

Pertussis

CLINICAL CASE DEFINITION

For endemic or sporadic cases, a cough illness lasting at least 2 weeks with one or more of the following:

- ◆ paroxysms of coughing,
- ◆ inspiratory “whoop,”
- ◆ post-tussive vomiting, without other apparent cause (as reported by a health professional).

In outbreak settings a case may be defined as a cough illness lasting > 2 weeks.

Note: *B. pertussis* infection among adults covers a spectrum from mild cough illness to classic pertussis; infection also can be asymptomatic in adults with some level of immunity. When the presentation of pertussis is not classic, the cough illness can be clinically indistinguishable from other respiratory illnesses. Prolonged cough is a common feature of pertussis. In studies of adults with pertussis, the majority coughed for ≥ 3 weeks and some coughed for many months

CASE CLASSIFICATION

- ◆ Probable: Meets the clinical case definition, is not laboratory-confirmed, and is not epidemiologically-linked to a laboratory-confirmed case.
- ◆ Confirmed:
 - A person with an acute cough illness of any duration who is culture-positive; **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 case confirmed by either culture or PCR.

TRANSMISSION

Person-to-person through direct contact with respiratory fluids/discharges, or airborne respiratory fluid droplets.

INCUBATION PERIOD

Commonly 7-10 days, range 6-20 days. See [Pertussis Timeline](#), below.

PERIOD OF COMMUNICABILITY

From early in the catarrhal phase (the first 1-2 weeks of illness, characterized by minor upper respiratory tract symptoms similar to the common cold) to approximately 3 weeks after onset of cough; appropriate antibiotics courses will shorten communicability to 5 days from start of treatment.

REPORTING/INVESTIGATION

Health care providers should immediately report cases/suspect cases of pertussis to local health department serving the residence of the case.

Local health department responsibilities:

- ◆ Contact case/guardian and health care provider.
- ◆ Determine if case meets clinical case definition.

- ◆ If definition met (probable or confirmed cases), investigate using CDC surveillance worksheet and control guidelines below.
- ◆ Assist with coordination of specimen collection and coordination if public health lab resources (MDCH, CDC, etc) are used.
- ◆ Report/ensure reporting of case to the Michigan Disease Surveillance System (MDSS). [CDC Pertussis Surveillance Worksheet](#) CDC Pertussis Surveillance Worksheet may be helpful in field investigation to collect and capture data. Obtain immunization history information from provider record or MI Care Improvement Registry (MCIR - state immunization registry).
- ◆ Update the MDSS record in a timely manner with new or additional info as it becomes available. Finalize MDSS record when case investigation is complete.
- ◆ In the event of death, obtain and send copies of hospital discharge summary, death certificate, and autopsy report to MDCH Immunization Division, and complete the [CDC Pertussis Death Worksheet](#) -- MDCH personnel can assist.

LABORATORY CONFIRMATION

- ◆ Isolation of *Bordetella pertussis* from a clinical specimen, or
- ◆ Positive polymerase chain reaction (PCR) assay for *Bordetella pertussis*.

Whenever possible, suspected cases of pertussis should have a nasopharyngeal swab (or aspirate) obtained for bacterial culture or PCR analysis. The MDCH Laboratory offers pertussis PCR testing (and culture by special arrangement).

See [LABORATORY SPECIMENS: PROCEDURES AND CONSIDERATIONS](#), below, for additional information.

IMMUNITY/SUSCEPTIBILITY

Non-immunized persons should be considered susceptible.

Immunity from immunization wanes probably after a period of 7-10 years.

Natural disease confers immunity but does not appear to be permanent.

Children who have recovered from **documented** pertussis do not need additional doses of pediatric pertussis vaccine (but do need tetanus and diphtheria vaccine doses). **However**, Tdap vaccine is recommended when the child becomes age eligible. Satisfactory documentation of pertussis diagnosis includes isolation of *B. pertussis* on culture or typical symptoms and clinical course when these are epidemiologically linked to a culture-confirmed case, as may occur during outbreaks. When such confirmation of diagnosis is lacking, pertussis vaccination should be completed because cough illness thought to be pertussis may be caused by other *Bordetella* species, other bacteria, or certain viruses.

