Requisition	**MDH 4676 Form** Indicate specimen type using the "Specimen Code" on form.	
Package/Shipping/Transport	• Specimens must be packaged in a triple packaging system to ensure that under normal conditions of transport, they cannot break, be punctured or leak their contents (Refer to pages 9 & 10 for triple packing guidance). *Refer to current federal regulations for specific shipping requirements. • Best results are obtained by transporting specimens at room temperature the same day taken. If delays are expected (not transported the same day), place inoculated tubes into an incubator at 35-37°C. Cooled transport of the specimen significantly decreases the number of bacteria. Specimens should be shipped to: MD Department of Health Laboratories Administration, Central Laboratory 1770 Ashland Avenue, Baltimore, Maryland 21205	

Treatment

- Antimicrobial therapy administered during the catarrhal stage may reduce symptoms.
- Antimicrobial therapy is indicated before test results are received if the clinical history is strongly suggestive of pertussis or the patient is at high risk of severe or complicated disease (e.g., an infant).
- Azithromycin, clarithromycin and erythromycin are recommended antibiotics for pertussis treatment and for postexposure prophylaxis. Healthcare providers can also use trimethoprim-sulfamethoxasole. (Table 2)
- Penicillins and cephalosporins are **not** effective against *B. pertussis*.

Table 2: Recommended Treatment and Post-Exposure Prophylaxis, by Age Group

Source: [Red Book 2024-2027]

- 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.

Age	Recommended Drugs			Alternative
	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

Control Measures and Timing of Post-Exposure Prophylaxis

A **close contact** or **exposure** is defined as:

- Household contacts
- Someone who has had face-to-face contact with a symptomatic person
- Exposure within 3 feet, for at least an hour of a symptomatic person
- Contact with respiratory secretions (e.g., via cough, sneeze, sharing food utensils, mouth-to-mouth, nose/throat exam) of a symptomatic person

PEP is recommended for:

- All asymptomatic household contacts of a pertussis case within 21 days of onset of cough in the index patient.
- People at high risk of severe infection within 21 days of exposure to an infectious

pertussis case
    - Infants under 12 months of age
    - People with pre-existing health conditions that may be exacerbated by a pertussis infection, including, but not limited to people with immunocompromising conditions or moderate to severe medically treated asthma
- People in contact with those at high risk of severe infection within 21 days of exposure to an infectious pertussis case.
    - Pregnant women in their third trimester
    - All people in high-risk settings (e.g. neonatal intensive care units, childcare settings, maternity ward)

Individuals who have had close contact or exposure to a pertussis case patient but who do not fall into one of the above categories for which PEP is routinely recommended, should be advised to monitor for symptoms and to follow up with their health care provider regarding PEP.

Note that a broader use of chemoprophylaxis may be appropriate in limited closed settings, when the number of identified cases is small, and when a community-wide outbreak is not ongoing. However, when continued transmission of pertussis is evident, multiple rounds of antibiotics would not be recommended. Rather than repeating a course of antibiotics, contacts should be monitored for onset of signs and symptoms of pertussis for 21 days.

Reporting

The Code of Maryland Regulations (COMAR) 10.06.01 Communicable Diseases requires healthcare providers, hospitals, laboratories, and school and child care facility personnel to report cases of pertussis to the health department.

When reporting a case of pertussis, information should include:

- Identifying information (Name, DOB, address, telephone number)
- Demographic information (Age, sex, race, etc.)
- Clinical details, such as the date of illness onset and symptoms
- Laboratory results (if available)
- Vaccination status
- Risk factors
- Occupation
- Contacts for investigation and prophylaxis

Case and Outbreak Investigations

CASE INVESTIGATION

- Use the Pertussis Surveillance Worksheet (case report form) to guide the investigation.
    - Interview the case patient and make recommendations for testing and isolation.
        - If testing has been completed and is positive, coordinate to have specimens sent to MDH Laboratory for confirmation.
        - If testing has not been completed, obtain NP swab for PCR/culture (if not

already done)
        - Advise patient to isolate for the entire infectious period (21 days following onset of paroxysmal cough) or until completion of 5 days of appropriate antibiotic treatment.
        - Identify possible source (e.g. sick contacts, recent travel)
        - Determine vaccination status
    - Identify close contacts and implement control measures
        - Determine who index case had close contact with during their infectious period
        - Educate close contacts about pertussis symptoms, mode of transmission, and prevention.
        - Symptomatic contacts should isolate and be tested if positive, isolation may be discontinued when 5 days of an appropriate antibiotic are completed. If an antibiotic is not taken, isolation should continue for the entire infectious period.
        - Recommend PEP, as appropriate. See "Treatment" and "Control Measures and PEP" sections.

SPECIAL SETTINGS

In addition to the case investigation steps outlined above, the following steps should be taken in special settings where pertussis can be easily transmitted and/or where vulnerable populations are at risk.