Currently licensed pertussis vaccines are not approved for persons 7 – 9 years of age or for persons over 64 years of age.

CONTROL MEASURES

- ◆ Investigate reports of possible pertussis immediately.

- ◆ If clinical case definition is met, regard as a true pertussis case.
- ◆ Cases should receive antimicrobial treatment to help limit spread of the disease to others and should be excluded and isolated from group activity settings (e.g. schools, day-care centers, work place, camps, etc.) until they have received at least 5 days of an appropriate course of antibiotics for pertussis (generally the macrolide agents erythromycin, clarithromycin, or azithromycin; see [table of Recommended Antimicrobial Agents](#) below for further details). In health care settings, use of Droplet Precautions is recommended.
- ◆ Identify exposed close contacts, including household contacts, child care contacts, etc.
Note: Patients with pertussis are highly infectious; attack rates among exposed, nonimmune household contacts are as high as 80%–90%
- ◆ Administer course of antibiotics to close contacts **within three weeks of exposure**, especially in high risk settings.
- ◆ Household and other close contacts should be treated prophylactically with appropriate antimicrobial therapy. The recommended antimicrobial agents and dosing regimens for postexposure prophylaxis are the same as those for treatment of pertussis; see [table of Recommended Antimicrobial Agents](#) below for further details.
 - Defining “close contacts” outside the household is especially challenging. Therefore, outside household environments, the risk for secondary transmission of pertussis should be evaluated on a case-by-case basis and decisions to recommend prophylaxis should be based on infectiousness of the case, transmission setting, risk for transmission to others, and risk status of the contacts.
 - Specific definitions of a contact for purposes of pertussis control are problematic and will vary according to the situation. Transmission can be expected with the following situations:
 - ◆ Direct face-to-face contact for a period (not defined) with a case-patient who is symptomatic (e.g., in the catarrhal or paroxysmal period of illness);
 - ◆ Shared confined space in close proximity for a prolonged period of time, such as >1 hour, with a symptomatic case-patient; or
 - ◆ Direct contact with respiratory, oral, or nasal secretions from a symptomatic case-patient (e.g., an explosive cough or sneeze in the face, sharing food, sharing eating utensils during a meal, kissing, mouth-to-mouth resuscitation, or performing a full medical exam including examination of the nose and throat).
- ◆ Use of vaccine in disease control
 - **Children under age 7**
The immunization status of all contacts under 7 years of age should be assessed. All contacts ≤6 years of age who are not up-to-date with DTaP/DTP should be brought up to date with doses of DTaP using the minimal recommended intervals. If the child has had three doses of DTaP or DTP, is ≥12 months of age, and ≥6 months have passed since the third dose of DTaP or DTP, then a fourth dose of DTaP should be given. If the child has had four doses

of DTaP or DTP, is 4 - 6 years of age, and received the fourth dose before the 4th birthday, then the fifth dose of DTaP should be given.

- **Persons age 10 – 64 years**
Tdap vaccine is routinely recommended as a single dose booster at 11-12 years of age and is also recommended for adults to replace a single dose of Td in the 10 year booster series. Boostrix® is approved for 10 -18 years of age, Adacel® is approved for 11 – 64 years of age. Persons in these age groups who are close contacts to a pertussis case and who have not received Tdap should receive a dose of Tdap.
- In general, adults who have or who anticipate having close contact with an infant <12 months of age (e.g., parents, grandparents <65 years of age, childcare providers, health-care workers) should receive a single dose of Tdap.
 - ◆ An interval of 2 years or more since the last dose of tetanus toxoid-containing vaccine is suggested; a shorter interval can be used.
 - ◆ Ideally, Tdap should be given at least one month before beginning close contact with the infant.
 - ◆ Women should receive a dose of Tdap in the immediate post-partum period if they previously have not received Tdap.
 - ◆ Any woman who might become pregnant is encouraged to receive a single dose of Tdap.
- Pertussis vaccines have not been specifically recommended for post-exposure prophylaxis, but may be considered in outbreak or control situations. For details see ACIP recommendations at <http://www.cdc.gov/vaccines/pubs/acip-list.htm> (scroll to ACIP Tdap Vaccine Recommendations).
- Vaccines are not currently licensed for persons 7- 9 years of age and persons >64 years of age.
- ◆ Provide information about pertussis to persons at risk and/or the general public. An excellent Question-&-Answer [pertussis information sheet](#) in .PDF format is available from the Immunization Action Coalition.

LABORATORY PROCEDURES AND CONSIDERATIONS

Cases of pertussis should be confirmed by laboratory testing whenever possible. Acceptable tests are bacterial culture and PCR. Culture is considered the standard and preferred test; it is specific for a diagnosis of pertussis, but is somewhat insensitive due to fastidious growth requirements of the organism. Culture is the only method that allows evaluation of antimicrobial resistance and molecular typing of organism strains.

PCR methods are becoming widely available; positive results are considered confirmatory **if** the illness meets the clinical case definition (see above). However, false positives are a common problem. CDC recommends culture whenever PCR is performed.

Specimens should be obtained from the posterior nasopharynx, **not** the throat; see [Collection of NP Swab Diagram](#), below. For culture either Dacron or calcium alginate swabs may be used; for PCR only Dacron swabs are recommended. Cotton swabs should **not** be used for either culture or PCR.

Direct fluorescent antibody (DFA) testing of nasopharyngeal specimens should **not** be used for laboratory confirmation due to limited specificity, but can be used for screening.

Serology is **not** recommended for lab confirmation of pertussis.

The MDCH Laboratory offers bacterial culture and PCR analysis. Culture is performed only by special arrangement. PCR is routinely performed because it offers greater sensitivity compared to culture. Additional information from MDCH Bureau of Laboratories available at http://www.michigan.gov/documents/LSGBordetella_pertussis_Culture_8242_7.doc

Pertussis Culture and/or PCR:

Purpose: To confirm a case of pertussis.

Specimen needed: Nasopharyngeal swab.

MDCH lab kit: Unit 15

Specimen container: Culture swab in Regan Lowe transport medium.

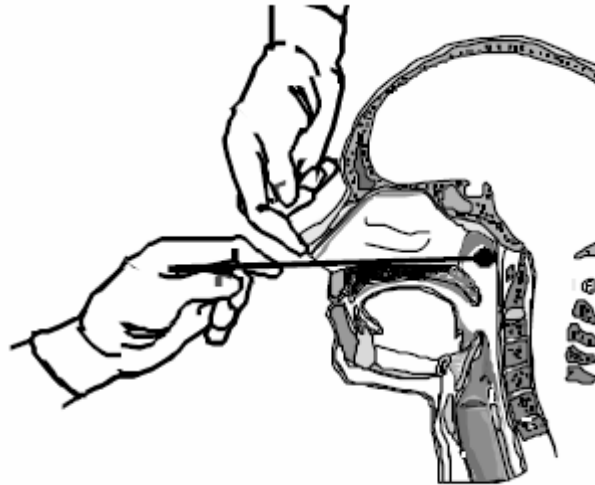
MDCH test requisition form: [DCH-0583](#)

MDCH Test Codes: Culture 0450 PCR 0750

Specimen collection/submission procedure - Nasopharyngeal swab for culture or PCR:

- ◆ If possible, obtain specimen during the catarrhal stage of illness (generally first 1- 2 weeks of cough), before paroxysmal coughing starts.
- ◆ Dacron swabs (on aluminum or plastic shafts) are recommended. Tilt patient's head back, press nose slightly back and up to facilitate swab entry and passage into nostril; gently insert swab into nostril and continue slowly until it reaches the back of the nasopharynx; ideally the swab should be left in the posterior pharynx for about 10 seconds, then slowly and gently remove the swab and re-place in the container tube, following additional directions on tube label. See [Collection of NP Swab Diagram](#) below.
- ◆ Label tube with patient's name, type of specimen, and date collected.
- ◆ Ship specimen via overnight delivery on cold pack to arrive within 24 hours (refrigerate specimen if it cannot be shipped within 2 hours).
- ◆ Send specimens to:
Michigan Department of Community Health
Bureau of Laboratories DASH Unit
3350 N. Martin Luther King Blvd.
Building 44, Room 155
Lansing, MI 48909

Diagram: Collection of nasopharyngeal swab



Recommended antimicrobial agents for the treatment and postexposure prophylaxis of pertussis: 2005 CDC guidelines.

TABLE 4. Recommended antimicrobial treatment and postexposure prophylaxis for pertussis, by age group

Age group	Primary agents			Alternate agent*
	Azithromycin	Erythromycin	Clarithromycin	TMP-SMZ
<1 month	Recommended agent. 10 mg/kg per day in a single dose for 5 days (only limited safety data available.)	Not preferred. Erythromycin is associated with infantile hypertrophic pyloric stenosis. Use if azithromycin is unavailable; 40–50 mg/kg per day in 4 divided doses for 14 days	Not recommended (safety data unavailable)	Contraindicated for infants aged <2 months (risk for kernicterus)
1–5 months	10 mg/kg per day in a single dose for 5 days	40–50 mg/kg per day in 4 divided doses for 14 days	15 mg/kg per day in 2 divided doses for 7 days	Contraindicated at age <2 months. For infants aged ≥2 months, TMP 8 mg/kg per day, SMZ 40 mg/kg per day in 2 divided doses for 14 days
Infants (aged ≥6 months) and children	10 mg/kg in a single dose on day 1 then 5 mg/kg per day (maximum: 500 mg) on days 2–5	40–50 mg/kg per day (maximum: 2 g per day) in 4 divided doses for 14 days	15 mg/kg per day in 2 divided doses (maximum: 1 g per day) for 7 days	TMP 8 mg/kg per day, SMZ 40 mg/kg per day in 2 divided doses for 14 days
Adults	500 mg in a single dose on day 1 then 250 mg per day on days 2–5	2 g per day in 4 divided doses for 14 days	1 g per day in 2 divided doses for 7 days	TMP 320 mg per day, SMZ 1,600 mg per day in 2 divided doses for 14 days

*Trimethoprim sulfamethoxazole (TMP–SMZ) can be used as an alternative agent to macrolides in patients aged ≥2 months who are allergic to macrolides, who cannot tolerate macrolides, or who are infected with a rare macrolide-resistant strain of *Bordetella pertussis*.