- **Healthcare facilities**
    - All healthcare workers with unprotected exposure to a confirmed case of pertussis should receive post-exposure prophylaxis, regardless of their vaccination status.
    - Healthcare workers with unprotected exposure who cannot take, or decline antimicrobial therapy should be excluded for 21 days from last exposure.
    - Exposed staff with symptoms of pertussis should be tested, considered for treatment prior to test results, and excluded from work while results are pending. If they are not tested or test results are positive, they should be excluded for 21 days following the onset of paroxysmal cough or until they have completed 5 days of the recommended course of appropriate antibiotic treatment.
    - Assess the immunization status of all staff, including persons involved in direct patient care (e.g. nurses, physicians, phlebotomists) as well as other persons who work in the patient care setting (e.g. clerical staff, front office staff, technicians).
    - Ensure that those who are not fully immunized and do not have a medical contraindication are educated on the importance of staying up to date with an age-appropriate pertussis-containing vaccine. Offer vaccination when possible. Vaccination is not a substitute for chemoprophylaxis and is unlikely to prevent illness in a person who has already been infected with *B. pertussis*.

- **Schools and Childcare facilities**
    - Exposed students and staff with symptoms of pertussis should be tested. Consider treatment prior to test results. If the test is positive, exclude from school/childcare

until they have completed the first 5 days of appropriate antibiotic treatment. If testing is not done, and antibiotics for pertussis are not taken, in most situations, exclude from school/childcare for 21 days after last contact with the infected person.
    - Request that the school notify parents/guardians/staff that a pertussis case has been identified in the facility. A letter and pertussis fact sheet should be sent to notify and educate the community's members. The LHD should review the letter prior to sending.
    - Assess the immunization status of staff and students.
    - Ensure that those who are not fully immunized and do not have a medical contraindication are educated on the importance of staying up to date with an age-appropriate pertussis-containing vaccine. Offer vaccination when possible.

OUTBREAKS

- A pertussis outbreak is defined as 2 or more epidemiologically linked cases occurring within a 42-day period, AND at least 1 case is laboratory-confirmed.
  Note: Cases must come from two or more households for an outbreak investigation to be initiated. Outbreak investigations are not typically opened for events occurring in a private residential setting (e.g., a birthday party held in a home).
- Settings with a pertussis outbreak should conduct surveillance for at least 2 incubation periods (42 days) after the last reported confirmed case to ensure that all cases are identified before the outbreak investigation is closed. During this surveillance period, active screening (e.g., screening children at the door before they enter a child care setting) for individuals with symptoms compatible with pertussis can be considered. Specimen collection from symptomatic contacts should occur as soon as possible.

References

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Appendix - Sample Pertussis Notification Letter of Potential Exposure

Letterhead of LHD or Facility

Date

Dear Parent/Guardian/Teacher/Staff,

We are sending this letter to make you aware that a case of pertussis, commonly known as "whooping cough," has been reported in our community.

Whooping cough is a very contagious bacterial infection that spreads from person to person through coughing or sneezing. Symptoms may occur from 4 days up to 21 days after being exposed and usually start like a common cold (e.g., sneezing, runny nose) followed by a cough that may last for weeks to months. The cough may include coughing spells in which people can't catch
their breath, loud gasps ("whoop"), and vomiting.

Whooping cough vaccines (DTaP and Tdap) are the most effective way to prevent pertussis. However, immunity from vaccination decreases over time, so even people who have been vaccinated may still get whooping cough. Therefore, it is very important for everyone in the family to be up-to-date with DTaP and Tdap vaccinations.

Whooping cough can be treated with antibiotics. Without antibiotics, a person with whooping cough is considered to be contagious and can spread the disease to others for weeks.

Attached is a Pertussis Fact Sheet. If you/your child has signs or symptoms of pertussis illness, please contact your healthcare provider. If you/your child has been seen by a healthcare provider and been diagnosed with pertussis, please notify us immediately, and stay home until cleared by the health department.

If you or your healthcare provider has any questions, please contact (POC at facility/school/daycare) at (###-###-####) or the (local health department name) at (###-###-####).

Sincerely,

Name of Facility/School/Childcare and LHD

Revisions from February 2018 Local Health Department Guidelines for the Epidemiological Investigation and Control of Pertussis Manual

The information in this document has been consolidated and edited in an effort to make it more concise and focused on the information needed to effectively conduct case and outbreak investigations. This includes reorganization of sections headings and content, and removal of unnecessary or redundant tables/charts. Additionally, all links, tables, and references have been updated. Other significant revisions include:

- Updated CDC Surveillance Case Classification to 2020 version
- Changed infectious period to align with CDC language
- Edited Sample Pertussis Notification Letter of Potential Exposure