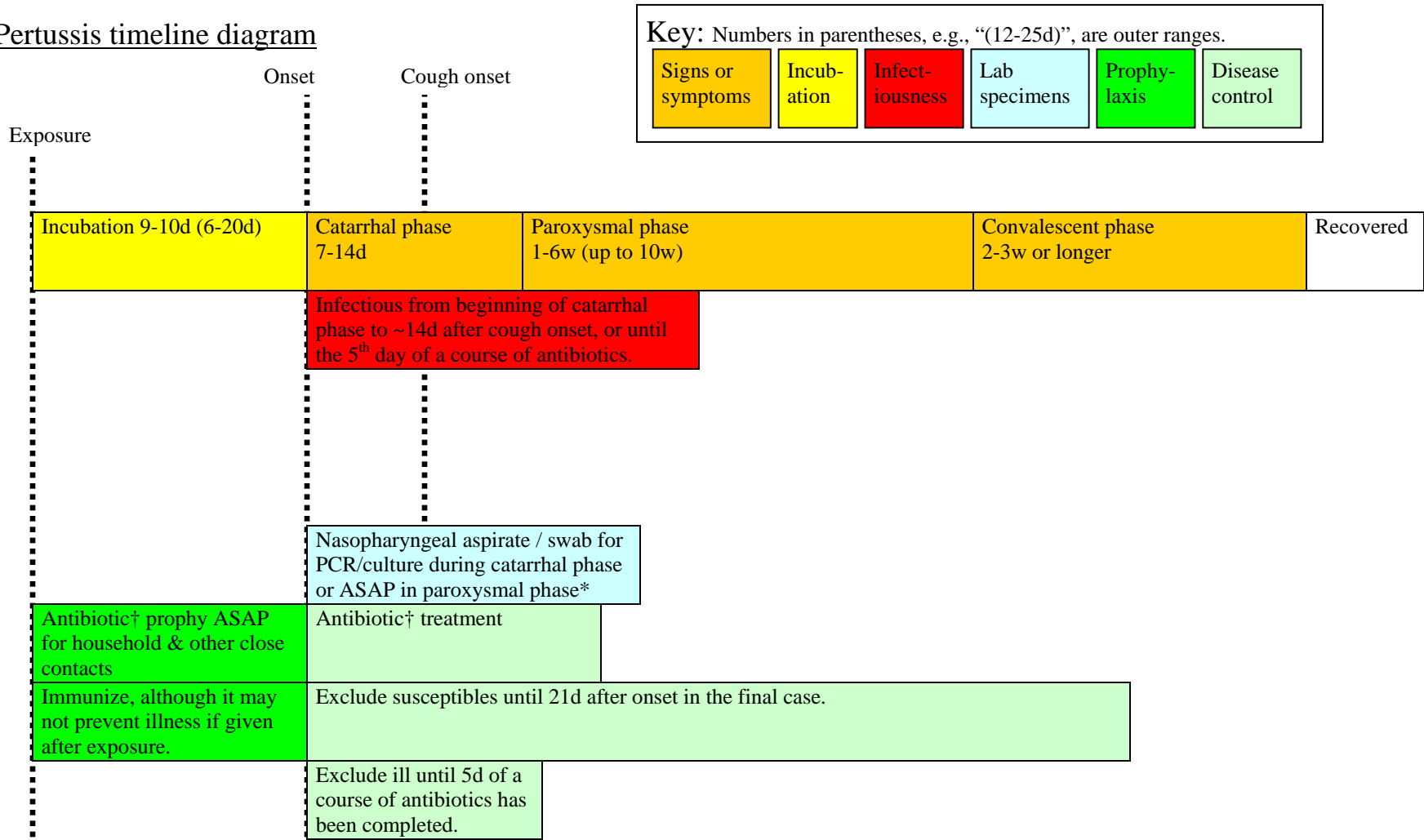
Source: Centers for Disease Control and Prevention. Recommended antimicrobial agents for the treatment and postexposure prophylaxis of pertussis: 2005 CDC guidelines. MMWR 2005;54(No. RR-14):1-13.

Available for on-line viewing and downloading at

http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5414a1.htm?s_cid=rr5414a1_e#tab4



Pertussis timeline diagram



* Serology for pertussis is unreliable. PCR or culture is preferred if at all possible. MDCH laboratories do not do pertussis serology.
† Cases and contacts should receive a 14d course of macrolide (erythromycin, azithromycin, or clarithromycin) or appropriate alternate (eg. trimethoprim-sulfamethoxazole) for treatment/prophylaxis, regardless of immunization status.

Sources: Control of Communicable Diseases Manual, Red Book, Pink Book, CDC VPD surveillance manual, CDC Recommended antimicrobial agents for the treatment and postexposure prophylaxis of pertussis: 2005 CDC guidelines.